

Appendix C Disaster Recovery

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Introduction

This section provides instructions for helping you to prepare for disasters (such as complete server failures). It outlines the steps you should perform prior to running recovery procedures. The basic topics are outlined below.

Disaster Recovery

Any organization that has experienced data loss due to a server failure or complete on-site disaster knows that disaster recovery planning involves more than just installing backup devices and reliable software.

You need software that can manage the complete recovery of your data as it existed before the disaster. Backup Director not only provides backup operations, but ensures your data is properly protected both on and offsite using its automated media scheduling and flexible backup schemes.

TIP: Fires, earthquakes, winter storms, floods, etc. are always in the news. But broken water pipes, theft, long term power and telephone outages, etc. can also make it necessary to temporarily relocate critical business operations.

Palindrome Prepare! software is designed to simplify the creation and maintenance of a reliable Disaster Recovery Plan for all areas of your organization. Contact Palindrome for more information.

Understand Recovery Issues

In today's rapidly expanding networks, three key issues emerge in the disaster recovery category.

File Loss

The most common disaster administrators experience is file loss, not server or volume loss. Depending on the file, this type of disaster may be nearly as significant as a total server failure.

Backup Director's powerful searching and tagging features and flexible media management options allow you to restore lost data quickly and efficiently by automatically determining the best media to restore the lost files.

Server/Volume Loss

Server/Volume loss is the second most critical disaster in today's LANs. While many products focus on the "backup window" (how long it takes to complete backups), Backup Director is designed for "restore time objectives" (how long it takes to restore your server volume in case of a disaster).

Using its high levels of automation and intelligence, Backup Director provides clear directives when recovering a server or volume. Because it tracks what media is on- and off-site, the software knows what media can restore your server or volume to its most recent state with the fewest amount of media changes.

On-site Disaster

Today, many organizations are realizing what impact a disaster can have on their entire business unit. Questions such as: “How can I recover if my server room is flooded?” and “What happens if I lose my entire building” are being asked frequently.

Backup Director is flexible so that you can configure it with your corporate objectives in mind. For example, you can automatically schedule snapshots of your accounting data once a month or configure full backups every day to a non-managed media so it can be sent off-site without affecting your media rotation schedule.

The Backup Director Solution

Once configured, Backup Director makes recommendations regarding what media should be on-site and offsite. Through automatic adjustments, the software always recommends actions that will insure objectives are met despite issues such as:

- Missed tape changes (due to 3-day weekends, etc.)
- Missed backups (due to drive or media failure or other factors)
- Interruptions to the schedule
- Scheduled media being unavailable (misplaced or offsite)

Preparing for a Server Failure

Introduction

This section details procedures how you can prepare for a server failure by recording server information and creating disaster recovery diskettes.

By following the instructions below, you can recover a NetWare server without having to completely re-install NetWare or Backup Director.

The recovery procedures outlined in this section can serve as a template for your own server recovery procedure and should be followed for each of your protected servers.

When you are finished recording information and preparing diskettes, you should test the recovery procedures so you have experience with unexpected issues that may arise.

Assumptions

The following procedures assume:

- The person creating recovery diskettes and recovering servers has a good understanding of NetWare and Backup Director.
- The server has a high-density floppy drive (the A: drive).
- The user has several blank formatted high-density floppy diskettes.
- The servers to be recovered will retain the same name and volume

structure.

- DOS partitions on the servers must have at least 4MB of free space and should have common DOS utilities including FDISK.EXE, FORMAT.COM, BACKUP.EXE, RESTORE.EXE, etc.
- On 4.1 servers, NDS partitions have been replicated according to Novell recommendations. In other words, either a MASTER or R/W replicas of the partition which contains the server to be recovered exists on other servers within the tree.

Record Server Information

By recording information about your server's environment, you will have the required information to restore the server to its previous state prior to a server crash.

Review Your Server Environment

- > Review and understand the layout of the server.

Is the SYS: volume physically on a separate hard drive compared to the DOS partition?

- > Review and understand the network protocols being used by the server.

How do these protocols interact with server related issues such as SAPs and TIMESYNC?

- > For 4.1 servers, review and understand the structure of your NDS tree and how the server fits into that structure.

