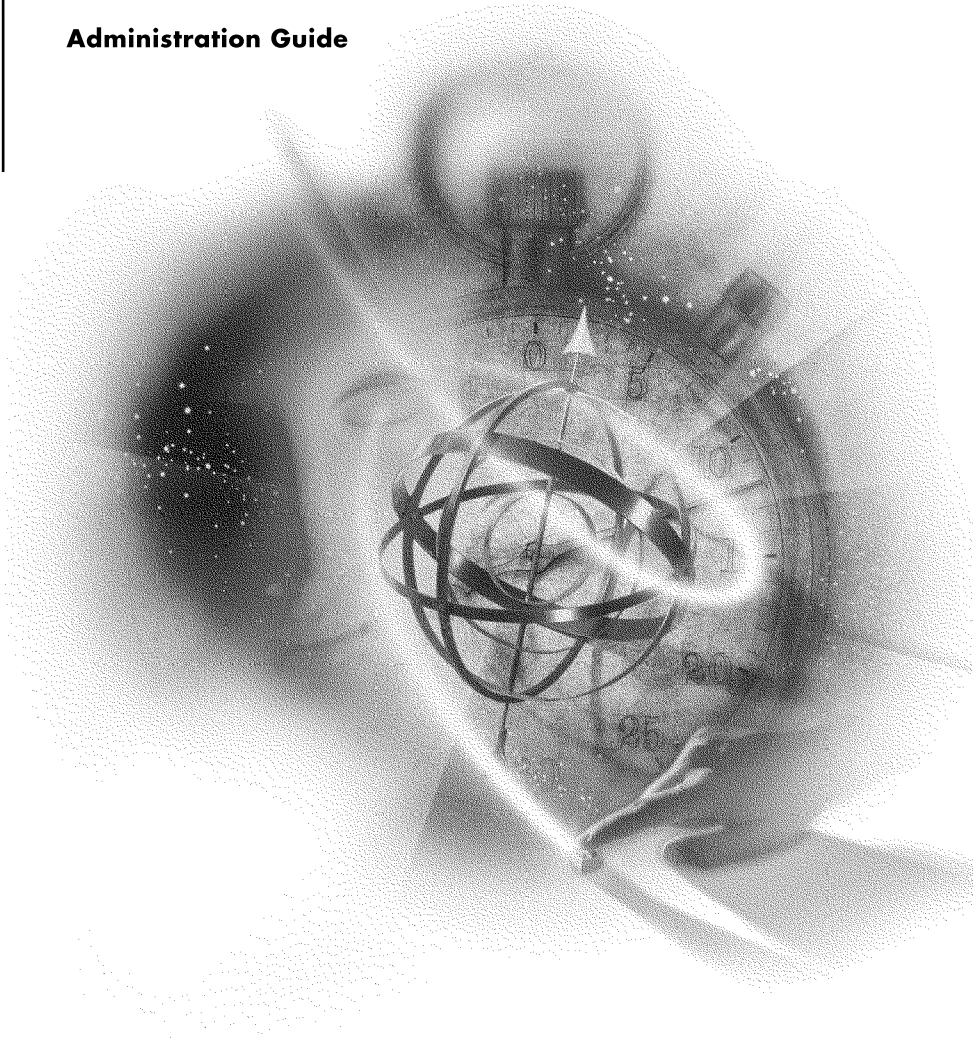

Backup and Restore Services

Administration Guide



NetWare[®] 5.1
NETWORKING SOFTWARE

Novell[®]

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Storage Management Services (SMS)

Storage Management Services (SMS) is a collection of software programs by Novell® that provides backup and restore services. These services are performed by a collection of components that are independent of operating systems and hardware.

SMS Components

- ♦ Storage Management Engine (SME) backs up and restores operations. Enhanced SBACKUP is a basic SME for NetWare® 5.
- ♦ SMDR (Storage Management Data Requester) communicates between the backup program and Target Service Agent™ (TSA™) software.
- ♦ Storage device interface communicates between the SME and the storage devices.
- ♦ Device drivers controls the behavior of the storage devices.
- ♦ Target Service Agents (TSAs) passes requests and commands between the SME and server or NDS® database, and prepares the data for the SME.
- ♦ TSAProxy registers the workstation with the host server.

Enhanced SBACKUP for Backup and Restore Sessions

Enhanced SBACKUP allows backups of SMS Targets such as NDS™, binderies, the file system, or an individual workstation's hard disk onto media that can be stored off-site. If you have a hardware failure, natural catastrophe, corrupted data, or incorrectly deleted or changed data, you can recover a previous version of the data.

Enhanced SBACKUP retrieves and reinstates backed up data. The restore session produces the requested data, which is retrieved from the storage media and restored to the location you specify. During a restore session, Enhanced SBACKUP reads the backup storage media and the Target Service Agent compares the media data set to the existing hard disk data set.

1

Understanding

Backup services is an essential piece of Novell®'s Storage Management Services™ (SMS™), a collection of services that provide backup, restore, and data migration. These services are performed by various components and are independent of operating systems and hardware.

Future enhancements will allow SMS to back up databases such as Oracle* as well.

Backup is grouped according to the following topics:

- ♦ **Backup services** provides information on supported devices, the SMS architecture, memory requirements, types of backup offered, customizable options, schedules, how to back up NDS®, how to back up the file system (both legacy NetWare® file system and Novell Storage Services), and how to use Target Service Agents™ (TSA™).
- ♦ **Restore services** provides information on how SMS restores data from NDS, volume Sys and other volumes, single servers, multiple servers, and the NDS tree structure.
- ♦ **Error and log files** discusses the files that are created during backup.

Backup Services

Storage Management Services (SMS) allows you to back up SMS targets such as NDS, binderies, the file system, or hard disks on individual workstations to media such as a tape drive for off-site storage, and gives you a periodic view (daily, weekly, monthly) of your data. Then in case of hardware failure, natural catastrophe, corrupted data, or incorrectly deleted or changed data, you can retrieve a previous version of the data.

The following SMS components are also illustrated in “Overview of SMS” on page 13:

- ♦ **Storage Management Engine (SME)** for backup and restore operations. Novell provides the Enhanced SBACKUP utility as a basic SME for NetWare.

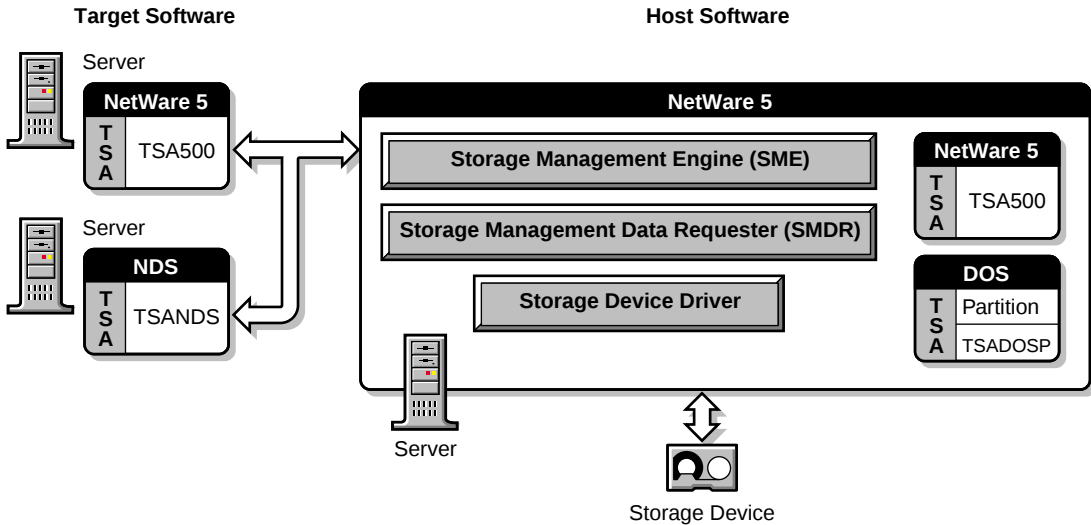
See “Storage Management Engine (SME)” on page 14 for information.

- ♦ **Storage Management Data Requester (SMDR)** for passing communication between the backup program and the Target Service Agent (TSA) software.
- ♦ **Storage device interface** is used to pass information between the SME and the storage device.
- ♦ **Device drivers** are used to control the behavior of the storage devices.
- ♦ **Target Service Agents (TSAs)** pass requests and commands between the SME and server or NDS database, and prepare the data for the SME. The TSA500 must be loaded on the server where the file system data is to be backed up.

See “Target Service Agents (TSAs)” on page 27 for more information.

- ♦ **TSAProxy (TSADOS for DOS workstation)** is used to register the workstation with the host server. TSAProxy also identifies and keeps track of the stations waiting to be backed up. It receives I am here messages from workstations available to be backed up. The TSAProxy keeps the names of these workstations in an internal list and displays the list, allowing you to select a target for a backup or restore procedure.

Figure 1 Overview of SMS



The Enhanced SBACKUP process involves two machines:

- ♦ The host server (the NetWare server where the backup program resides)
- ♦ A target device (the NetWare server that contains the data to be backed up or restored)

Enhanced SBACKUP can also be loaded and used on one machine.

Enhanced SBACKUP uses an application on the host server to communicate with modules on target devices. The application reads the information from the target device and sends it to a storage medium, such as a tape drive.

Supported Storage Devices and Drivers

The NetWare 5 version of the Enhanced SBACKUP utility supports 0.25-inch, 4mm, and 8mm storage devices. If you are using 4mm tape, use only DDS (Digital Data Storage)-certified, computer-grade tapes. We recommend that you pretest your storage devices before you begin backup.

IMPORTANT: To ensure reliable operations, pretest all media storage devices that are not Novell certified with the appropriate NetWare device driver and Enhanced SBACKUP backup and restore utility.

Use the driver files recommended by your hardware manufacturer.

Storage Management Engine (SME)

Storage Management Engine (SME) is central to the SMS architecture. The SME communicates with the network clients to back up and restore information.

The new backup engine, Enhanced SBACKUP, has three modules:

- ♦ Engine
- ♦ Q Manager (QMAN)
- ♦ User interface

The following figure shows how the SME works.

Figure 2 Block Diagram of the SME

Q Manager facilitates multiple job scheduling plus other features. Loading Q Manager automatically loads the backup engine. The user interface can be loaded after you load the Q Manager. See “Setting Up” on page 37 for information on Q Manager.

Memory Requirements

To run Enhanced SBACKUP, the host server requires

- ♦ A minimum of 3 MB free memory
- ♦ Memory required to run NetWare 5 (currently 48 MB)
- ♦ Memory required to run the clients

If 3 MB of memory is not available, try setting the storage buffers lower than the default and still run Enhanced SBACKUP. For memory and buffer settings, see “Changing the Size and Number of Buffers” on page 103.

Backup Files

Each backup session produces three types of files:

- ♦ **Data files** are copied to the selected storage media.
- ♦ **Log files** are produced by the engine while backing up. Log files are placed in a directory on the host server and accessed through the Enhanced SBACKUP Main Menu or on a Windows 95 or Windows NT client using NWBACK32.
- ♦ **Error files** are produced by the engine while backing up. Error files are placed in a directory on the host server and accessed through the Enhanced SBACKUP Main Menu or on a Windows 95 or Windows NT client using NWBACK32.

Both log and error files contain information such as the date, time, and media identification for a session, but the error file also contains a list of any errors that occurred during the backup session, such as files that were not backed up. (See “Log and Error Files” on page 92 for more information on these files.) The log and error files are labeled with the same description you give the session.

Backup Types

Enhanced SBACKUP has three types of backup sessions:

- ♦ **Full backup** —Backs up the entire file system of the selected target regardless of whether the data has changed since the last backup, and clears the Modify bit after the backup.
- ♦ **Differential backup** —Available only for the file system; backs up only data that has been changed since the last full or incremental backup. When you perform a differential backup, the modify bit is not cleared after the backup. All files modified since the last full backup are included in the backup (unless they have been deleted). Each differential backup uses more media and is slower than an incremental backup because it backs up more files.

IMPORTANT: Do not interchange differential backups and incremental backups. If you do, the differential backup will not contain all changes since the last full backup. Use full backups interspersed with differential backups or full backups interspersed with incremental backups.

- ♦ **Incremental backup** —Available only for the file system; backs up only data that has been changed since the last full or incremental backup (whichever was last). Incremental backup sessions back up only files that

have the modify bit set (that is, files that changed since the last full or incremental backup session when the modify bit was cleared).

Customize Your Backup

All backup types contain advanced options to allow you to customize your backup. These options allow you to

- ♦ Choose subsets of data to back up.

You can choose specific subsets of a data set to exclude from or include in the backup session by selecting major resources, such as volumes, files, directories, or path.

- ♦ Specify how to scan what you are backing up.

Exclude and Include Options

Whenever you perform a custom backup or restore, you can use the exclude and include options to select subsets of what you want to back up.

Whether you use exclude or include usually depends on the size of the data you want to back up, compared to the size of the data you do not want to back up.

Exclude

To back up most of the file system structure or NDS tree structure while omitting only a small part, use the exclude option to omit the part you do not want to back up. Everything that you do not specifically exclude is included.

After you exclude part of the structure such as a volume, directory, or container, you cannot include any subdirectories, files, or objects beneath that excluded volume, directory, or container.

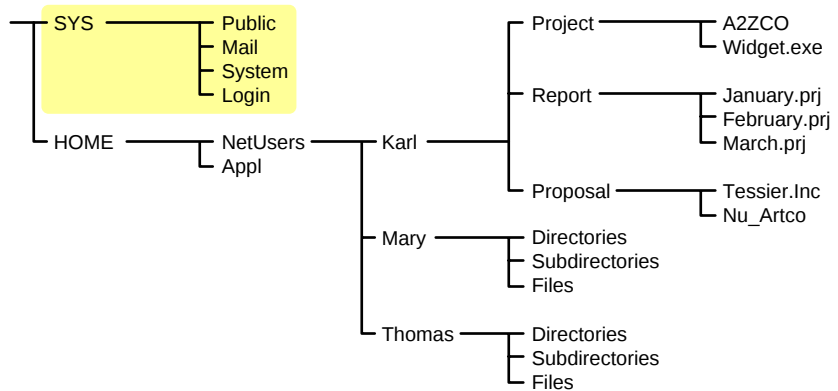
Include

To back up a small part of the file system structure, use the include option to specify the data you want. Everything you do not specifically include is excluded.

When you select only part of the file system structure to include (such as a volume), all directories, subdirectories, and files under that selection are included in the backup by default.

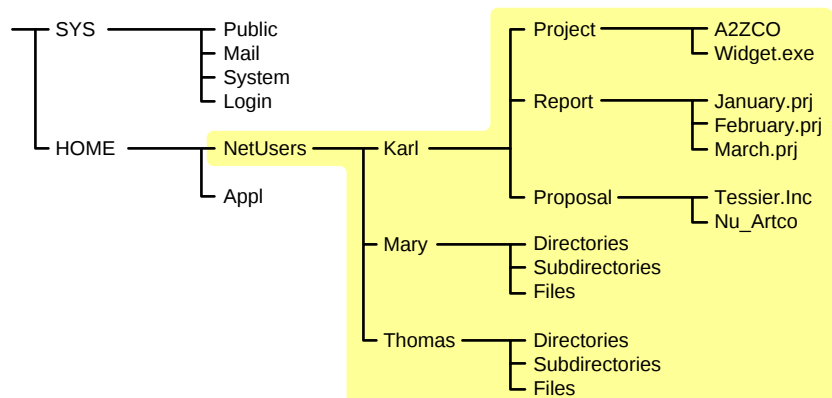
Figure 3 on page 17 illustrates this use of the include option. In the next figure, volume Sys is selected as an include option. All other areas of the file system structure are excluded from the backup. You can exclude some subdirectories or files beneath your selection if necessary.

Figure 3 Include Option: Specific Volume Included, All Others Excluded



The same principle applies when you specify a directory with the include option. Figure 4 on page 17 shows that all directories, subdirectories, and files under the NetUsers directory are included in the backup. All other areas of the file system structure are excluded from the backup.

Figure 4 Include Option: Specific Directory Included, All Others Excluded



The reverse is true when you select a major TSA resource, a directory, or a file as an exclude option. All other areas of the file system structure are included in the backup.

Combining Include and Exclude Options

By combining the include and exclude options, you can control what is backed up.

For example, the following command sequence results in volume HOME being included in the backup with the exception of the MARY directory and the widget.exe file.