Are the NDS partitions replicated according to the Novell recommendation of three replicas per partition? Does the server to be recovered contain a read/write replica or a master? Is the auto login user object properly configured?

Run PALSDUMP

PALSDUMP is a Palindrome utility that provides summary information about your server's environment such as SET parameters, NCF files, and what modules you have loaded on the server. PALSDUMP is located on your last Backup Director installation diskette in the \TOOLS directory.

To run PALSDUMP from the server console, type:

- > LOAD PALSDUMP

PALSDUMP creates a PALSDUMP.DAT file on the root of your SYS: volume. Print the SYS:\PALSDUMP.DAT output file for later reference.

NLM Modules

Review the PALSDUMP.DAT printout to determine what NLMs are required to restore the server.

NLMs such as Virus or CD Rom drivers do not need to be loaded for a recovery, but special LAN drivers, name space NLMs, or configuration files do need to be loaded.

TIMESYNC

On 4.1 servers, it is necessary to document the type of time server. If preparing a 4.1 server, perform the following; otherwise, skip to *Recording Partition Information*.

At the server console prompt, type:

> **SET TIMESYNC TYPE**

If the server is a PRIMARY, REFERENCE, or SECONDARY time server type, then no further action will be needed. If the server is SINGLE time server, then another server in the tree will need to be designated as a new SINGLE time server type during the recovery. This will be covered in the section entitled *Setting TIMESYNC Type*.

Record Partition Information

Run INSTALL.NLM and document ALL information about the NetWare partitions and volumes. Pay close attention to the volume names, volume sizes, block sizes, file compression, sub-allocation, and migration.

At the server console prompt, type:

> **LOAD INSTALL**

> Choose *Disk Options* and record partition information for each disk on your server. (On 3.x servers, highlight each drive and press <<**Enter**>> to see detailed partition information.)

> Choose *Volume Options*. Select a volume and press <<**Enter**>>. Record all volume information for each volume.

Make a copy of all the information you recorded in the previous steps and store a copy both on-site and off-site.

Create Recovery Diskettes

By creating recovery diskettes, you can easily rebuild your server in the event of a server crash without having to manually re-install NetWare as a separate step. You will create the following diskettes:

- Diskettes containing DOS boot information and NetWare startup files.
- A diskette containing the necessary network files to perform data recovery.
- A diskette containing the necessary Palindrome files to perform data recovery.

Create “DOS_BOOT” Diskette(s)

NOTE: If the DOS partition does not need protection, skip this section.

The diskette(s) generated in the section will be used as the bootable floppy when necessary

to recover DOS partitions. Label the diskettes DOS_BOOT1, DOS_BOOT2, etc.

Before starting the following procedures, be sure to have enough blank, formatted diskettes to copy your entire DOS partition.

To create the DOS_BOOT diskettes:

1. Down your server.
2. Place a blank, high-density floppy in the disk drive of your server.
3. From the DOS prompt, type:

FORMAT A: /S
(where A is the drive you are using).

It is important that the diskette is formatted at the server to ensure the DOS version used to boot off the diskette is identical to the DOS version on the server. Label this diskette DOS_BOOT1.

4. Copy FORMAT.COM, FDISK.EXE, RESTORE.EXE, and any other utilities you feel might be needed to DOS_BOOT1 from the DOS partition on your server. If copying these files from a workstation, be sure the workstation is using the same DOS version as your DOS partition.
5. Remove DOS_BOOT1 diskette and insert another blank, formatted diskette.
6. From the DOS prompt, type:

MSBACKUP C:\ A: /S

(where A: is the drive your diskette is in and C: is your DOS partition) This command duplicates your DOS partition onto the floppy diskettes.

Insert as many floppy disks as needed to backup the DOS partition. Label the diskettes in sequential order (for example, DOS_BOOT2, DOS_BOOT3, etc.).

NOTE: If using DOS 5.0 or previous versions, the backup command is BACKUP.EXE; substitute BACKUP.EXE for MSBACKUP in the above example.

7. Repeat the previous step as necessary to copy your entire DOS partition.
8. When finished copy the DOS partition to the diskettes, from the DOS prompt, type:

FDISK

and document the information about the DOS partition (e.g. size, volume label, DOS version etc). Keep this information with your BOOT diskette(s). If you ever upgrade DOS versions, you must recreate the DOS boot diskettes.