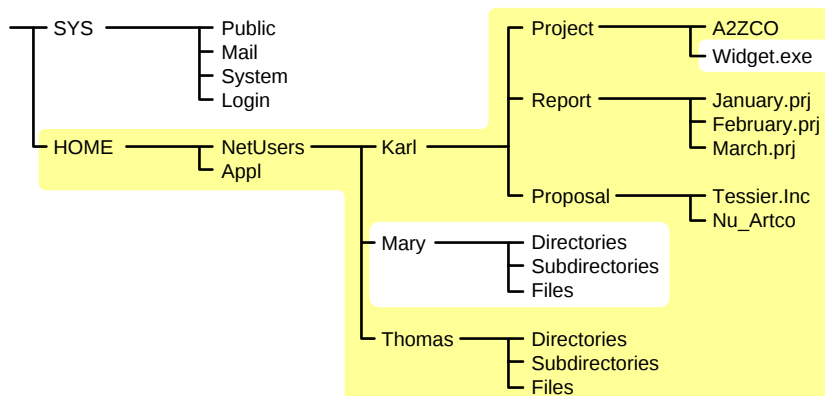
Include major TSA resources HOME:

Exclude directories (full path): HOME:NETUSERS/MARY

Exclude path/files HOME:NETUSERS/KARL/PROJECT/WIDGET.EXE

Figure 5 on page 18 illustrates this example.

Figure 5 Combining Enhanced SBACKUP Include and Exclude Options



Scan Data Sets

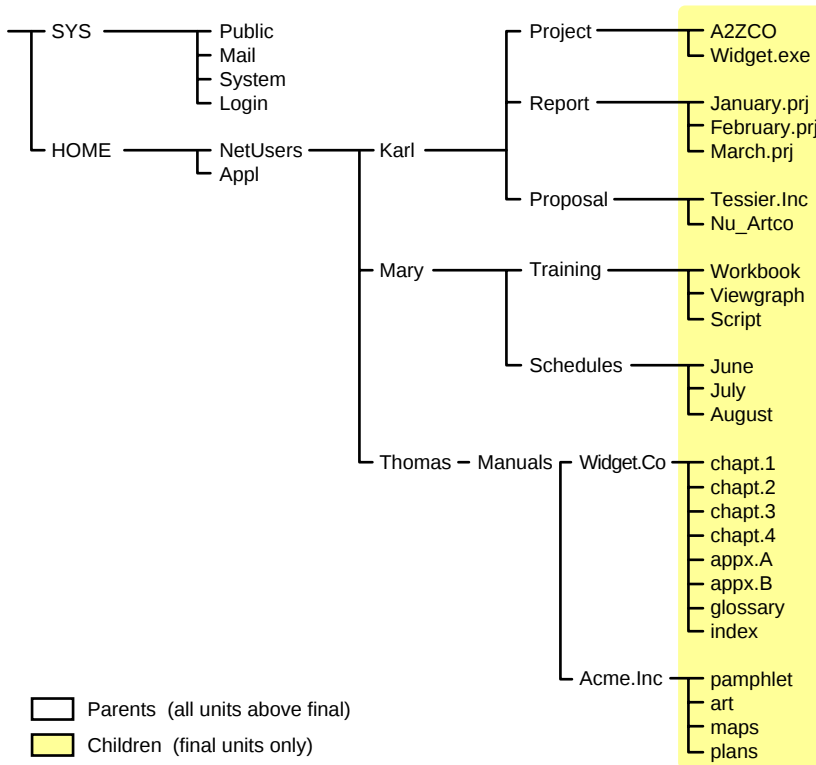
You can specify a different type of data set to be scanned.

A data set is a group of data that can be manipulated by Enhanced SBACKUP. Each data set in the file system structure can be classified as a parent or a child, and each class includes different types of data items.

Within Enhanced SBACKUP, a parent might be a server, NDS, a volume, or a directory. A child is a file, which is the lowest level of the directory structure.

As shown in Figure 6 on page 19, the unit below a parent is not necessarily a child; it might be another parent, or the line might end with the parent. The unit above a child must always be a parent.

Figure 6 Parent and Child Levels in a File System



Items in a data set for either a parent or child should be items that do not frequently change. You might choose to exclude from the backup session one or more items in the data set of your target.

Overwriting a Parent or Child

Enhanced SBACKUP allows you to overwrite all existing parents or children. Children can be overwritten only if the date on the data set on the hard disk is more recent than the date of the data set backup.

Backup Logbook

Keep a hard copy log of your backups in case your online log and error files become corrupted. The log should contain the following information:

- ♦ Source backed up (such as the server or workstation name)
- ♦ Full path for session log and error files directory
- ♦ Full path for backed-up data
- ♦ Label of the media on which the backup is stored
- ♦ Description of the session
- ♦ Name or initials of the person performing the backup
- ♦ Date and time of the backup session

Backup Schedules

Before you begin backup procedures, plan a backup schedule based on your needs. Consider such factors as the number of users and frequency of changes to files.

You can perform different types of backups on different schedules:

- ♦ **Daily** —Perform an incremental or differential backup after the close of business. If revisions are heavy and rapid, consider several backup sessions each day.
- ♦ **Weekly** —Perform an incremental or differential backup after the close of business on the last day of the week for three of the four weeks in the month.
- ♦ **Monthly** —Perform a full backup on the last business day of the month (for example, the last Friday).
- ♦ **Major changes** —Perform a full backup before and after you change your configuration, and before and after you upgrade your server to a new version of NetWare.
- ♦ **Application changes** —Perform a custom backup before and after you modify applications.

Prepare to Back Up

Before you back up, consider the following:

- ♦ What should be backed up

- ♦ What to back up
- ♦ Backup type
- ♦ Who should back up
- ♦ When to back up
- ♦ How to prepare for a backup
- ♦ How to track backup

Careful planning can help you minimize the impact of data loss. Track backups by keeping a manual log of all backups in which you record the following:

- ♦ Date
- ♦ Backup type
- ♦ Contents
- ♦ Media identification

HINT: For the most complete backup, schedule a backup session when the fewest files are open. Enhanced SBACKUP does not back up open files.

In addition, do the following to prepare for the backup session:

1. Determine the appropriate backup type
2. Perform preliminary backup steps

Backup Types

Each type of backup has a different effect on the backup and restore process. When planning your backup schedule, consider all of the following variables before determining which schedule is right for you.

Media usage and backup speed. This helps increase the speed of the restore.

Restoring after incremental backups. If you have performed full and incremental backups and need to restore data, you must restore the last full backup as well as all subsequent incremental backups.

Restoring after differential backups. If you have performed full and differential backups and need to restore data after an unexpected loss, restore only the last full and differential backup.

Backups and NDS

The best way to protect your NDS database is to use replicas. Replication, however, is not sufficient protection for a single server network or when all copies of the replicas are destroyed or corrupted. In these instances, if the NDS data has been backed up regularly, the NDS tree structure can be restored using SMS.

You can back up the entire tree or a selected section of the tree starting with a particular container. You can back up the schema and schema extensions. Trustee assignments are backed up as part of the file system.

You cannot back up partition information. If the NDS tree structure becomes corrupted and you restore the NDS data, all data is restored to one partition, [Root]. You need to repartition that portion of the tree.

It is important that you keep a written copy of the tree structure and the partitions. You can use the dsmisc.log file that is backed up with the file system as part of the server-specific information.

Distributed Database

The network of servers that comprise an NDS tree structure continually exchange updates and other time-sensitive information. The NDS database exists as a set of files that are stored in the Sys volume, and are hidden so they are not accidentally tampered with or deleted.

The NDS database files cannot be backed up, as was the case with bindery files in NetWare 3.12™ or earlier versions.

Server Interdependence

NDS is not server-centric, and neither are its backup and restore processes. Backing up NDS, for example, backs up data that is spread out over multiple servers. SMS Directory database backups gather all the necessary NDS data.

To handle the necessary links and dependencies between objects, the backup and restore system must be able to navigate the entire NDS tree structure.

Object ID Numbers

In NetWare, a random ID number is assigned when an object is created. NetWare uses object ID numbers to keep track of information such as users' trustee rights to directories and files in the file system. These object ID

numbers are stored in the directory entry table (DET) of each file and directory and are server-centric.

When NetWare is backed up, SMS-compatible products store the objects' *fully distinguished names* on the backup media, not the objects' ID numbers. If an object with the same distinguished name as on the backup media already exists in the NDS tree structure, its object ID is not overwritten during a restore. If an object with the same name does not already exist in the NDS tree structure, it is assigned a new object ID when it is restored. This occurs on every server where the object is used.

Schema Backup

The schema is backed up automatically with a full NDS backup. You can also choose to back up the schema separately using a custom NDS backup.

Placeholder (Unknown) Objects

Whenever insufficient information is known about an object, such as when one of its mandatory attributes is missing, NDS creates as a placeholder an Unknown object.

NOTE: In NetWare Administrator, Unknown objects appear with a ? icon.

During a restore session of the NDS database information, Unknown objects are created when restoring an object that has an access control list (ACL) or any other attribute that refers to other objects that do not currently exist in the NDS tree structure.

This condition is common in a restore, since only one object can be restored at a time. When this condition arises, an Unknown object is created until the real object is restored.

For example, User object User1 has been given property and object rights to User object User2. If User1 and User2 are deleted and only User2 is restored, an object named User1 will be created but it will have a base class of Unknown. This occurs because the access control list of User2 lists User1 which was not restored. The Unknown object is used as a placeholder in the tree. If User1 is later restored, it will replace the Unknown object.

If the restore session does not include the object for which the placeholder was created, the object remains in the NDS tree structure as type Unknown. Expect to see Unknown objects after a restore session if all network resources such as servers, volumes, and users are not in place before the restore session starts.

Objects that remain unknown after a restoration is completed are objects for which NDS could not resolve the dependencies.

In this case, you can do one of two things:

1. Delete the Unknown objects and re-create the original object.
2. Perform a selective restore to overwrite the Unknown objects.

Backup Software for NDS

In order to back up the NDS database, the `tsands.nlm` software must be loaded on one server in the NDS tree structure—preferably the server containing a replica of the largest partition.

For large or complex networks, you can improve performance by loading the `tsands.nlm` software for a particular partition. This minimizes network traffic during the backup process and improves performance when the backup program performs name resolution across the NDS tree structure.

The version of `tsands.nlm` that ships with NetWare allows selective backup and restoration of an NDS tree structure.

NOTE: Not all third-party backup applications support this selective backup and restoration. Check with the application vendor for details on product features.

In Enhanced SBACKUP, you can begin the backup of the NDS database from any in the NDS tree structure. The backup process continues from that point downward to the end of that portion of the tree. If the selected container is [Root], the entire NDS tree structure is processed.

This allows you to back up the entire NDS tree structure or subsets such as a single branch, a single container, or even a single leaf object. Also, a scan option allows backup of only those objects for which the backup user has Supervisor rights.

When you back up NDS, we recommend that you back up the NDS tree structure in one session whenever possible. Although partial NDS backups and restores are possible, numerous precautions and additional issues must be noted. See “Partial NDS Restores” on page 77 for more information.

Set Rights to Back Up Portions of the NDS Tree

The network administrator can assign backup administrators with limited rights to the NDS tree structure.

For example, suppose in your company you have three Organizational Units that need to be backed up (East, West, Mid). You could create three User objects—BackAdmin1, BackAdmin2, and BackAdmin3—and give them rights to the Organizational Unit that they are responsible to back up.

You then create a tsands.cfg file that lists the fully distinguished name of the contexts where the backup administrators' rights begin. It would look similar to the following:

```
.OU=East.O=Acme  
.OU=West.O=Acme  
.OU=Mid.O=Acme
```

Backup administrators have rights to back up the NDS tree structure beginning only at the context listed, and the rights continue until the tree stops or the rights are filtered out. Backup administrators should use a custom NDS backup to back up the portions of the tree for which they have rights.

The network administrator assigns Supervisor rights to the backup administrators for the section of the NDS tree structure that they are responsible to back up. The network administrator then needs to create a tsands.cfg file that lists the fully distinguished names of the containers where each of the backup administrators' rights begin. The tsands.cfg file should be saved in the Sys:system\tsa directory of the server where the backup program resides.

Frequency of Backup

In general, the NDS database should be backed up on a weekly basis. The frequency of this backup depends on how often changes and updates are made to the NDS tree structure. For a tree that changes often, you might want to perform an NDS backup every time you do a full backup of all servers on the network.

IMPORTANT: Always back up NDS prior to major tree modifications.

To get a full backup, the entire NDS tree structure needs to be functioning, meaning that all partitions are synchronizing normally. An NDS tree cannot be backed up entirely if any replicas of any partition are offline.

Backups and the File System

Back up your volumes so that in the case of hardware failure, natural catastrophe, or accidental change or deletion of files, you can restore the file system to a previous state and not lose the data.

To back up file system data, an appropriate SMS TSA must be loaded on each server for which a file system backup is to be created (see “Load the Target Service Agents” on page 40). For NetWare 4.11 and NetWare 5 servers, load TSA500. To back up file system information, make sure your backup application can handle the NetWare file system name spaces, extended attributes, trustee rights, compression, etc.

Once the device drivers for your backup hardware and the SMS TSA software is loaded, you can run the backup program of your choice (see “Loading Enhanced SBACKUP” on page 41).

Trustee Assignments

Trustee assignments are stored as part of the file system as an ID. They are backed up by default when the file system is backed up with the SMS TSA software. If a User object is deleted and then re-created or restored, its object ID changes. This is why the SMS TSA500 module uses fully distinguished names for objects to back up the trustee rights from the file system. If a User object is deleted and re-created with a new ID, the user's trustee assignments in the file system can be restored.

As long as an object with the same name on the backup media exists in the NDS tree structure when the file system is restored, the TSA can interact with NDS to rebuild the directory entry table (DET) to reflect new object ID numbers.

For additional information about object ID and trustee issues, see “Restore NDS” on page 66.

Server-Specific Information

Server-specific information such as the replica information, ID information, name spaces loaded, and system configuration is stored on the volume Sys. This information is backed up as part of the file system as a single resource. This resource includes the following five files:

- ♦ **Servdata.nds** contains server-specific NDS data.
- ♦ **Dsmisc.log** contains a replica list and replica types on the server at backup.
- ♦ **Startup.ncf** contains a disk driver, name spaces, and SET parameters.
- ♦ **Autoexec.ncf** contains load modules and the NetWare operating system configuration.

- ♦ **Vol\$Info.txt** contains volumes on the server, name spaces loaded, compression, and migration information.

You can also choose to back up this information individually. The information is not restored unless you specifically choose to restore it. It does not need to be restored unless you have lost the Sys volume. In that case, you must replace the hardware and restore this information. For more information, see “Begin to Restore the Entire NDS Tree Structure” on page 69.

Target Service Agents (TSAs)

In SMS, a target is any machine on the network that requires backup. Examples of targets include SQL database engines, NDS databases, workstations, and NetWare servers.

Through specific TSAs, Enhanced SBACKUP allows you to back up the information that exists on the following targets. These TSAs are listed in general as follows:

Target	TSA on the Target
Windows 95 workstation	W95TSA
Windows NT workstation	Windows NT TSA
MAC workstation	MACTSA
GroupWise™ data	GWTSa
OS/2 machine	OS/2 TSA

A Target Service Agent (TSA) is a software module that understands how to scan, read, and write the target data. The primary functions of an SMS TSA are to prepare the target data for backup or restoration, and to communicate with the storage management engine (SME). For example, an SMS TSA for a NetWare server understands name spaces, file and directory attributes, security privileges, etc., for the data on that server.

The TSA packages data from the target and presents it to the SME in a generic format. This allows one SME to interact with many types of TSAs.

Restore Sessions

Use Enhanced SBACKUP to retrieve and reinstate data you have backed up to storage media. You restore data if it has been lost or corrupted since a backup was made.

A restore session restores data from a backup. The restore session produces the requested data which is retrieved from the storage media and restored to the location you specify. If an error occurs during the restore session, an error message is appended to the error file on the host server.

The error file is labeled with the same description that you give the backup session (such as Friday's Full Backup) and is accessed through the Log/Error File Administration option of the Enhanced SBACKUP main menu.