Create Recovery Diskettes

The following procedures use the PKZIP™ compression utility to compress and copy files onto multiple diskettes. If you do not have this utility, you must manually copy the files onto diskettes.

Prior to copying the files, create a directory structure on the network or local drive to copy the files into.

To prepare files for recovery diskettes

1. Create a directory named RECOV on a NetWare or local drive.
2. Create \SYSTEM, \LOGIN\NLS, \PAL subdirectories under the RECOV directory using the DOS MKDIR command. The directory structure should look similar to:

```
\RECOV
 \SYSTEM
  \LOGIN\NLS*
  \PAL**
```

*NetWare 4.1 servers only

**If your Backup Director NLMs are located in the SYS:\SYSTEM directory you do not have to create a \PAL directory.

3. Copy the following files from the SYS:\SYSTEM (or equivalent) directory to the \RECOV\SYSTEM directory you just created. Note that not all files apply to all NetWare versions. For example, the DS*.NLM files apply to NetWare 4.x only.

3C5X9.LAN*	ETHERTSM.NLM*
AFTER311.NLM	MSM.NLM
NWSNUT.NLM	INSTALL.NLM
EDIT.NLM	AUTOEXEC.NCF
DS.NLM	DSI.NLM
DSAPI.NLM	DSREPAIR.NLM
CLIB.NLM	AHA*.DSK (SCSI host adapter driver)
STREAMS.NLM	ASPITRAN.DSK (ASPI module)
TLI.NLM	SPXS.NLM (and related patches [SPXFSFIX, etc.])
IPXS.NLM	MATHLIB.NLM (or MATHLIBC.NLM)

TSAXxx.NLM+
SMDR.NLM

*substitute equivalent NIC LAN driver and proper Topology Support modules

+Copy the appropriate TSAs for your server.

If your hard disk drivers are not loaded from your DOS partition via the STARTUP.NCF file, copy these to the \RECOV\SYSTEM directory also (reference the PALSDUMP printout).

NOTE: If this server is NOT the Backup Director installation server, you do not need to copy the Palindrome files (PAL*.NLM) you can skip the next two steps.

4. Copy the following files from the SYS:\SYSTEM directory to the \RECOV\SYSTEM directory. If your Backup Director NLMs are located in a different directory than SYS:\SYSTEM copy them from their directory to the \RECOV\PAL directory.

ARNANDX.RSF, ARNADAT.RSF, PALREST.NLM, PALMEDIA.NLM, PALSDRV.NLM, PALLIB.NLM, PAL.NLM, PALALDRV.NLM, PALJSRVR.NLM

5. For 3.12 and 4.1 servers, copy SERVER.MLS from the server's NetWare license diskette (or CD ROM) to the RECOV\SYSTEM\ directory.

Different versions of NetWare may have different modules. All of the above files may not apply to your particular servers. Copy any additional NLMs or other files (such as name spaces) that might be needed after reviewing the PALSDUMP.DAT file.

6. From the SYS:\LOGIN\NLS directory on 4.1 servers, copy *.001 files to the \RECOV\LOGIN\NLS directory.

PALFCOPY.NLM

PALFCOPY.NLM is a Palindrome utility that allows you to copy files directly from your server's floppy drive to a mounted NetWare volume. By using PALFCOPY.NLM, you don't need a workstation to recover a server.

> Copy PALFCOPY.NLM from the \TOOLS directory on the last installation diskette to the \RECOV\SYSTEM directory.

To create the recovery diskettes

To perform the following, you need multiple blank, high-density formatted diskettes. Label them RECOVERY1, RECOVERY2, etc. for each disk you create during the following steps.

NOTE: If you do not have PKZIP.EXE, copy the contents of the \RECOV directory onto the blank diskettes.

1. Insert a blank diskette into the local drive at your workstation.
2. At the \RECOV directory prompt, type the following command:

```
PKZIP A:RECOV.ZIP *.* -r -p -&
```

(this command compresses the directories and files in the \RECOV directory into a compressed file RECOV.ZIP. The RECOV.ZIP file will span multiple diskettes.)

3. Copy PKUNZIP.EXE to the last diskette.

You have completed creating recovery diskettes.