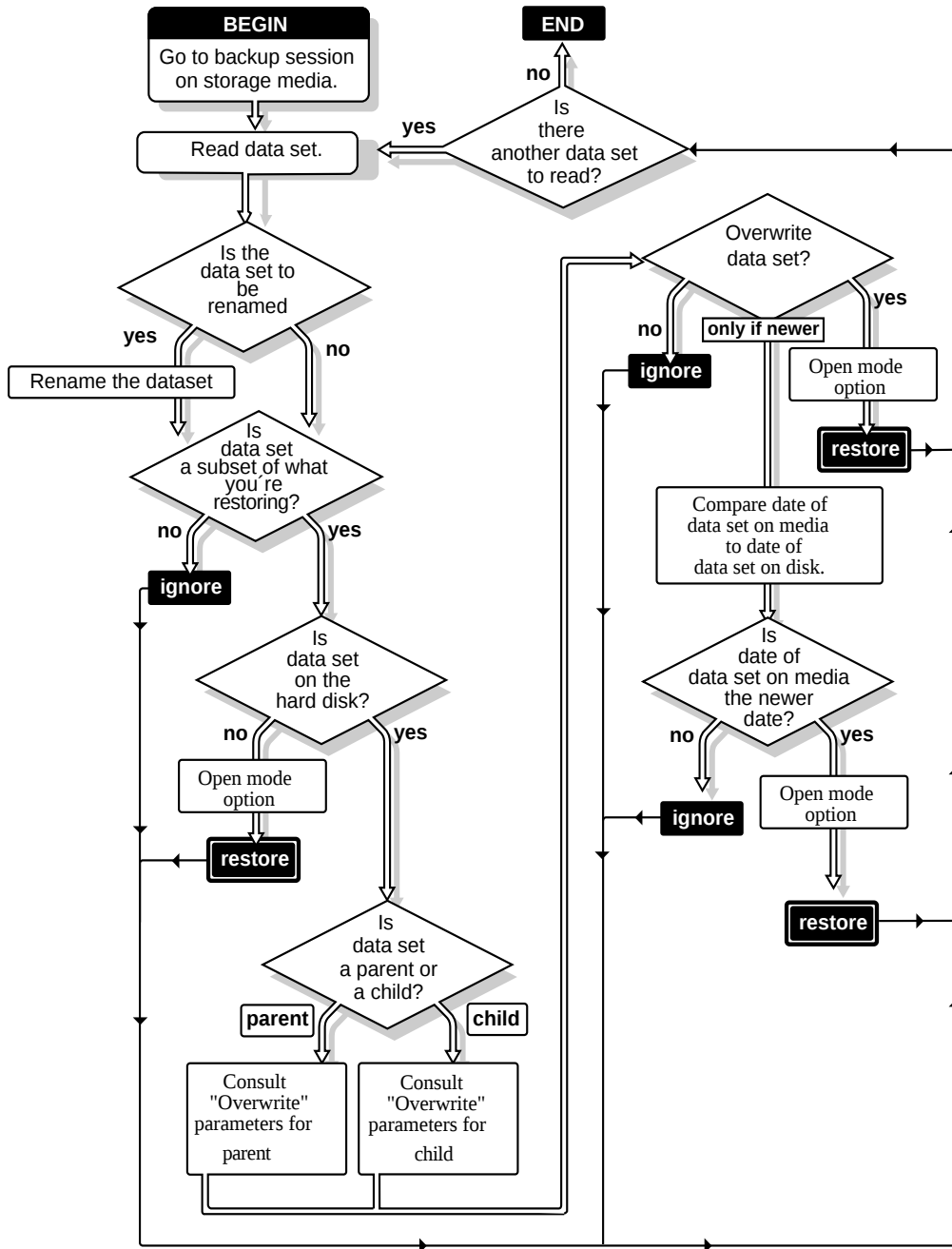
The error file might be located in the default directory (sys:system/tsa/log) or in another directory that you specified during the backup or restore session.

How SMS Restores Data

During a restore session, Enhanced SBACKUP reads the backup storage media, and the Target Service Agent (TSA) compares the media data set to the existing hard disk data set. The Target Service Agent evaluates each data set according to the following criteria:

- ◆ Is this data set a subset of what is being restored?
- ◆ Is this data set found on the hard disk?
- ◆ Which parts of the data set are subject to restoring?
- ◆ Is this data set a parent or a child, and is the Overwrite parameter set to Yes, No, or Overwrite Only if Newer?
- ◆ If the parameters for a child are set to Overwrite Only if Newer, does the backup copy have a more recent date than the existing copy?

Figure 7 How Enhanced SBACKUP Restores Data



Restore Options

For a custom restore session, you can specify exactly which data to restore. Several options work together to allow you maximum flexibility in your restore session. These options allow you to do the following:

- ♦ Choose subsets of data to restore
- ♦ Open mode options
- ♦ Overwrite an existing parent (such as a container) or child (such as an object)

Subsets of Data to Restore

You can choose specific subsets of a backup session to include in or exclude from the restore session by selecting major resources (such as volumes, server-specific info, or containers) or minor resources (such as directories, paths, files, or objects).

For more information about including and excluding, see “Customize Your Backup” on page 16.

Overwriting Existing Parents or Children

Be careful when you perform a selective restore and choose whether to overwrite existing parents or children, especially NDS objects. Objects such as groups and users have references to other objects in the NDS tree structure that will be affected by a selective restore.

For example, suppose a part of the NDS tree structure gets corrupted and several users are deleted from the tree. There is a group that contains those users, but once the users are gone, the group purges the membership list to remove those users; the group, however, continues to exist in the NDS tree structure.

If you perform a selective restore and choose not to overwrite existing objects, the group membership list remains empty even if you restore the users. You need to either add the users manually to the group membership list or restore the original group.

Restore NDS and the File System

The only way to ensure that your NDS database can be fully restored is through partition replication, with replicas of the entire database on multiple servers.

On a single-server network, you need to rely more heavily on backing up the data because you do not have replicas to restore information.

If part of the NDS tree structure, including partitions and replicas, exist when the NDS database information is restored, those partitions and replicas will be restored also, and you will not need to repartition the tree.

In case of corrupted data, follow these general steps:

1. Delete the corrupted NDS data.
2. Allow time for the deletion to propagate throughout the network. The allotted time depends on the size of the data to be backed up, the size of your network, the number of servers you have, and the number of containers and users you have.
3. Restore the NDS data.

A replica containing the object does not have to be on the server. The NDS database creates external reference when necessary.

NOTE: An external reference is a pointer to an NDS object not found locally on the server; it is used to authenticate and reference objects that are not local to the server.

There are specific recovery procedures for the following scenarios:

- ♦ Loss of a volume other than Sys
- ♦ Loss of the Sys volume or an entire server
- ♦ Loss of the entire NDS tree

Loss of a Volume Other than Sys

Loss of a volume other than Sys does not affect NDS. The only requirement is to restore the file system data and trustee rights.

Loss of the Sys Volume or an Entire Server

A hard disk failure involving the Sys volume affects the entire server and halts all NetWare operating system activities. Because the NDS files are stored on volume Sys, losing Sys is equivalent to removing NetWare and NDS from the file server. You must reinstall NetWare and NDS before you restore your data.

The procedures for this scenario are divided into two cases:

- ♦ Loss of the only server in a single-server network. See “Single-Server Network” on page 32.

- ♦ Loss of a single server in a multiple-server network. See “Multiple-Server Network” on page 32.

Single-Server Network

In a single-server network, server failure brings all network operations to a halt. The same situation exists if the failure affects only the hard disk(s) containing the Sys volume.

Since there are no replicas in a single-server network, you cannot recover any NDS information from a replica.

Use the following general steps to restore the server.

1. Repair or replace the failed hardware.
2. Reinstall NetWare.
3. Restore NDS from an SMS backup. See “Restoring Data” on page 57.
4. Restore the file system. See “Restoring Data” on page 57.

Multiple-Server Network

In a multiple-server environment, it is possible for one server to go down and for the rest of the servers in its replica list to remain intact. The same situation exists if the hard disk(s) containing volume Sys on one server gets damaged, causing the failure of the entire server.

Use the following general steps to restore the server.

1. Repair or replace the failed hardware.
2. Restore servdata.nds (the server-specific NDS information) for the failed server to another server on the network. See “Restoring Data” on page 57.
3. Reinstall NetWare, including restoring the servdata.nds file (located in Sys) to the original server.
4. Restore NDS. See “Restoring Data” on page 57.
5. Restore the file system. See “Restoring Data” on page 57 and “Restore Session to File System” on page 70.
6. Restore any replicas that were removed from the server.

Loss of the Entire NDS Tree

If all servers on a network are destroyed because of a disaster, you must perform a complete restore of NetWare 5, NDS, and file system data.

IMPORTANT: We recommend that you document your NDS tree structure; the location of server objects, partitions, and replicas; and record bindery context settings and other relevant information.

Use the following general steps to restore the NDS tree structure.

1. Repair or replace the failed hardware.
2. Reinstall NetWare on the first server.
3. Install NetWare on remaining servers to create a skeleton of the tree.
4. Restore NDS. See “Restore NDS” on page 66.
5. Restore the file system to all servers. See “Restore Session to File System” on page 70.
6. Re-establish partition boundaries and distribute replicas.

Use the next table to help you.

If you are restoring	Then
A volume other than Sys	Go to “Begin to Restore a Volume Other than Sys” on page 66.
Volume Sys in a single server network	Go to “Begin to Restore Volume Sys in a Single-Server Network” on page 67.
Volume Sys in a multiple-server network	Go to “Begin to Restore Volume Sys in a Multiple-Server Network” on page 67.
The entire NDS tree	Go to “Begin to Restore the Entire NDS Tree Structure” on page 69.
NDS on a server	Go to “Single Server or an Entire Tree” on page 70.
The file system on a server	Go to “Restore Session to File System” on page 70.
Server-specific information	Go to “Server-Specific Information” on page 74.
The file system on a workstation	1. Reinstall client software. 2. Go to “Custom File System Restore” on page 72

Session Files

Whenever you back up or restore files/directories, a log and corresponding error files are created for that particular session on the server on which you are executing the job. The .log file is the session file for that particular job.

The need to create a session file arises when you are restoring the data on a server other than the one you backed up from. The server should possess the session ID of all the jobs that are present on the tape so that the SME can restore it. These session IDs are created from the .log files. See “Creating Session Files” on page 97.

Log and Error Files

Enhanced SBACKUP generates a log file and an error file each time a backup session is performed, and records specific information about the session in these files.

The files are stored in a default directory (such as Sys:system/tsa/log). If you prefer, you can create your own directory for the log and error files as long as it resides on the host server.

HINT: You might want to create individual log directories for the different types of backup or restore session targets or different organizational units. For example, you could create one directory for workstation backups and another for server backups.

Enhanced SBACKUP keeps a list of all the log and error files. These lists show

- ♦ The description you enter for the session.
- ♦ The date and time the session was begun or, in the case of a delayed backup session, the time the session was scheduled.
- ♦ The name of the target the data was backed up from.

Log File

The log file is created on the host server the first time a particular set of data is backed up. This file contains

- ♦ The session date and time and the description you entered.
- ♦ The target from which the data was backed up.
- ♦ Media set identification information.

- ♦ The area of the file system structure that was backed up (such as the volume name, directory name, etc.).
- ♦ The names of files that were backed up.
- ♦ The numerical location of the data on the storage media.

Error File

The error file is created on the host server the first time a particular set of data is backed up. It contains a list of any errors that occurred during a backup or restore session.

This file also contains

- ♦ The session date and time and the description you entered.
- ♦ The target from which the data was backed up.
- ♦ Media set identification information.
- ♦ The area of the file system structure that was backed up.
- ♦ The total number of parents and children that were backed up.
- ♦ The names of files that were not backed up, along with any error messages or information.
- ♦ Skipped data sets (any file that is open when a backup session begins, is not backed up, and is listed as a skipped data set).

2

Setting Up

In addition to being able to back up data from a server with Enhanced SBACKUP, you can now use a Windows 95 or Windows NT machine to perform your backups using the graphical interface.

Procedures for backing up and restoring your data include the following:

- ♦ How to load the backup software. See “Load Controller and Storage Device Drivers on the Server” on page 39, “Load the Target Service Agents” on page 40, and “Loading Enhanced SBACKUP” on page 41.
- ♦ How to unload the backup software. See “Unloading Enhanced SBACKUP” on page 45.
- ♦ How to back up your data. See “Backup Options at the Server” on page 43, “Custom Backup” on page 50, or “Back Up a Workstation” on page 54.
- ♦ How to restore your data. See “Custom Restore” on page 62, or “Restore NDS” on page 66.

Enhanced SBACKUP Guidelines

Before you set up and begin backups, follow these guidelines to make backups easier and to avoid problems later.

- ♦ **Log in.** You will have limited success backing up and restoring if you log in without supervisor rights.

For security reasons, many Enhanced SBACKUP options are limited to the network administrator.

- ♦ **Reserve disk space for temporary files.** Make sure you have disk space available (1 to 2 MB) on the target server's volume Sys to accommodate log and error files.

Enhanced SBACKUP creates temporary files on the target server during backup. If you have linked UNIX files or files with extended attributes, the temporary files might be larger than 1 MB.

- ♦ **Do not mount or dismount volumes during a backup or restore session.** The data might be corrupted or an abend might occur at the host server.
- ♦ **Use the correct name space and name space formats.** If you do not use the correct name space and name space formats when entering paths and file names, files can't be restored.

Name spaces: DOS, FTAM, Macintosh, NFS, and OS/2.

Name space formats:

- ♦ For Macintosh, use *Volume::directory:directory:filename*
- ♦ For all others, use *Volume:/directory/directory/filename*
- ♦ **Exit Enhanced SBACKUP before unloading drivers.** If you unload a manually loaded driver (such as aha1740.dsk or aspitran.dsk) before exiting Enhanced SBACKUP, you might cause the host server to abend.
- ♦ **Use original case for non-DOS names.** Non-DOS pathnames and filenames are case-sensitive. NetWare recognizes DOS pathnames and filenames in uppercase, lowercase, or mixed case. If you're not sure of the original case, refer to your log file.

Before Loading the Backup Software

Before you load the backup software on the server or on a Windows 95 or Windows NT machine, you need to configure a server to execute your backups.

Determine the following:

- ♦ The tree to which the server belongs which must be made the current tree.
- ♦ The full NDS[®] context of the server.

Before Running the Backup Software

Before backing up software, in general you must

- ♦ Load the controller and storage device drivers on the server. See “Load Controller and Storage Device Drivers on the Server” on page 39.
- ♦ Load the TSAs on a server, workstations, or both. See “Load the Target Service Agents” on page 40.
- ♦ Load the backup engine from the server. See “Loading Enhanced SBACKUP” on page 41.

Then load Enhanced SBACKUP either on the server or on a workstation, depending on what you want to back up. See “Loading Enhanced SBACKUP” on page 41.

Load Controller and Storage Device Drivers on the Server

Controller and device drivers control the mechanical operation, such as read, write, forward, back, and stop of various storage devices and media.

- ❑ Ensure that you have installed the storage device controller and storage device according to the hardware manufacturer's instructions.

When NetWare 5 is installed, the device drivers are placed in the startup.ncf file automatically.

Whenever you want to add new drivers, you can either place them in startup.ncf or use the following steps to load the controller and device drivers.

- 1** Load the drivers for controller and storage devices.
- 2** To load device drivers, do the following.

At the server console prompt, type:

3

```
LOAD [PATH] : CONTROLLER_DEVICE_DRIVER_NAME(S)
LOAD [PATH] : STORAGE_DEVICE_DRIVER_NAME(S)
```

For example, to load the drivers from drive C:, type:

```
LOAD SCSI154X.HAM PORT=24
LOAD SCSIHD.CAM
LOAD SCSI2TP.CDM
```

At NWCONFIG, select:

Driver Options > Configure disk and storage device drivers > Discover and load additional drivers or Select an additional driver.

- 4** If you loaded HAM drivers, or if you added an external device, type the following at the server console prompt:

LIST DEVICES

- 5** To register the storage device with the system, type the following at the server console prompt:

SCAN FOR NEW DEVICES

NOTE: If you load the drivers from the startup.ncf file, you do not need the SCAN FOR NEW DEVICES command.

Load the Target Service Agents

Target Service Agents are loaded on servers and workstations. If you want to back up a server, load the TSA on this server now.

- ☐ Load the controllers and device drivers.

The next table contains a summary of the load commands and executables for backup or restore targets.

Table 1 **LOAD Commands for Servers, Workstations, or NDS Databases**

To back up or restore...	At this console...	Enter this command...
5.00 host server	5.00 host server	LOAD TSA500
5.00 target server	Target server	LOAD TSA500
3.12 target server	Target server	LOAD TSA312
3.11 target server	Target server	LOAD TSA311
NDS database	Any 4.x or 5 server (preferably a server with a copy of the largest partition)	LOAD TSANDS
DOS partition on NetWare	Host server	LOAD TSADOSP
OS/2, UNIX, and Macintosh workstations	Host server	LOAD TSAPROXY
	Target workstation	See the documentation that came with the OS/2, UNIX, and Macintosh workstation software.

To back up or restore...	At this console...	Enter this command...
Windows 95	Target workstation	W95TSA.EXE (installed with the Novell Client). See Help in your Windows NT client.
Windows NT	Target workstation	TSAPrefs.exe, TSAMain.exe, NT TSA (installed with the Novell Client). See Help in your Windows NT client.

Type the commands at the specified console in the order listed, for example, **load TSA500**.

Follow these general steps when backing up or loading the software.

- ♦ **Backing up the NDS database.** Load tsands.nlm once on the server with a replica of the largest partition.
- ♦ **Backing up the file system.** Load the respective TSA for its server (such as TSA500) on every server to be backed up.
- ♦ **Backing up workstations.** Load the appropriate TSA on the workstation. For more information about backing up workstations such as UNIX, OS/2, or Macintosh, see the documentation included with the client software. See the previous table for information on Windows 3.1, DOS, Windows 95, or Windows NT.
- ♦ **Loading the files when the server starts.** Place the commands in the server's startup.ncf file, and in the workstation's net.cfg file, autoexec.bat file (for DOS), or Startup folder (for OS/2).

Loading Enhanced SBACKUP

You can load Enhanced SBACKUP either from the server command line or using the graphical interface at a Windows 95 or Windows NT workstation.

- ☐ Load controller and storage device drivers on the server. See "Load Controller and Storage Device Drivers on the Server" on page 39.
- ☐ Make sure smdr.nlm, tsa500.nlm, smsdi.nlm, qman.nlm, sme.nlm, sbsc.nlm, and sbcon.nlm are installed on the server. They should have been installed automatically when NetWare 5 was installed.
- ☐ Make sure each NLM listed previously is in the search path.

- ❑ Load the TSA on each machine to be backed up. See “Load the Target Service Agents” on page 40.

Load Enhanced SBACKUP from the Server

To load Enhanced SBACKUP, you must load several modules. This section lists those modules and includes what options you will see at the server and at the workstation.

Load the Storage Management Engine and Backup Software

To load the storage management engine, do the following.

1 Type **LOAD SMDR**.

If this is the first time loading the modules, you are asked to create a new SMDR group. Every server and workstation that will be backed up and that has a submitter will be recognized by this submitter group.

Enter the name of the new group in the SMDR Group Context field.

2 Press Enter to accept the default or add a new SMDR context. If this is the first time loading the modules, enter the SMDR Context name. This registers the local submitter with the group submitter. You can change the context if necessary.

3 Enter the full context of your user name.

This is the name of the person who will be performing the backups and restore. The name must begin with a period (.), for example, .khill.novell.

4 Enter your administrator password.

5 Type **LOAD TSA500**.

6 Type **LOAD SMSDI**.

7 Type **LOAD QMAN**.

If this is the first time loading the module, the queue is created automatically once you enter the following information:

- ♦ **Queue Context** is the context that will be used for the job queue. You need this when you create backup or restore jobs.
- ♦ **Queue Name** is the name of the job queue. You need this when you create backup or restore jobs.
- ♦ **User Name** is the name of the person who will be submitting the jobs.

- ♦ **Password** is the password of the person who will be submitting the jobs.

8 Type **LOAD SBSC**.

9 Type **LOAD SBCON**.

If you use backup and restore on the server, load sbcon. If you use NWBACK32 on a client, you do not need to load this module.

Backup Options at the Server

From the Main Menu > Job Administration, the following options are available.

- ♦ **Backup** contains the options to back up data.
- ♦ **Restore** contains the options to restore backed up data.
- ♦ **Verify** contains the options to check what you have backed up or restored.

From the Main Menu, the following options are available.

- ♦ **Log/Error File Administration** contains the session and error files.
- ♦ **Storage Device Administration** contains the options to monitor the properties of a device.
- ♦ **Change Target To Back Up From or Restore To** contains the options to change your target.

Load Enhanced SBACKUP at a Workstation

To load SBACKUP at a Windows 95 or Windows NT workstation, do the following.

1 Log in to the desired NDS tree structure.

2 Click Network Neighborhood > Novell > sys:public.

If this is the first time you have used NWBACK32, go to Step 3. Otherwise, go to Step 4.

3 If this is the first time you have used NWBACK32, do the following:

3a Click NWBACK32.

3b Log in to the server running the backup engine.

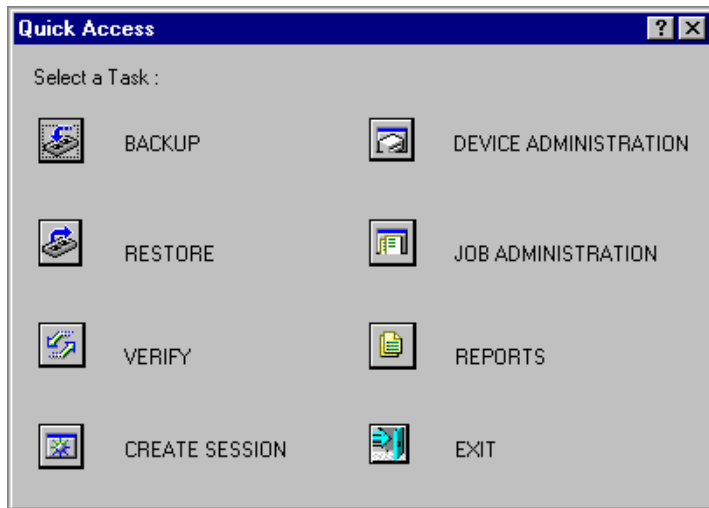
3c Enter your user name and password.

3d Configure NDS information.

- ♦ **Tree Name** . Enter the name of the NDS tree you will be using to backup and restore data.
- ♦ **SMDR Context** . Enter the context you created during the server configuration.
- ♦ **SMDR Group Context** . Enter the context you created during the server configuration.
- ♦ Check the SAP (IPX) box if you want to use IPX. Uncheck the box for IP.

4 Click NWBACK32 to open the application.

The following screen appears.



Backup allows you to select what to back up and where.

Restore allows you to select what to restore and where.

Verify allows you to check data on the media to make sure your backup was successful.

Create Session allows you to re-create your log and error files.

Device Administration allows you to monitor the properties of a device.

Job Administration lists jobs in a queue for which you can view and change the properties.

Reports allows you to view the details of session and error reports.

- 5** You are now ready to back up data. Go to “Backing Up Data” on page 46 to continue.

Unloading Enhanced SBACKUP

To ensure maximum memory utilization and throughput, you should unload backup software and other Storage Management Services (SMS) modules when you are finished performing your backup. That way, more memory will become available on your host or target.

WARNING: If you unload these files while Enhanced SBACKUP is running, the host server might abend or data might be corrupted.

Unload Enhanced SBACKUP from the Server

To unload Enhanced SBACKUP, follow these general steps:

1. Unload the Enhanced SBACKUP utility.
2. Unload the SMS modules, including the Target Service Agents (TSA), Q Manager (QMAN), Storage Data Management Requester (SMDR), etc.

The full steps are as follows.

- 1** Exit Enhanced SBACKUP from the Main Menu.

Press Esc until you reach the Enhanced SBACKUP Main Menu; then press Esc again and confirm the prompt.

- 2** Unload the SMS NLM files.

To unload the server modules, type the following commands at the server console prompt in the order shown:

```
UNLOAD SBCON
UNLOAD SBSC
UNLOAD QMAN
UNLOAD SMSDI
UNLOAD TSA500
UNLOAD TSADOSP
UNLOAD TSANDS (if applicable)
UNLOAD TSPROXY (if applicable)
UNLOAD SMDR
```

The system displays a warning message on the console if you attempt to unload a module being used by another NLM. If you continue, your server may abend.

- 3 Unload the workstation SMS files, if applicable.

Exit Enhanced SBACKUP from the Workstation

To exit Enhanced SBACKUP, follow these general steps:

1. Unload the Enhanced SBACKUP utility.
2. Unload the SMS modules, including the Target Service Agents (TSA), Q Manager (QMAN), Storage Data Management Requester (SMDR), etc.

The steps are as follows.

- 1 Exit Enhanced SBACKUP from the Quick Access window.
- 2 Unload the SMS NLM files from the server as described in “Unload Enhanced SBACKUP from the Server” on page 45.
- 3 Unload the workstation SMS files, if applicable.

Backing Up Data

You can use Enhanced SBACKUP to create a tape backup of the NDS database, or of the file system on your servers or workstations. The procedure listed here uses Enhanced SBACKUP as the Storage Management Engine (SME).

- ☐ Understand the process for loading Enhanced SBACKUP. (See “Loading Enhanced SBACKUP” on page 41.)
- ☐ Ensure that you know the workstation password if you are backing up a workstation. For DOS workstations, make sure the Target Service Agent was loaded with the /Password parameter instead of the /Trust parameter, as explained in Table 1 on page 40.
- ☐ If you are backing up the NDS database, ensure that NDS synchronization and communication are functioning properly.

Before starting the backup, make sure NDS is fully functional. This means that all partitions are synchronizing correctly.

If your backup host and targets communicate across a WAN, check the status of the WAN links to verify that they are operating properly.

- ☐ If you are backing up the file system, make sure you have Read and File Scan rights to the directories/files you are backing up.
- ☐ Ensure that you know what type of backup you want to perform: full, differential, or incremental. For more information, see “Backup Types” on page 15.
- ☐ If you use the Advanced Options, ensure that you know the file system structure of the target you are backing up. You will be prompted for the paths to the volumes and directories that you want to include in or exclude from your backup.
- ☐ Ensure that you have loaded the drivers for your specific device and controller board.
- ☐ Ensure that the required files for your target are loaded.
- ☐ Ensure that you have loaded the Enhanced SBACKUP files for your specific target. (See “Load the Target Service Agents” on page 40.)
- ☐ Ensure that media is inserted into your storage device.

You can back up your data two ways: from a server using SBCON or from a workstation using the graphical interface.

Back Up from the Server

When you back up your data from one server to a target server or workstation, you are using the command line.

To back up your data, do the following:

- 1** Load the SBACKUP modules.
- 2** Select Main Menu > Job Administration > Backup.

The Backup Options form appears.

Figure 8 Backup Options Form

Backup Options	
Target Service:	<Not Connected>
What to Backup:	<Select to View>
Description:	
Device/Media Name:	*.*
Advanced Options:	<Select to View>
Append Session:	No

- 3 Select Target Service to choose the NetWare server running your backup or restore Target Service Agent.

Target Service —The server name you want to back up or restore. Before selecting the server, you need to load the right Target Service Agent (TSA). See “Load the Target Service Agents” on page 40.

If you do not see the target you want on the list, check for these possible causes:

Proper Target Service Agent is not loaded on either the host or the target. (See “LOAD Commands for Servers, Workstations, or NDS Databases” on page 40 for LOAD commands.)

Network traffic is heavy. Press Esc to return to the Main Menu, and then press Enter again. Your target should now be listed. From the Target Services list, choose a target.

If you are backing up...	Then...
The file system	Choose the server whose file system you want to back up.
The NDS database	Choose the server with TSANDS loaded.
A workstation	Choose the workstation's host server, and then select the workstation.
Server-specific information	Choose the server whose server-specific information you want to back up, and then choose to back up the file system.

- 4 When prompted for the target username, enter the username (and context if required) for the target.

If Enhanced SBACKUP rejects the username you entered, you probably need to include the context of where the user object is located. For example, instead of entering **ADMIN** as the username, enter **.CN=ADMIN.O=company_name** or **.ADMIN.company_name**.

You must include the context in the username at this point if the username you use exists in an NDS container that is different from the bindery context set on the server running the engine.

- 5 If a password is requested, enter the password for the target.

Enhanced SBACKUP will take a few moments to attach to that target. The Backup Options form appears. See “Back Up from the Server” on page 47 for explanations of the fields on this form. If you select the default values on this form, a full backup of the source is performed. Otherwise, if you want to perform an incremental or differential backup, select Advanced Options. For more details on the Advanced options, see “Custom Backup” on page 50.

6 Select What to Backup.

The List of Resources comes up.

Select the directories/files you want to back up from the target server. If you want to start the backup at a container other than [Root], press Enter and then Insert. You can browse the NDS tree structure and choose the container where you want the backup to begin.

7 Press Insert and select the volumes and files you want to back up from the NetWare Server screen and press Esc.

The selected volume/file appears.

8 Type a descriptive name for the backup session in the Description field.

This is a descriptive name of the job. This should help you identify the specific backup session; if a restore is necessary, you can easily identify the session you need. There is no special requirement for what to enter as the session description.

HINT: You might want to include the full path of the data (for example, sys:home\reports\july.98) which you will need to know if a restore session is necessary.

9 Select Device/Media Name.

A list of objects available is displayed in the Select a Device screen.

If your host has only one storage device attached, Enhanced SBACKUP selects the device for you and notifies you of the device and media that will be used. If you enter *.*, the engine selects the device and media which you have designated as the default.

NOTE: If there is only one media type available, it will be treated as the default. You can also specify the following command to *.MEDIA or DEVICE.* to ?

If your device has more than one storage device attached, choose an available device from the list. If the device contains multiple media, select the media for the backup.

If the storage media does not have a label, Enhanced SBACKUP displays a message saying that the media cannot be identified. You should set the label before selecting it for a backup job.

10 Select Advanced Options.

The Advanced Backup Options form appears. For more details about this form, see “Customize Your Backup” on page 16 or “Custom Backup” on page 50. You can specify the execution time or reschedule the job using this form.

11 Select Append Session.

This option appears on your Backup Options form only if your device supports appending to previous sessions on the media, and the media already has one or more sessions on it.

Accept the default No if you want to overwrite all sessions on the media. The media rewinds and existing data is overwritten by the next backup.

If you want to append this session, enter Y. The backup session is appended to the media at the end of the previous session. Each appended session has separate backup and error logs.

NOTE: Labeled media is not considered empty media. No sessions are necessary on the media for you to set the Append option to Yes.

Delete the log and error files for any session you overwrite to avoid trying to restore a session that no longer exists.

12 Press Enter to save your options and continue with the backup.

WARNING: If you are appending a backup session to a media set (two or more tapes), insert the last tape in the set.

13 To return to the Main Menu, press Enter and then press Esc.

The Esc key allows you to exit Enhanced SBACKUP one screen at a time until you reach the Main Menu. If you want to exit Enhanced SBACKUP, Press Esc once again and answer the confirmation prompt.

Custom Backup

You can customize your backup using the Advanced Backup Options form when you use SBCON at the server to launch your backup program. This form allows you to specify exactly what you want to back up data, such as a server, the NDS database, workstation, directory, or file. You can even specify subsets of groups. The Advanced Backup Options form activates only after you have selected at least one of the resources (directory/file). Select Advanced Options

from the Backup Options form to perform advanced backup sessions. See “Back Up from the Server” on page 47.

NOTE: Enhanced SBACKUP displays prompts and messages at the bottom of the screen. For example, you can press F1 for help at any time.

If you want to perform a series of backups and restores and need to change your target, see “Changing Your Target” on page 56.

Figure 9 Advanced Backup Options Form

Advanced Backup Options	
Backup Type:	Full Backup
Subsets of What to Backup:	<Select to View>
Scan Options:	<Select to View>
Execution Time:	3/4/1998 - 9:5:34
Scheduling:	<Select to View>

A custom backup allows you to specify exactly what you want to back up: server, volume, the NDS database, workstation, directory, or file.

To customize a backup, do the following:

- 1 Select Backup Options > Advanced Options.
- 2 Select Backup Type.

By default, Storage Management Engine (SME) performs a full backup. See “Backup Types” on page 15. Differential and incremental backups are not interchangeable. See “Backup Schedules” on page 20.

NOTE: If you choose to include migrated data, ensure that your backup media capacity matches the jukebox media capacity.

- 3 Select Subsets of What To Backup

The Subsets of What You Want to Backup screen appears. The default setting means that everything in the Subsets of What You Want to Backup screen is backed up.

Include/Exclude TSA Resources —Includes or excludes resources such as servers or volumes.

Include/Exclude Directories —Includes or excludes directories.

Include/Exclude Files —Includes or excludes files.

Include/Exclude path/files —Includes or excludes pathnames and files.

4 Select Scan Options.

The How to Scan What You are Backing Up screen appears.

4a (Optional) Choose to exclude objects below the current container, or objects that users have no rights to back up.

4b The default means that nothing will be excluded. If you do not want to accept the default, press Enter.

To change this option, select Select to View and change the option.

4c You can either select Yes or No to include or exclude objects below the current container. Set Exclude Objects for Which the User Has No Rights option to Yes.

4d Press Esc to finish.

For information about how Enhanced SBACKUP scans data, see “Scan Data Sets” on page 18.

5 Select Execution Time.

To schedule the job to run another time, press Enter and go to Step 6. Otherwise, go to Step 7.

6 (Optional) Select Scheduling.

Reschedule —Select Yes to reschedule.

The Edit Date and Time screen appears. You can choose the default date and time shown for the backup to begin, or you can type a new date and time. You can change the month/day/year and hour/minute/second fields. The engine should initiate the rescheduled job.

Rerun Interval —Specify the duration in terms of elapsed time and days, months or years to rerun an already scheduled job.

The Edit Date and Time screen appears. You can specify the number of days, months, or years after which an already scheduled job will run.

The day, month, or year you enter should not be the actual date when you want the job to run, rather it is the duration after which the job gets executed.

Example

If you have scheduled a job to run on 03/20/1999, and wish to rerun the job after two months and at the same time, then the Rerun Interval field should be:

Days: 02, Month: 00, Year: 0000

Hour: 0, Minute: 0, Second: 0

Rerun Count —Specify the number of times you want to rerun a job after the current execution.

Keep Finished jobs —Select Yes to keep the job in the queue after execution so that it can be rescheduled when you need it.

NOTE: If you are performing a series of backups or restores and need to change your target, follow the procedures in “Changing Your Target” on page 56.

Back Up from a Workstation

When you load the backup software from a workstation to the target server or workstation, you are using the graphical interface.

To back up from a Windows 95 or Windows NT workstation, do the following:

- 1** Run Enhanced SBACKUP. See “Loading Enhanced SBACKUP” on page 41.

Click `sys:public\win95` or `winnt\nwback32.exe`.

- 2** Click Backup at the Quick Access window.

The next screen displays WHAT TO BACKUP and WHERE TO BACKUP.

- 3** Select what you want to back up.

3a Double-click WHAT TO BACKUP.

3b Click to back up NDS, NetWare Servers, or Workstations.

A list of servers appears.

3c Double-click to select a server to back up.

3d Enter the username and password to authenticate to the server.

A list of resources to back up appears, such as volumes and files.

3e Click OK.

3f Click the resources to back up.

- 4** Select where you want your backup data to go.

4a Double-click WHERE TO BACKUP.

- 4b** Change to the correct NDS tree structure and context by clicking on the Change to Context button on the toolbar.
- 4c** Double-click Queues.
A list of Queue objects appears.
- 4d** Click to highlight a Queue object.
- 4e** Right click to open the drop down box.
- 4f** Click Submit the Job.

This step allows you to submit the job to a queue, on the chosen server, or on the chosen media type.

Queue . Double-click to expand the queue.

Server . Double-click to expand the queue, double-click to select a server, then right click to submit the job.

Media . Double-click to expand the queue, double-click to select a server, double-click to view a list of devices, double-click to view a media list, and right click to submit the job.

Back Up a Workstation

To back up the workstation (the target), a Target Service Agent (TSA) must be loaded on the server. See “Load the Target Service Agents” on page 40. You can select the directories to back up or back up the entire workstation.

Windows 95 Workstation

- ☐ Make sure that the W95TSA is installed and configured. It is a part of the Novell Client modules (checkbox for Target Service Agent for Windows 95).

NOTE: To configure W95TSA, refer to Help that comes with the Novell Client modules. If it is installed and registered, a shield-like icon appears in the shell tray and indicates Novell TSA (Listening) message when the mouse pointer reaches the icon. You will also see an SMS screen pop up when you log in to NetWare.

To prepare for a back up on a Windows 95 workstation, do the following:

- 1** At the target workstation, register with the W95TSA.
 - 1a** Double-click the shield-like icon that appears in the shell tray. The Novell Target Service Agent for Windows 95 Properties box appears.
 - 1b** Enter your user name and password for TSA.

- 1c** Enter the server name that will be servicing this Windows 95 client.
- 1d** Choose the disk drive you want to register.
- 1e** (Recommended) Check Auto Register. This automatically registers your workstation with the server.
- 1f** Click OK.
- 1g** Restart your workstation.

The TSA must be installed and registered with the host server, along with the TSA username and password.

- 2** At the host server, load TSAPROXY.
- 3** Select or click the NetWare server running the target service agent.
See Step 2 in “Backing Up Data” on page 46.
- 4** Select or click the target workstation you want to back up.
- 5** Enter the username and password when prompted.
- 6** Follow the steps in the procedure “Backing Up Data” on page 46 to complete your backup.

Windows NT Workstation

- ☐ Make sure that the NT TSA is installed and configured. It is a part of the Novell Client modules (checkbox for Novell Target Service Agent).

The Windows NT TSA has two parts:

- ♦ **TSA Service** (TSAmain.exe) is a service that waits for and acts when there is a request from the backup engine.
- ♦ **TSAPrefs** (TSAPrefs.exe) allows an NT administrator to set preferences and monitor the activities of the TSA Service.

Configure the NT TSA

To configure the NT TSA on your Windows NT client, do the following:

- 1** In Windows NT, click the Properties page.
The TSA Prefs page appears with tabs for Preferences, Registration, Connections, and Event Logs.
- 2** Click Preferences.
- 3** Fill in the following fields:

Workstation . Enter the name of the workstation.

Preferred Server . Enter the name of the server on which you want to connect. This server must have TSAProxy installed.

Protocol . Select SPX/IPX or TCP/IP.

Events to Log . Check the items you want to log: Connection, Registration, Security, or Service.

Allow Backup User . This grants the backup user rights depending on the group.

Auto Register . This automatically registers the Windows NT workstation with the server.

4 Click Registration.

5 Check the fields in the Registration page and click Register if the fields are correct.

If information in any of the fields is incorrect, click Withdraw and return to the Preferences page to change the information, then repeat Steps 4 and 5.

6 Click Connections.

7 Check the fields in the Connections page and click OK.

If you need to add or change information, click Apply.

You can delete connections in this page under Current Connections if preferred. Click Apply.

Changing Your Target

Any time you are performing a series of backup or restore sessions, you might need to change your target. This can be easily done from the Enhanced SBACKUP Main Menu either at the command line or using the Windows 95 or Windows NT graphical interface.

If you do not specify a new target, Enhanced SBACKUP automatically selects the target used during the last session and continues without asking you to make a selection.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.
- ☐ Load the required TSA. See “Load the Target Service Agents” on page 40.

Change a Target from a Server

To change your target, do the following:

- 1** Select Main Menu > Change Target to Back Up From or Restore To.
- 2** Select one server.
- 3** From the list of Target Service Agents, select a target.

If the target you select includes more than one TSA loaded, Enhanced SBACKUP will show you a list of their full names.

- 4** Type in the username and password for the target you just selected.

Change a Target from a Workstation

To change your target on a Windows 95 or Windows NT workstation, do the following.

- 1** Click Backup at the Quick Access window.

The backup program is in sys:public\win95\nwback32 or \winnt\nwback32.

You can use the toolbar to open this window if preferred.

- 2** Double-click WHAT TO BACKUP.
- 3** Double-click Workstations (or you can select NetWare Servers).
- 4** Select the workstation (or server) to use as the target.

Restoring Data

Use Enhanced SBACKUP to restore information from tape backup. These procedures use Enhanced SBACKUP as the Storage Management Engine (SME).

- ☐ Know the username and password for the target server or workstation to which you want to restore data.
- ☐ Know the session description that you want to restore. You can get this information from your session log and error files. (See “Session Files” on page 34.)
- ☐ For an Advanced Options restore session, ensure that you know the file system structure of the data you are restoring. You will be prompted for specific paths and filenames while setting the restore options.

If you restore the server-specific information from the file system backup of the failed server to a functioning server or location, you can use the vol\$info.txt file as a reference for this information.

- ❑ If you want to restore data to a new location (different from where the original data was located), you must specify the full path to both the original data and the new location. If the new location does not exist, Enhanced SBACKUP will create a new file system structure.

You can get the original path from your backup logbook or from the session log files if you noted the path at the time the backup was performed.

- ❑ Replace faulty hardware or correct the problems that caused data loss (if applicable).
- ❑ Ensure that media is inserted in your storage device.

You can restore data either from the command line or from a Windows 95 or Windows NT workstation using the graphical interface.

Restore Data from a Server

To restore your data, do the following.

- 1** Load the drivers for your specific device and controller board.

See “Load Controller and Storage Device Drivers on the Server” on page 39.

- 2** Load the appropriate Target Service Agents.

See “Load the Target Service Agents” on page 40.

- 3** Load Enhanced SBACKUP.

See “Loading Enhanced SBACKUP” on page 41.

- 4** Select Main Menu > Job Administration > Restore.

The Restore Options form appears.

Figure 10 The Restore Options Form

Restore Options

Target Service:

TS_MOABHP

Description:

Device/Media Name:

Session to Restore:

<First Session>

Advanced Options:

<Select to View>

- 5 Select Target Service > NetWare server running your backup and restore Target Services Agent.

This is the name of the server or workstation on which you want to restore your data. Before selecting it, you must load the correct TSA. See “Load the Target Service Agents” on page 40.

If you do not see the target you want on the list, check for these possible causes:

- ◆ The proper TSA is not loaded on either the host or the target.
- ◆ Network traffic is heavy. In these circumstances, it might take Enhanced SBACKUP a few moments to detect all the targets. Press Esc to return to the Main Menu, and then press Enter again. Your target should now be listed. From the Target Services list, choose a target.

If the target you select has more than one TSA loaded, Enhanced SBACKUP shows you a list of their full names in the Backup/Restore Target Services on This Server.

NOTE: When you are trying to connect to a different server, Enhanced SBACKUP uses the same username and password you gave the first time. It prompts only if it fails.

If you are restoring...	Then...
The file system	Select the server whose file system you want to restore.
The NDS database	Select the server with TSANDS loaded.
A workstation	Select the workstation's host server, and then select the workstation.

If you are restoring...	Then...
Server-specific information	Select the server whose server-specific information you want to restore, and then choose the file system to restore.

- 6 When prompted for the target username, enter your username (and context if required) as the network administrator for the target.

If Enhanced SBACKUP rejects the username you entered, you probably need to include the context of where the user object is located. For example, instead of entering **ADMIN** as the username, enter a complete name such as **.CN=ADMIN.O=COMPANY_NAME** or **.ADMIN.COMPANY_NAME**.

You must include the context in the username at this point if the username exists in an NDS container that is different from the context set on the server running Enhanced SBACKUP.

- 7 If a password is requested, enter the password for the target.

Enhanced SBACKUP will take a few moments to attach to the target. Wait for the confirmation box, then press any key to continue.

- 8 Type a descriptive name for the restore session in the Description field.

The descriptive name of the job will help you identify the session.

- 9 Select the device and media for restore. Press Enter at the Device/Media Name field and decide where you want to restore from.

A list of objects available is displayed in the Select a Device screen.

If your host has only one storage device attached, Enhanced SBACKUP selects the device for you and notifies you of the device and media that will be used. If you enter ***.* (DEVICE_NAME.MEDIA_NAME)** the engine selects the device and media that it encounters first.

If your device has more than one storage device attached, choose an available device from the list. If the device contains multiple media, select the media for the backup.

If the storage media does not have a label, Enhanced SBACKUP displays a message indicating that the media cannot be identified. You should set the label before selecting it for a backup job.

- 10 Select the Session to Restore.

Select Choose a Session to Restore if you want to select a session from a list of session log headers which is displayed in Select a Session.

Figure 11 Select a Session

The screenshot shows a window titled "Select A Session" with a blue background and yellow text. It contains a table with four columns: Description, Date, Time, and Source. The first row of data shows "test", "4-2-98", "2:45:00 pm", and "TS_MOABHP". Below the table, there are two options: "Session to Restore:" with a selection of "<First Session>" and "Advanced Options:" with a selection of "<Select to View>".

Description	Date	Time	Source
test	4-2-98	2:45:00 pm	TS_MOABHP

Session to Restore: <First Session>
Advanced Options: <Select to View>

WARNING: TSA500 backs up files in compressed or uncompressed format as specified by the user. However, if you try to restore a compressed file to a volume without compression, the file is corrupted and no error message is displayed.

Description—Description of the job as specified by you while submitting the job.

Date—Date on which the job was started.

Time—Time when the job was started.

Source—The server or workstation name which serviced the job request.

Advanced options —Press Enter to see the Advanced Restore Options form.

10a Specify the path to the session log file of the session you want to restore.

To specify a path, use one or more of the following methods:

- ◆ Press Enter to accept the default; then go to Step 10b.
- ◆ Press Insert to select from a list of directories, press Esc to return to the previous window, and then go to Step 10b.
- ◆ Press Backspace over the path shown (or a portion of the path), type in a new directory or path, and then go to Step 10b.

Press Insert any time during this process to choose parts of the existing path from a list.

NOTE: At the present, it takes the default. This will be implemented in the future release.

- 10b** When a list of sessions is displayed, select the session you want to restore.

If the media on which the data resides is not loaded on the device you choose, you will be prompted to insert the correct media.

- 11** Select Advanced Options to make the selective restore.

The Advanced Restore Options screen appears. See “Custom Restore” on page 62. You can perform the advanced restore, specify the execution time, reschedule the job, etc., using this form.

- 12** Complete the Advanced Restore Options form.

- 13** Press Esc and answer the prompt at the Submit Job screen to begin the restore session.

- 14** Press Alt + Esc to view the activity log screen.

If the job execution starts and is not successfully completed, the error messages appear on this screen. The activity log file `ACTIVITY.LOG` is located at the server's `SYS:\SYSTEM\TSA\LOG` directory.

- 15** To view the Run Time Status of a job, select Job Administration > Current Job List > *job name*.

- 16** When the restore session finishes, your screen display reads:

`The restore process was completed normally.`

- 17** To return to the Main Menu, press Esc as required.

The Esc key allows you to exit Enhanced SBACKUP one screen at a time until you reach the Main Menu. If you want to exit Enhanced SBACKUP, answer the confirmation prompt.

NOTE: To unload Enhanced SBACKUP and applicable Target Service Agents, see “Unloading Enhanced SBACKUP” on page 45.

Custom Restore

Using the Advanced Restore Options form at the server, you can perform a custom restore of the database you need. The fields are explained in the next procedure.

Figure 12 Advanced Restore Options

Advanced Restore Options	
Rename Data Sets:	<Select to View>
Subsets of What to Restore:	<Select to View>
Open Mode Options:	<Select to View>
Overwrite Parent:	Yes
Overwrite Child:	Yes
Execution Time:	3/4/1998 - 9:51:27
Scheduling:	<Select to View>

To customize the restore of your database, do the following.

- 1 Select Restore Options > Advanced Options.

The Advanced Options screen appears.

- 2 Select Rename Data Sets to restore data to a location different from the backup location.

The Restore Datasets to a Different Location screen appears.

- 2a Press Insert to select the namespace type.

- 2b Enter the source path (where the data originally was backed up from).

- 2c Enter the destination path you want the data restored to, in the entry box.

Both the source and destination paths must include the volume names (for network server) or the hard disk drive letter (for example, C:\) for workstations.

IMPORTANT: When you specify a particular portion of the file structure as the source location, it does not necessarily mean that this will be the only data restored. What is restored can be influenced by the include and exclude settings on the Subsets of What You Want to Restore form. If you do not want to overwrite any subdirectories that might exist in the area you have included, you must specifically exclude them by their full path.

- 3 Select Subsets of What to Restore.

Select parts of the backed up data structure to be restored. A list of available data subsets appears.

Figure 13 Subsets of What You Want to Restore

Subsets of what you want to restore	
Include major TSA resources	<Default>
Exclude major TSA resources	<Default>
Include directories (full path)	<Default>
Exclude directories (full path)	<Default>
Include files	<Default>
Exclude files	<Default>
Include path/files	<Default>
Exclude path/files	<Default>

Use this form to specify which parts of the file structure you want to restore. Various data sets to be included or excluded are listed in this form. You can include or exclude any or all items listed. For more information about including and excluding items, see “Exclude and Include Options” on page 16.

The screen lists major and minor resources. *Default* indicates that none of that type of subset has been specified.

To specify a subset, do the following:

3a Select any item on the screen.

3b Edit the Include or Exclude screens using Insert and Enter.

3c Press Esc to save changes.

3d To view a list of values associated with major TSA resources (for example, server or volumes) select either the include or exclude line.

The Selection List Options form appears. Any value you previously selected is shown on the form. If you did not select a value, the form is blank.

3e To select a value for this major resource, press Insert and select the value from the list that appears by pressing Enter.

4 Select Open Mode Options.

Select parts of the backed up data structure to be restored. A list of available data subsets appears in the Subsets of What You Want to Restore screen.

The backed up data set contains various types of data that are listed on the panel. By default, all the types of data are included in the restore.

4a To exclude a particular type of data from the restore, select that line and type Y.

- 4b** When all the data items are selected correctly, press Esc.
- 5** Specify whether to overwrite the existing parent by typing Y (Yes) or N (No).

For more information, see “Overwriting a Parent or Child” on page 19.
- 6** Specify whether to overwrite the existing child by clicking Y (Yes) or N (No).
- 7** Specify the execution time.
- 8** Select Scheduling to reschedule the job.
- 9** Press Esc as required and select Yes to confirm the Submit Job? prompt.

The job is submitted and is listed in the Current Job List menu.

Restore Data from a Workstation

When you restore data, you are copying your backed up data to a server or workstation.

To restore data to a Windows 95 or Windows NT workstation, do the following.

- 1** Run Enhanced SBACKUP. See “Load Enhanced SBACKUP at a Workstation” on page 43.

You can run the NWBACK32 program from sys:public\win95 or winnt\nwback32.exe.

- 2** Click Restore at the Quick Access window.
- 3** Click what you want to restore.

The next screen displays WHAT TO RESTORE and WHERE TO RESTORE.

- 3a** Double-click WHAT TO RESTORE.
- 3b** Select the context.
- 3c** Double-click Queues and select the queue.
- 3d** Double-click Servers and select a server.
- 3e** Double-click Devices and select a device.
- 3f** Double-click the device to view the media list.
- 3g** Select a medium.

- 4** Click where you want the restored data to go.
 - 4a** Double-click WHERE TO RESTORE.
 - 4b** Select NDS, NetWare Servers, or Workstations.
 - 4c** Click the server to which you want to restore your data.
 - 4d** Enter your username and password to authenticate to the server.
 - 4e** Click OK.
- 5** Submit the restore job by clicking Restore > Submit the Job on the toolbar.
- 6** (Optional). Click Next to display more information about the restore.

Restore NDS

The procedures in the following sections are performed at the beginning of the restore process.

- ♦ See “Begin to Restore a Volume Other than Sys” on page 66 for more information.
- ♦ See “Begin to Restore Volume Sys in a Single-Server Network” on page 67 for more information.
- ♦ See “Begin to Restore Volume Sys in a Multiple-Server Network” on page 67 for more information.
- ♦ See “Begin to Restore the Entire NDS Tree Structure” on page 69 for more information.

Begin to Restore a Volume Other than Sys

WARNING: Do not delete the Volume object for the failed volume from the NDS tree structure. The Volume object preserves any references that other objects (such as Directory Map and Queue objects) may have to that volume. If the Volume object is deleted and you have objects that depend on this volume, you must re-establish the relationships through a selective NDS restore. See “Custom NDS Restore” on page 71.

To restore a volume other than Sys, do the following.

- 1** Bring down the server.
- 2** Correct the problem.
- 3** Bring the server back up and re-create the volume.
- 4** Perform an advanced file system restore. See “Custom Restore” on page 62 for the procedure.

Begin to Restore Volume Sys in a Single-Server Network

Since there are no replicas in a single-server network, you cannot recover any NDS information from a replica. After repairing or replacing the failed hardware, you must restore the entire NetWare environment, including NDS, from an SMS backup.

To restore a single Sys volume, do the following.

- 1** Correct the problem that caused volume Sys to fail.
- 2** Reinstall NetWare and NDS.

When NWCONFIG asks for the names for Organization objects immediately under the [Root] object, use the same names that existed before in the NDS tree. Otherwise you will end up with new, empty containers in the restored NDS tree structure.

Make sure disk partitions are at least as large as they were before, and that the volumes are defined as before.

- 3** Restore NDS using “Custom Restore” on page 62.

Begin to Restore Volume Sys in a Multiple-Server Network

To restore Sys volumes on several servers, do the following.

- 1** Restore the server-specific NDS information file (servdata.nds) to another server on the network following the custom (advanced) file system restore (see “Custom Restore” on page 62).

By default, the file is placed into the sys:system\server_name directory on the server you have selected.

- 2** Use the dsmisc.log file (part of the information restored with the server specific information) to see if the failed server had a master replica of any partition.
- 3** If the failed server had a master replica of any partition, select the server you want to hold the master replica and load DSREPAIR on that machine.
 - 3a** Select Available Options > Advanced Options Menu.
 - 3b** Select Replica and Partition Operations.

NOTE: Use the NDS Manager utility to perform regular partition operations.
 - 3c** Select the partition you want to edit.
 - 3d** To see the list of servers that have replicas of that partition, select View Replica Ring.

- 3e** Press Esc.
- 3f** Select Designate This Server as the New Master Replica.
- 3g** Repeat Steps 3a through 3f for each master replica that the failed server contained.
- 4** If the failed server contained any replicas, remove them.
 - 4a** Select Available Options > Advanced Options > Replica and Partition Operations.
 - 4b** Select the partition the server held replicas of.
 - 4c** Select View Replica Ring.
 - 4d** Select the name of the failed server.
 - 4e** Select Remove This Server From the Replica Ring.
 - 4f** Enter the supervisor's name and password.
 - 4g** Select Yes to continue.
- 5** Exit DSREPAIR.
- 6** Reinstall NetWare.
 - 6a** Begin the installation.
 - 6b** When prompted for DS install, select Create a New DS Tree and complete the installation.
 - 6c** Load NWConfig and remove DS.
 - 6d** Install DS, when prompted for DS install and select Install Into an Existing Tree.
 - 6e** When prompted to choose a NDS tree structure, press F5.

This allows you to choose to restore the servdata.nds file to the failed server.
 - 6f** To specify the path where the servdata.nds file exists, press F3 and enter the path.

If the information fits on a diskette, you can save the information on a diskette instead of another server on the network.
 - 6g** Press Enter to accept the path.
 - 6h** Log in to the server that contains the servdata.nds file.
 - 6i** Log in to the NDS database.

6j If the startup.ncf file of the failed server is different from the default, you can edit the default file.

6k You now can choose from the following:

- ♦ To continue the install and not copy the files from install, but use the backup tapes to finish restoring the information, press Enter.
- ♦ To go back to the previous screen, press Esc.
- ♦ To copy the files from install and then restore the files from tape, press F3.

7 Restore the file system using “Restoring Data” on page 57.

Begin to Restore the Entire NDS Tree Structure

To restore an entire network from a full backup in a multiple-server environment, do the following.

1 Reinstall NetWare on the first server.

By default, this server will hold the master replica of the [Root] partition.

When NWCONFIG asks for the names of Organization objects immediately under the [Root] object, use the same names that existed before in the NDS tree.

In NWCONFIG, select Directory Options > Directory backup and restore options to obtain the information.

Otherwise you will end up with new empty containers in the restored NDS tree.

When this installation is complete, you will have a working NDS tree containing one NetWare server with a master [Root] partition.

2 Add name spaces as required.

3 Install the remaining servers to complete a skeleton of your network.

Before restoring a full NDS session, you should create a skeleton of your network.

- ♦ All servers and volumes should be up and running.
- ♦ Their NDS objects should exist in the NDS tree in the same context as before. (NWCONFIG prompts you for the container in which you want each server to be placed.)
- ♦ Make sure all servers are communicating with one another.

- ♦ Make sure time synchronization is working properly.

NOTE: If you can get some, but not all of the servers backed up, you can still proceed with the restoration. However, you may see errors and experience problems due to NDS objects having dependencies that cannot be resolved.

The User object (Admin or equivalent) used to create the backup session must exist in the same container with the same password and NDS rights as when the backup was performed.

Once this step is completed, you still have just one partition: the [Root] partition. Because of the NWCONFIG program defaults, you now have two replicas of that partition. These are stored on the second and third servers you installed.

- 4** Restore NDS on one server using “Restoring Data” on page 57.

NDS Restore Session Types

You can choose to restore NDS in one of the following ways:

- ♦ “Single Server or an Entire Tree” on page 70
- ♦ “Restore Session to File System” on page 70
- ♦ “Custom NDS Restore” on page 71
- ♦ “Custom File System Restore” on page 72
- ♦ “Server-Specific Information” on page 74
- ♦ “Single File or Directory to File System” on page 74

Single Server or an Entire Tree

To restore NDS on one server or the tree, do the following.

- 1** Restore the entire NDS session from your SMS backup.

You will have no session file to work from at this point. Choose the option to restore without session files.

- 2** Continue with Step 13 of “Restoring Data” on page 57 to restore NDS.
- 3** Restore the file system data to a volume Sys from the SMS backup using “Restoring Data” on page 57.

Restore Session to File System

To restore NDS and a file system, do the following.

- 1 Answer Yes to Proceed With the Restore?
- 2 Continue with Step 13 of “Restoring Data” on page 57.

Custom NDS Restore

To perform a custom NDS restore, do the following.

- 1 Enter SBCON at the server console prompt.
- 2 Select Job Administration.
- 3 Select Restore Options > Advanced Restore Options > Subsets of What to Restore.

See Step 3 of “Custom Restore” on page 62. The screen allows you to choose to include or exclude containers and objects by their complete name.

To specify a subset, do the following.

- 3a Choose any item on the screen.
- 3b Edit the Include or Exclude screen using Insert and Enter.
- 3c Press Esc to save your changes.
- 4 Specify whether or not to overwrite the existing parent or child.
A parent would be a container. A child is an object, which is the lowest level of the NDS tree.

Use the table next to help you decide what to do.

If	Then
You want to overwrite the parent or child that exists on the hard disk, regardless of whether the existing version or the backed-up version has the latest date...	Accept the Yes default for parent or child or both.
You do not want to overwrite the parent or child that exists on the hard disk, regardless of whether the existing version or the backed-up version has the latest date...	Select the option (parent or child or both), and enter N.

- 5 Continue with Step 12 of “Restoring Data” on page 57.

Custom File System Restore

To perform a custom file system restore, do the following.

- 1** Enter SBCON at the server console prompt.
- 2** Select Job Administration > Restore Options > Advanced Restore Options > Subsets of What to Restore.

The screen lists major and minor resources. The word `DEFAULT` indicates that none of that type of subset has been specified.

To specify a subset, do the following.

- 2a** Select any item on the screen.
- 2b** Edit the Include or Exclude screen using Insert and Enter.
- 2c** Press Esc to save your changes.
- 3** (Conditional) If you want to exclude certain types of data from the restore session, select Job Administration > Restore Options > Advanced Restore Options > Open Mode Options and then edit the form.

The backed-up data set contains the various types of data items listed on the screen. By default, all types of data items are included in the restore.

If you want to exclude any item, select it and enter Y. Press Esc when you are finished editing the form.

- 4** (Optional) Restore data to a different workstation or location on a different NetWare server.
 - 4a** Back up the data from the server where it resides.
 - 4b** Exit to the Main Menu.
 - 4c** Select Change Target to Back Up From or Restore To screen from the Main Menu. See “Changing Your Target” on page 56.
- 5** (Optional) Restore data to a different workstation or location within the backed-up server's file system structure.

Follow these important rules about restoring to a new location:

- ♦ When you specify a particular portion of the file system structure as the source location, it does not necessarily mean that this will be the only data restored. You can influence what is restored by using the Include and Exclude options on the Choose Subsets Of What You're Restoring screen (Job Administration > Restore Options > Advanced Restore Options > Subsets of What to Restore).

- ◆ You can only restore to a new location in the name space that is supported by the drive you are restoring to.
- ◆ OS/2 workstation only—On an HPFS drive you can only rename in the OS/2 name space, and on a FAT file system you can only rename in the DOS name space. However, Enhanced SBACKUP displays both names spaces in the log file even though only one is valid.
- ◆ If you do not want to overwrite any subdirectories that might exist in the area you have included, you must specifically exclude them by their full path.

5a Go to Subsets of what you want to restore, press Enter, press Insert, select the name space you want, and enter the name you used for your backup at the Enter the Data Set Name field.

5b Enter the full directory path of the source including the volume name.

5c Enter the full directory path to the new destination.

5d Press Esc to save your changes.

NOTE: The NDS Target Service Agent (TSANDS) does not support restoration of data to a different location.

6 Specify whether to overwrite the existing parent or child.

A parent might be a server, a volume, or a directory. A child is a file, which is the lowest level of the file system structure.

Use the table to help you decide what to do:

If	Then
You want to overwrite the parent or child that exists on the hard disk, regardless of whether the existing version or the backed-up version has the latest date...	Accept the Yes default for parent or child or both.
You don't want to overwrite the parent or child that exists on the hard disk, regardless of whether the existing version or the backed-up version has the latest date...	Select the option (parent or child or both), enter N.
You want to overwrite the child that exists on the hard disk only if the date of the backed-up copy on the media is later than the date of the copy on the hard disk...	Select Overwrite Existing Child and choose the option.

7 Continue with Step 13 of “Restoring Data” on page 57.

Server-Specific Information

To view and change server information, do the following.

- 1** Select Main Menu > Job Administration > Restore Options > Advanced Options > Subsets of What to Restore > Include Major TSA Resources.
The Selection List Options screen appears and is empty.
- 2** Press Enter to see the Selection List Options. Press Insert to see the server specific information.
- 3** Highlight the Server-Specific Info and press Enter.
Esc returns you to the Selection List Options.
This will return you to the Choose Subset of the Session to be Restored screen.
- 4** Complete the form and press Esc.
This will return you to the Restore Options screen.
- 5** Complete the Restore Options form and press Esc.
The server-specific information will be restored to the `sys:system\failed_server_name` directory of the server on which you are running Enhanced SBACKUP.
- 6** Continue with Step 13 of “Restoring Data” on page 57.

Single File or Directory to File System

To restore a file or directory, do the following.

- 1** Select Main Menu > Job Administration > Restore Options > Advanced Options > Subsets of What to Restore.
- 2** Enter the full path and name of the file or directory, including full directory and volume names.
The following options appear:
Include/Exclude directories (full path)
Include/Exclude files
Include/Exclude path/files
- 3** Press Insert and enter the name space for the name space format you used when entering the file or directory name.

The name space allows Enhanced SBACKUP to correctly interpret the path information entered earlier in this menu in either the directory field or the location field.

NOTE: If files are restored to a new location, the name spaces must be the same or an error message will occur.

You can restore to a new location only in the name space that is supported by the drive to which you are restoring.

The supported name spaces are DOS, FTAM, Macintosh, NFS, and long.

Enhanced SBACKUP provides a list of the name spaces currently loaded on the target to which you are restoring.

For example, if you are restoring to a new Macintosh location, enter a path, for example, **sys::test:monday**, then enter **Macintosh** as your name space.

4 (Optional) Restore to a new location (located in Rename Data Sets).

4a Enter the source path, including the volume name, to the target directory (a location different from where the data was backed up). Type *Volume:/directory/directory*.

4b If the new location you are restoring to is a different NetWare server, do the following:

1. Back up the data from the server where it resides.
2. Exit to the Main Menu.
3. Change your target to the server you want to restore the data to. See “Changing Your Target” on page 56.

5 Continue with Step 13 of “Restoring Data” on page 57.

Complete the NDS Restore

If you restored the NDS database to volume Sys, you should complete the restoration for one of the following to make sure the NDS database is working properly:

- ♦ “Begin to Restore a Volume Other than Sys” on page 66
- ♦ “Multiple-Server Network” on page 76
- ♦ “Single-Server Network” on page 76
- ♦ “Entire Tree” on page 76
- ♦ “Partial NDS Restores” on page 77

Volume Other than Sys

To finish restoring NDS on a volume other than Sys, do the following.

- 1** Bring the server up.
- 2** (Optional) Verify proper restoration of the data, trustee assignments, file ownership, and other related information by spot-checking some of the restored directories and files.

Single-Server Network

To finish restoring NDS on a server, do the following.

- 1** Restore the full file system following “Restoring Data” on page 57.
- 2** (Optional) Verify proper restoration of the data, trustee assignments, file ownership, and other related information by spot-checking some of the restored directories and files.

Multiple-Server Network

To finish restoring NDS on multiple servers, do the following.

- 1** Restore replicas to the server.

Use the NDS Manager utility to create partitions and replicas.

The file, `dsmisc.log`, which is created when the `servdata.nds` file is restored, contains the partition and replica information that resided on the failed server at the time of the backup. This will show you what replicas were on the server when it failed.

- 2** (Optional) Verify proper restoration of the data, trustee assignments, file ownership, and other related information by spot-checking some of the restored directories and files.

Commands that might be helpful include `RIGHTS /T /S` (displays users, groups and other objects that have explicit trustee assignments in a directory and its subdirectories) and `NDIR` (displays owners and other NetWare file information).

Entire Tree

To finish restoring NDS on the tree, do the following.

- 1** Restore the file system information to each server following “Restoring Data” on page 57.

2 Re-create partitions and replicas.

Use the NDS Manager utility to create partitions and replicas.

3 (Optional) Verify proper restoration of the data, trustee assignments, file ownership, and other related information by spot-checking some of the restored directories and files.

Commands that might be helpful include RIGHTS /T /S (displays users, groups and other objects that have explicit trustee assignments in a directory and its subdirectories) and NDIR (displays owners and other NetWare file information).

Partial NDS Restores

Certain conditions may arise in special cases involving the backup and restoration of NDS information.

The SMS TSA software allows you to do selective restores from the backup media. However, partial restoration of NDS from a backup can have many subtle consequences, particularly when only a single object or a selected group of objects is restored.

For partial NDS restores, keep these two main issues in mind:

- ♦ **Object ID numbers** —If you restore objects that no longer exist in the NDS tree, those objects receive new ID numbers when restored. New object IDs affect file system trustees, print queue directories, user mail directories, etc.

If you restore objects on top of objects that exist in the NDS tree, the objects do not receive new ID numbers. These objects' current attribute and property information is overwritten with previous information from the SMS backup.

- ♦ **Objects that depend on other objects** —In the NDS schema, objects are defined to have certain attributes. Some of these attributes are mandatory (meaning they must contain a value); others are optional.

For some NDS objects, the value for a particular attribute is a reference to another object upon which the object depends. For example, Queue object has a Queue Directory attribute that contains the file system path to the queue directory. It also has a Host Server attribute that identifies the file server on which the queue directory resides. This information is used to determine the physical location of the resource.

The specifics of restoring objects vary depending on what type of object is involved and whether the object's dependencies are physical entities (servers and volumes) or logical entities.

In some cases, you can simply restore an object and everything will work fine. In other cases, an object may be restored but not be functional unless you first restore its dependent object(s).

3

Managing

After you install and load Enhanced SBACKUP, you can manage your jobs, data, devices, reports, and so on either from the server or from a workstation. Though the screens may look different, you can perform the same tasks in each interface.

Be sure to read “Prerequisites for Enhanced SBACKUP Tasks” on page 79 before performing any tasks in this section.

Procedures for managing backups include the following:

- ♦ How to place a job on hold or rename it. See “Viewing or Changing Job Details” on page 82.
- ♦ How to check or rename your devices. See “Storage Devices” on page 84.
- ♦ How to erase or retention your media. See “Using Media Utilities” on page 88.
- ♦ How to span media for extra backup storage space. See “Spanning Storage Media” on page 91.

Prerequisites for Enhanced SBACKUP Tasks

Before you can manage any backup tasks, make sure you have performed the following general tasks:

- ☐ Load the drivers for your specific device and controller board.
- ☐ Load the Enhanced SBACKUP files for your specific target.
- ☐ Insert the media into your storage device.

- ❑ Be sure you can see the Enhanced SBACKUP Main Menu on your server console or the Quick Access window on your Windows 95 or Windows NT workstation.

Administering Jobs

Job management means you can delete, hold, reschedule, abort, or enable a job. You can perform these tasks either at the server (immediately following) or at the workstation (see “Administer Jobs from a Workstation” on page 80).

Administer Jobs from the Server

On the Enhanced SBACKUP Main Menu at the server, the Current Job List option gives you a job management facility where you can delete a job, hold a job, or enable it if it has been disabled after a job failure. You can even monitor the status of the backup/restore jobs you have submitted.

Current Job List provides the following information about all jobs submitted.

- ♦ **The name of the server from which the job was submitted** . If you initiated the job from the client, locate the workstation name. See “Viewing the Job Queue” on page 81.
- ♦ **The job name that you entered on the Backup Options form** . The job name can be renamed using the Job Details screen if you are rescheduling it to run another time and you want to change the name. See “Viewing or Changing Job Details” on page 82.
- ♦ **The Hold status** . If you want to prevent a prescheduled job from execution, you can put it on Hold. See “Postponing a Job” on page 83.
- ♦ **The job status, whether it finished the execution of the request, or if it was submitted for execution at a later time** . Other statuses are: active currently, could not run, processing, failed, and success. The log of each of these status reports can be viewed using the log and error reporting. For more details see “Log and Error Files” on page 92.

Administer Jobs from a Workstation

On Job Administration at the Quick Access window of a Windows 95 or Windows NT workstation or at the toolbar, you can access the current list of jobs. If you select a job, you can see the properties, which include:

- ♦ **General properties** contains fields for the Job Name, Job Type, Submitted By, Entry Open, and Serviced By. These fields are the same as

the Job Details screen at the server. See “View or Change Job Details from the Server” on page 82 for more information.

- ♦ **Static properties** contains fields for the Job Status, Job Submitted At, Execution Time, and Job's Rescheduled Count. See “View or Change Job Details from the Server” on page 82 for more information.
- ♦ **Dynamic properties** contains data that indicates how much data has been backed up along with the file names. This dialog box appears when a job is running and SBSC is loaded on the server.
- ♦ **Enable job** allows you to start a job that has been disabled.
- ♦ **Delete the job** allows you to remove a job.
- ♦ **Start/Hold the job** allows you to start a job that is in the hold state or place it on hold if it is not in a hold state.
- ♦ **Reschedule options** contains a fields for changing the backup schedule.
- ♦ **Abort** cancels an active job.

Viewing the Job Queue

This task allows you to view your jobs.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

View the Job Queue from the Server

To view the Current Job List, do the following.

- 1** Select Main Menu > Job Administration > Current Job List.

The Queue Jobs screen displays a list of all jobs, showing each job name, hold status, status of the job, and name of the server from where the job was submitted.

View the Job Queue from a Workstation

To view the job list from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Job Administration at the Quick Access window.
- 2** Double-click the context of the queue location.
- 3** Double-click Queues.

A list of jobs appears.

4 Click the job.

5 (Optional). Right click to view the properties of the job.

Or you can view the properties using the toolbar. Click Job Administration > Properties.

Viewing or Changing Job Details

This screen gives you all the details of the job you submitted including job name, the time the job was submitted, and the time the job should be executed. You can also schedule the job to run at a predefined time again after its execution.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

View or Change Job Details from the Server

To view and change jobs, do the following.

- 1** Select Main Menu > Job Administration > Current Job List.
- 2** Choose one of the jobs listed and press Enter.

The Job Details screen appears.

- ♦ **Job Name**— A descriptive name of the job for your identification. You can change the name if you want to reschedule the job and run it again.
- ♦ **Disabled**— Indicates whether the job is disabled. If it is, this field displays **Yes**; if enabled, it displays **No**. Updates to this field depend on the job status. If the job status says **Could Not Finish**, the message is **Yes**. You can perform the required troubleshooting, and change this field to **No**, subsequently allowing the job to execute. After completion of the job, the Disabled field indicates **Yes**.
- ♦ **Submitted By**— The name of the server where you have submitted the job. If you submitted the job from a client, it displays the name of the workstation and is the same as the Owner in the Queue Jobs screen.
- ♦ **Submitted at**— The date and time the job was submitted. The execution time could be different depending upon the specifications

you defined in Execution Time and Scheduling Options in the same screen.

- ♦ **Entry Open**— The status is **Yes** when the job is active and **No** when it is inactive. This is one of the fields that is updated automatically.
- ♦ **Execution Time**— An option to give the time and date when you want the job to run. It is the same as the Execution Time in the Advanced Backup Options form.
- ♦ **Serviced By**— This indicates the name of the server where the job is to be executed. From a single server, you can submit jobs to various servers. This field indicates which job is serviced by which server. This field is active only when the job is active, otherwise it indicates **None**.
- ♦ **Scheduling Options**— You can schedule the same job to run at another time. For information, see “Custom Backup” on page 50.
- ♦ **Session Report**— Press Enter at this field to view the session log report or the session error report for the particular session you selected. The same information can be seen in the Error Log File where it gives a log of all the jobs. For information, see “Viewing a Log File” on page 92.

View or Change Job Details from a Workstation

To view information about a job from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Job Administration at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.
- 4** Click the job to view or change.
- 5** (Optional). Right click the job to view the static properties.

Or you can view the properties using the toolbar. Click Job Administration > Properties.

Postponing a Job

This task allows you to place a job on hold.

- ❑ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Postpone a Job from the Server

To hold a job, do the following.

- 1** Select Main Menu > Job Administration > Current Job List.

The Queue Jobs screen appears with a list of jobs.

- 2** Select a job and press Tab.

The job is on hold if `Hold` is displayed in the column. If no status is displayed, it is ready for execution at the time you configured it. Press Tab to toggle holding a job.

Postpone a Job from a Workstation

To place a hold on a job from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Job Administration at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.
- 4** Click the job to place on hold.
- 5** (Optional). Right click to view the static properties.

Or you can view the properties using the toolbar. Click Job Administration > Properties.

Storage Devices

The Storage Device Administration option of the Enhanced SBACKUP Main Menu at the server or the Device Administration button at a Windows 95 or Windows NT workstation lists the devices and the media you can access.

You can perform the following administrative tasks:

- ◆ “Checking the Device Status” on page 85
- ◆ “Changing the Device Label” on page 86
- ◆ “Viewing the Media List” on page 87
- ◆ “Using Media Utilities” on page 88

- ♦ “Checking Media Status in a Device” on page 90
- ♦ “Spanning Storage Media” on page 91

Enhanced SBACKUP supports autoloader, which holds multiple media within a magazine. Every magazine has slot numbers given by the manufacturer and each slot holds a single medium. This is extremely useful when you are backing up a large server. If one medium is fully written, the SME automatically writes to the other available media.

NOTE: Any media under a device becomes inaccessible if a job is running on it because it is reserved by the engine. Any job scheduled to be executed at that instance will fail.

Checking the Device Status

The Device Status screen displays information about the current status of a device, such as read, write, format, etc. It also gives information on the storage capacity.

- ❑ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Check the Device Status from the Server

To check the status, do the following.

- 1** Select Main Menu > Storage Device Administration.

A list of devices is displayed.

- 2** Select a device and press Insert.

The Utilities screen appears.

- 3** Select Utilities > Device Status.

The Device Status screen is displayed listing the following:

- ♦ **Current Operation**— Indicates whether the device is currently reading, writing, formatting the media, or none of these.
- ♦ **Device Mode**—Indicates whether the device is selected for reading, writing, or both.
- ♦ **Maximum Capacity**— Indicates the total storage capacity of the media currently present in the device.

- 4** Press Esc when you are finished to return to the Main Menu.

Check the Device Status from a Workstation

To check the status of a device from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Device Administration at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.
- 4** Double-click the preferred queue.
- 5** Double-click Servers.
- 6** Double-click the preferred server.
- 7** Double-click Devices.
- 8** Right click the device to check.
- 9** (Optional). Right click to view the properties.

Or you can view the properties using the toolbar. Click Device Administration > Properties.

You can view the Device Label or Device Type.

Changing the Device Label

The default names for storage devices are controlled by the device manufacturers. These names are often not descriptive, so you change the name of the device during multiple backup sessions. However, this change is temporary, and it is lost after a reboot. If you have several devices, it might be difficult to remember which name goes with which device. For this reason, renaming storage devices is helpful.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Change the Device Label from the Server

To change the label, do the following.

- 1** Select Main Menu > Storage Device Administration.
A list of devices is displayed.
- 2** Select a device name and press Insert.

- 3** Select Utilities > Change the Device Label.
- 4** Enter the new name in the field.
- 5** Press Esc as required to return to the Main Menu.

Change the Device Label from a Workstation

To change the label from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Device Administration at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.
- 4** Double-click the preferred queue.
- 5** Double-click Servers.
- 6** Double-click the preferred server.
- 7** Double-click Devices.
- 8** Right click the device to change.
- 9** (Optional). Right click to view the properties.
Or you can view the properties using the toolbar. Click Device Administration > Properties.
- 10** Click Properties.
- 11** Click Device Label.

Change the name in the Device Label field.

Viewing the Media List

This task allows you to view your list of devices.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

View the Media List from the Server

To view your devices, do the following.

- 1** Select Main Menu > Storage Device Administration.
A list of devices is displayed.

If no device is displayed in the list, run **LIST DEVICES** at the server prompt.

- 2 Select a device name and press Enter.

The List of Media screen appears with media name and other details.

- ♦ **Slot** —The slot number given by the manufacturer.
- ♦ **Media name** —The name of the media, which can be changed using the Utilities menu. See “Using Media Utilities” on page 88.
- ♦ **Number** —The sequential number of the media (tape) in a particular backup set. Enhanced SBACKUP automatically labels and appends an incremental number to any backup session that spans multiple media.

NOTE: It takes a lot of time to display the media in an Autoloader. However, once the media list is displayed, press Tab to access it. This will not rescan the device for new media. Press Enter only when you remove or add media.

View the Media List from a Workstation

To view the list from a Windows 95 or Windows NT workstation, do the following.

- 1 Click Device Administration at the Quick Access window.
- 2 Double-click the context.
- 3 Double-click Queues.
- 4 Double-click the preferred queue.
- 5 Double-click Servers.
- 6 Double-click the preferred server.
- 7 Double-click Devices.
- 8 Right click the preferred device.
- 9 View the media list.

Using Media Utilities

This task erases media headers, erases all data on the media, or retensions media in tape devices.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Administer Media from the Server

To erase or retention the media, do the following.

- 1 Select Main Menu > Storage Device Administration.

A list of devices is displayed.

- 2 Select one device.

A list of media is displayed.

- 3 Select a media name and press Insert.

- 4 Select Utilities > Erase the media or Retention of media option.

The following table explains each option.

Option	Explanation
Change the Media Label	This is permanent. Blank media (tape) does not have a label. Before submitting a job to the media, you need to label it.
Erase the Media	This option erases the tape completely. It might take up to two hours, depending on the size of the media.
Erase the Media Header	This is a quick method of making the media appear blank. Although it is less secure than erasing all the data, this method is quick and effective.
Media Status	See “Checking Media Status in a Device” on page 90 for information.
Move the Media	This option moves the media from one slot of an autoloader to another slot. It is not a valid operation on a single media device.
Retention of Media	This option is for tape devices that allow retention (For example, 0.25-inch cartridges). This rewinds the tape, which might resolve a problem reading the tape. An error appears if the driver does not support this method on the device.

Administer Media from a Workstation

To erase or retention media from a Windows 95 or Windows NT workstation, do the following.

- 1 Click Device Administration at the Quick Access window.
- 2 Double-click the context.
- 3 Double-click Queues.

- 4 Double-click the preferred queue.
 - 5 Double-click Servers.
 - 6 Double-click the preferred server.
 - 7 Double-click Devices.
 - 8 Right click the media to erase or retention.
 - 9 (Optional). Right click to view or change the properties.
- Or you can view the properties using the toolbar. Click Device Administration > Properties.

Checking Media Status in a Device

This task allows you to check the status of a particular media type.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Check the Media Status from the Server

To check your media, do the following.

- 1 Select Main Menu > Storage Device Administration.
- 2 Select one device name.
A list of media is displayed.
- 3 Select one media and press Insert.
- 4 Select Utilities > Media Status.

A screen is displayed listing the following information:

- ♦ **Number in Media Set**— This indicates the sequential number of the media within a particular media set.
Enhanced SBACKUP automatically labels and appends an incremental number to any backup sessions that span multiple media.
- ♦ **Creation time**— The time the current media label was first used on this media.
- ♦ **Mount status**— This indicates whether the media is Mounted (ready for reading or writing). There are two status messages:
Mount Pending: The request to mount is waiting to be processed.

Not Mounted: The media not ready to access.

- ♦ **Media mode**— This indicates whether the media is selected for reading, writing or both, or whether the mount request is pending.
- ♦ **Media type**— This indicates the type of media in the device, such as 4mm DDS (Digital Data Storage) tape, 8mm tape, etc.
- ♦ **Total capacity**— This indicates the total capacity of the media, if known. Sometimes it is not displayed, depending on the media manager.

The type of media manager controls the display of the total capacity of the media.

5 Press Esc when you are finished to return to the Main Menu.

Check the Media Status from a Workstation

To check your media from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Device Administration at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.
- 4** Double-click the preferred queue.
- 5** Double-click Servers.
- 6** Double-click the preferred server.
- 7** Double-click Devices.
- 8** Right click the preferred media.
- 9** (Optional). Right click to view the properties.

Or you can view the properties using the toolbar. Click Device Administration > Properties.

- 10** Highlight and click Media Status.

Spanning Storage Media

If the storage media you are using does not have enough space for the entire backup, Enhanced SBACKUP will span the media, prompting you to insert additional media when the first medium is full.

HINT: Always have extra media on hand in case the backup session spans more than one medium.

Enhanced SBACKUP designates the first media as label #1 and increments any subsequent medium with the same label.

WARNING: To help safeguard your network, Enhanced SBACKUP disconnects from the target when a delayed backup is complete. If the delayed backup session cannot fit on the media, Enhanced SBACKUP prompts you to insert additional media. If additional media are not inserted, the backup does not finish and Enhanced SBACKUP does not disconnect, thus compromising security.

Log and Error Files

Enhanced SBACKUP keeps a list of all the log and error files. These lists show specific information about the backup session. See “Session Files” on page 34 for more information.

You can manage these files as follows:

- ♦ View information contained in the log and error files. See “Viewing a Log File” on page 92 and “Viewing an Error File” on page 94 for information.
- ♦ Create these files. See “Creating Log and Error Files” on page 95 for information.
- ♦ Change their location. See “Setting the Location of Log and Error Files” on page 95 for information.
- ♦ Delete these files. See “Deleting the Log Files” on page 96 for information.

Viewing a Log File

This task allows you to view your log file for backup information. The log file is created on the host server the first time data is backed up, and contains details about the backup.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

View a Log File from the Server

To view the log file, do the following.

- 1** From the Enhanced SBACKUP Main Menu select Log File Administration > View a Log File.
- 2** If necessary, set the location of the log and error files.

To set the location, use one or more of the following methods.

- ◆ Press Enter to accept the default location, and then go to Step 3.
- ◆ Press Insert to select from a list of network directories, select a directory, and then press Esc to return to the previous window; then go to Step 3.
- ◆ To change the directory, delete the existing directory path and type a new one, and then go to Step 3.

You can also press Insert during this process to select existing parts of the path from a list.

The backup log displays all supported name space types. The DOS name space is the first in the group. A right angle bracket (>) appears next to the file creator's name space type.

If you have linked UNIX files, Enhanced SBACKUP retains both symbolic and hard links created under the NFS name space type, but links are not listed in the backup log. Restoring the original file restores associated links.

- 3** To return to the Main Menu, press Enter and then Esc.

The Esc key allows you to exit Enhanced SBACKUP one screen at a time until you reach the Main Menu. If you want to exit Enhanced SBACKUP, press Esc again and answer the confirmation prompt.

NOTE: To unload Enhanced SBACKUP and applicable Target Service Agents, see "Unloading Enhanced SBACKUP" on page 45.

View a Log File from a Workstation

To view a log file from a Windows 95 or Windows NT workstation, do the following:

- 1** Click Reports at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.

- 4** Double-click the preferred queue.
- 5** Double-click Servers.
- 6** Right click the preferred server.
- 7** Select Session Report.

The server displays where the report is located.

Viewing an Error File

An error file records any errors that occurred during the backup or restore session. (See “Session Files” on page 34.)

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

View an Error File from the Server

To view an error file, do the following.

- 1** From the Enhanced SBACKUP Main Menu, select Log File Administration > View an Error File.
- 2** If necessary, set the location of log and error files.

To set the location, use one or more of the following methods.

- ◆ Press Enter to accept the default location, and then go to Step 3.
- ◆ Press Insert to choose from a list of network directories, choose a directory, and then press Esc to exit; then go to Step 3.
- ◆ To change the directory, delete the existing directory path and type a new one, and then go to Step 3.

You can also press Insert during this process to choose existing parts of the path from a list.

Restore errors are appended to a session's backup error file. A *Restore Session Begins* message marks the beginning of the restore errors, if any exist.

If you linked UNIX files, symbolic and hard links created under the NFS name space type might not be restored if the path name is not recognized. When this happens, the error file contains messages similar to the following:

Error restoring namespace specific information of

XXXX:tmp/hosts in NFS namespace, error 0x7!

Unable to allocate directory handle for XXXX:tmp/test!

3 When you are finished viewing the file, press Esc.

4 To return to the Main Menu, press Esc as required.

The Esc key allows you to exit Enhanced SBACKUP one screen at a time until you reach the Main Menu. If you want to exit Enhanced SBACKUP, press Esc again and respond at the confirmation prompt.

NOTE: To unload Enhanced SBACKUP and applicable Target Service Agents, “Unloading Enhanced SBACKUP” on page 45.

View an Error File from a Workstation

To view an error file from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Reports at the Quick Access window.
- 2** Double-click the context.
- 3** Double-click Queues.
- 4** Double-click the preferred queue.
- 5** Double-click Servers.
- 6** Right click the preferred server.
- 7** Select Error Report.

Creating Log and Error Files

If you do not know what is on the media, or you have lost or deleted the log and error files, you can re-create them.

- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

To create a log or error file, do the following.

- 1** See “Creating Session Files” on page 97.

Setting the Location of Log and Error Files

Every time you do a backup or restore, you are required to set a location (or directory path) for the log and error files.

You can set the location when requested in the backup or restore procedures, or you can use the following method prior to beginning the backup or restore procedures.

- ❑ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Set the Log and Error File Location from the Server

NOTE: You cannot perform this task at the workstation.

To set the location, do the following.

- 1** From the Enhanced SBACKUP Main Menu, select Log File Administration > Set Location of Log and Error Files.
- 2** Set the location.

To set the location, use one or more of the following methods:

- ◆ Press Enter to accept the default location, and then press Esc to return to the Main Menu.
- ◆ Press Insert to select from a list of network directories, select a directory, and press Esc twice to return to the Main Menu.
- ◆ Press Backspace over the path shown (or a portion of the path), type a new directory or path, press Enter, and then press Esc to return to the Main Menu.

You can also press Insert during this process to select existing parts of the path from a list.

- 3** Press Esc when finished to return to the Main Menu.

Deleting the Log Files

Enhanced SBACKUP allows you to overwrite sessions and reuse storage media.

When you delete the log file for a session using the following procedures, you automatically delete the corresponding error file as well.

To prevent outdated session information from taking up disk space and to help prevent confusion when you select sessions to view or restore, delete the session log files for any session that has been overwritten.

- ❑ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Delete a Log File from the Server

NOTE: You cannot delete log and error files at the workstation.

To delete the log and error files, do the following.

- 1** From the Enhanced SBACKUP Main Menu, select Log File Administration > View a Log File.
- 2** If you have not set the location of log and error files, do so now.

You can use one or more of the following methods:

- ◆ Press Enter to accept the default location; then go to Step 3.
- ◆ Press Insert to select from a list of directories, select a directory, and press Esc to return to the previous window; then go to Step 3.
- ◆ Press Backspace over the path shown (or a portion of the path), and type a new directory or path; then go to Step 3.

You can also press Insert during this process to select existing parts of the path from a list.

- 3** Select the description of the session that you have overwritten (or plan to overwrite) and press Delete.

A confirmation prompt is displayed.

- 4** To delete the log and error file for that session, click Yes.
- 5** Press Esc when finished to return to the Main Menu.

Creating Session Files

If you do not know what is on the media, or you have lost or deleted the log and error files, you can re-create them.

- ❑ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Create Session Files from the Server

To create new session files, do the following.

- 1 From the Enhanced SBACKUP Main Menu, select Job Administration > Create Session File.

The Session Files Options screen appears.

- 2 Enter a descriptive name.
- 3 Select the media you will be using. If you only have one loaded, press Enter to accept the default.
- 4 To verify the media, press Enter.

Enhanced SBACKUP reads the media and shows you the selected session.

- 5 Confirm the creation of the session files.

If the session selected is the session you want for log and error file creation, click Yes, Create Files for This Session.

If the session selected is not the session you want for log and error file creation, click No, Go to the Next Session.

- 6 If you elect to create session files, they will be created in the location you chose.

Create Session Files from a Workstation

To create new session files from a Windows 95 or Windows NT workstation, do the following.

- 1 Click Create Session at the Quick Access window.
- 2 Double-click the context.
- 3 Double-click Queues.
- 4 Select the preferred queue.
- 5 Double-click Servers.
- 6 Select the preferred server.
- 7 Double-click Devices.
- 8 Select the preferred device.
- 9 Select the preferred media.

- 10** Right click and highlight Submit the Job.
- 11** Check the appropriate fields in the Submission of Job dialog box.

Verifying Backup Data

This option allows you to check the data on the media to make sure it has been backed up properly, and to check later that the data is valid and can be restored.

You can verify the backup data in two ways.

- ♦ If you know what sessions are on the media and you have the log and error files, you can select the session from the list.
 - ♦ If you do not know what sessions are on the media, and if you are not sure the log and error files still exist, you should create the session files.
- ☐ Ensure that you have met the prerequisites detailed in “Prerequisites for Enhanced SBACKUP Tasks” on page 79.

Verify Backup Data from the Server

To check the data on your media, do the following.

- 1** Select Main Menu > Job Administration > Verify

The Verify Options screen appears.

- 2** Give a descriptive name for the verify job.

- 3** Select the device and media of the job.

You can manually enter this in the form *device name.media name*.

- 4** Press Enter on the Session to Restore field from the Verify Options screen.

A list of all backup sessions is displayed in the Select A Session screen.

- 5** Select a session from the list.

- 6** Submit the job after confirming the Submit Job? prompt.

- 7** Select Job Administration > Current Job List.

- 8** Select the job you have submitted.

If there were no problems with the verification or the data, the Run Time Status screen displays the following message:

The verification process was completed normally.

Verify Backup Data from a Workstation

To check the data on your media from a Windows 95 or Windows NT workstation, do the following.

- 1** Click Verify at the Quick Access window.
- 2** Double-click or change the context if necessary.
- 3** Double-click Queues.
- 4** Double-click the preferred queue.
- 5** Double-click Servers.
- 6** Double-click the preferred server.
- 7** Double-click Devices.
- 8** Double-click the preferred device.
- 9** Right click the preferred media.
- 10** Highlight Submit the Job.
- 11** At the Submission of Job dialog box, click the session.
- 12** Click Finish.

4

Optimizing

Procedures for enhancing or optimizing backup performance include the following:

- ♦ Whether you should compress your files before backup. See “Compressed Files” on page 101.
- ♦ How to increase speed when backing up your files. See “Host Server Performance” on page 102 and “Changing the Size and Number of Buffers” on page 103.
- ♦ How to enhance or optimize server performance. See “Setting Minimum Packet Receive Buffers” on page 103.
- ♦ How to synchronize memory between your media and your server. See “Setting Reserved Buffers Below 16 MB” on page 104.

Compressed Files

WARNING: Enhanced SBACKUP and file compression should not be run simultaneously. Because the default time for both delayed Enhanced SBACKUP sessions and compression is midnight of the current day, change one of these defaults to another time immediately.

If you want to perform a delayed backup that includes files flagged for compression, schedule the delayed backup after the compression time to allow time for the compression to be completed.

When a NetWare 5 or NetWare 4 volume is mounted, file compression is set to ON by default. When you perform a backup using TSA500, you can specify whether to keep already-compressed files in a compressed state for the backup, or back them up in a decompressed state.

To help you make a decision about whether to compress or decompress your backed up data, follow these guidelines:

- ♦ Backups are faster if files already compressed are left compressed.
- ♦ Compression is not supported in some environments (such as a NetWare 3.11 server, a DOS workstation, or Novell Storage Services). If you intend to restore a file that is currently compressed to an environment that does not support compression, back it up in a decompressed state.
- ♦ The Enhanced SBACKUP utility has no compression feature, so it cannot compress a file that is currently decompressed.
- ♦ If volume compression is turned on and you back up compressed files in a decompressed state, restore speed is degraded if you overwrite existing files.

To improve restore speed, delete the files you no longer want from the hard disk before restoring them from the backup media. If you back up compressed files in a compressed state, restore speed is not affected.

- ♦ You might run out of disk space if you restore decompressed files to a volume that compresses files.

Host Server Performance

The speed of the Enhanced SBACKUP utility depends upon the configuration of the host server, and on whether the server is backing up its own data or that of another server or workstation.

For information on server configuration and setting parameters, see [Communications Parameters](#) and [File Caching Parameters](#) under SET in [Utilities Reference](#).

A server backing up its own data runs about twice as fast as a server backing up data from another server.

This section includes four options using LOAD and SET commands that can enhance your host server's performance:

- ♦ “Changing the Size and Number of Buffers” on page 103
- ♦ “Setting Minimum Packet Receive Buffers” on page 103

- ♦ “Setting Maximum Subdirectory Level and Minimum Cache Buffers” on page 104
- ♦ “Setting Reserved Buffers Below 16 MB” on page 104

Changing the Size and Number of Buffers

If your server has sufficient free memory, or if it has memory that is not being used, you can speed up a backup session by increasing the number and size of the transfer buffers used by Enhanced SBACKUP to move the data to or from the tape.

You can change the size and number of buffers when you load Enhanced SBACKUP. To do this, at the server console prompt enter:

```
LOAD SBACKUP SIZE= XXX BUFFER= X
```

Select the size and number of buffers from the following chart:

Option	Range
Size	16, 32, 64, 128, or 256 KB (Default: 64 KB)
Buffers	2 to 10 (Default: 4)

Setting Minimum Packet Receive Buffers

Packet receive buffers represent the space in the server memory dedicated to handling network traffic. If the buffers are set too low, the server performance may be degraded.

To reset the packet receive buffers at the server console prompt, include the following SET command in your startup.ncf file:

```
SET MINIMUM PACKET RECEIVE BUFFERS = X
```

The *x* represents the number of buffers. Set two buffers for each user on the system. The minimum is 10. The changes will take effect immediately.

Setting Maximum Subdirectory Level and Minimum Cache Buffers

If you change the maximum subdirectory level in the server's startup.ncf file, you must also change the minimum cache buffer. The default maximum subdirectory level is 25.

To change the cache buffers at the server console prompt, do the following.

Include the following commands in the autoexec.ncf file:

```
SET MINIMUM FILE CACHE BUFFERS= X  
SET MAXIMUM DIRECTORY CACHE BUFFERS= X
```

The SET command changes the minimum and maximum directory in MONITOR > Available Options > Server Parameters. The changes will take effect immediately.

Setting Reserved Buffers Below 16 MB

If your storage device driver requires memory below 16 MB, and the server has more than 16 MB available to it, you must reserve memory below 16 MB for the driver.

To change the reserve memory at the server console prompt, include the following command in the startup.ncf file:

```
SET RESERVED BUFFERS BELOW 16 MEG= X
```

Replace the x with a number between 8 and 300. The default is 200. You can also make these changes in MONITOR > Available Options Menu > Server Parameters > Memory. Your changes will take effect immediately.

5

Troubleshooting

Common Backup Problems

Problems associated with Enhanced SBACKUP and SMS are included in the following table.

Table 2 Troubleshooting for Problems

Problem	Possible cause	Solution
The media owner is Unidentified.	Media is blank or was written in a non-SIDF format.	See “Checking Media Status in a Device” on page 90
Backup speed is slow.	Compressed files are being backed up in a decompressed format.	See “Compressed Files” on page 101
Restore speed is slow.	File compression and are running at the same time. Compressed files are being overwritten with decompressed files.	See “Host Server Performance” on page 102
Data is corrupted, but no error message was given.	Compressed files were restored to a volume without compression.	See Step 10 under “Restoring Data” on page 57
The target you want is not listed.	The Target Service Agent isn't loaded on the desired target. has not had time to find the target.	See “Backing Up Data” on page 46 Allow more time for the software to find the target.

Problem	Possible cause	Solution
	The host and target are physically far apart and network traffic is heavy.	Wait for non-peak hours to perform a backup or when fewer users are logged in.
You (the network administrator) can't back up a workstation.	The /Password option is set and is denying access to data on the workstation.	See "Set Rights to Back Up Portions of the NDS Tree" on page 24.
	Backup was attempted from two different servers at the same time. One succeeded and the other one failed.	Check to make sure all necessary backup software is installed loaded.
A backup does not contain all changes.	Differential and incremental backups were combined.	Use one or the other of these types in conjunction with full backups. See "Backup Types" on page 15
Changed files are not recognized.	The modify bit was cleared after the last customized backup, so changed files are not recognized.	See "Backup Types" on page 15
You cannot find the session log file you want.	It might be in a different directory, or you might have deleted it accidentally.	See "Deleting the Log Files" on page 96
Pressing Insert on a device list does not produce a media list at the server.	No medium has been selected.	Use the Select option at the bottom of the screen.
The time form is invalid message is displayed when you try to schedule a delayed backup.	The date has been entered incorrectly in the time form.	Press F1 for help with the time or date format. Check that the scheduling has been entered correctly.
Files were restored but the error file contains a message specifying which name space formats were not restored.	The file attributes and name space formats are not configured on the volume you restored to.	Check to make sure you selected the correct name space.
Can't list devices or see the Session/Error Report from the client. The message Unable to Establish Communication with Server appears.	A client-server communication problem.	1. Check whether SBSC is loaded on the server. If not, load it. 2. If SBSC is already loaded, unload it and load it again.



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