Store the Recovery Diskettes

Make copies of the recovery diskettes and the NetWare environment information (recorded previously) and store in an on-site and off-site location such as in a vault.

Recovery from Server Failure

The following procedures provide instructions for rebuilding DOS and NetWare partitions, recovering the minimum NetWare and Palindrome modules, and then recovering all other data on failed servers.

If you created the recovery diskettes and recorded the server environment information as explained previously, you do not have to re-install NetWare to get your server running.

Some of the procedures may have to be adapted to suite your environment. For example, not all server failures will require you to recreate a DOS partition.

Prior to restoring the server, retrieve the recovery diskettes and NetWare environment information created during the server recovery planning steps.

Setting TIMESYNC type (4.1 servers only)

If the server you are recovering is a SINGLE-type time server, then another server in the tree must be designated as the SINGLE time server. Locate another server in the tree and at that server's console, type:

```
> SET TIMESYNC TYPE = SINGLE
```

NOTE: You can have only one "SINGLE"-type time server within the network.

Creating DOS Partitions

This procedure assumes your DOS partition on your server is no longer operational. Prior to restoring the DOS partition, obtain the server information recorded earlier.

If your server failure necessitates recreating DOS partitions, follow the procedures below; otherwise skip to *Creating NetWare Partitions*.

To restore DOS partitions:

1. Insert the DOS_BOOT1 diskette into the floppy disk drive on your server and power on the PC.
2. Enter the date and time when prompted.
3. At the DOS prompt (A:\) type:
FDISK
4. Choose *Create DOS Partition or Logical DOS Drive*. Choose *Create Primary DOS Partition*.
5. When prompted for the partition size, enter the parameters recorded when you recorded the server environment information for this server.
6. At the main menu, choose *Set Partition Active* and select the primary DOS partition.
7. Press <<ESC>> to exit FDISK.
8. When the PC is done rebooting, enter the date and time when prompted.
9. At the DOS prompt (A:\), type:
FORMAT C: /S

(where C: is the DOS partition you are creating)

10. From the DOS prompt, type:

```
RESTORE A: C:\*.* /S
```

and insert the requested floppy disks as needed to restore the DOS partition.

11. When finished restoring the DOS partition, reboot the machine to ensure system is bootable.

Creating NetWare Partitions and Volumes

Prior to recreating the NetWare partitions, you need to restore the files from the recovery diskettes to the DOS partition so they can be loaded on your server.

Be sure your DOS partition has adequate space to restore the files from the recovery diskette. Remove obsolete files if necessary from the partition.

Copying Recovery Diskettes

Copy the contents of the Recovery diskettes to the DOS partition using the PKUNZIP™ command.

1. Create a \RECOV directory on your server's DOS partition using the DOS MKDIR command. Change to that directory.
2. Place the last recovery diskette into the local drive at the server and type:

```
PKUNZIP A:RECOV.ZIP -d C:\RECOV
```

(where A: is the drive your diskette is in and C: is your DOS partition.)

This step recreates the \RECOV directory structure (that you created when making the recovery diskettes) on your DOS Partition which contains the required NetWare and Palindrome files.

Prior to rebuilding the NetWare partition, be sure you have the printout from PALSDUMP (PALSDUMP.DAT) available and the partition information recorded as part of the recording server information steps.

3. Type SERVER from the NetWare directory in DOS.
4. When prompted, type the FILE SERVER name and IPX INTERNAL ADDRESS (refer to the AUTOEXEC.NCF file and the PALSDUMP.DAT printout as necessary).
5. From the server console prompt, type:

```
SEARCH ADD C:\RECOV\SYSTEM
```

6. Type MODULES at the server console to verify whether hard disk drivers have been loaded via the STARTUP.NCF file. If not, load them now.

For example, type LOAD ISADISK.DSK (where ISADISK.DSK is the name of your hard disk driver) and choose parameters according to NCF files (review the PALSDUMP printout if necessary). If these drivers are loaded from your STARTUP.NCF file, then this step is not required.

7. Type the following command:

LOAD INSTALL

For NetWare 4.1 servers

- > *Choose Disk Options. Choose Modify Disk Partitions and Hot Fix.* Recreate the former NetWare disk partitions according to the server environment information you recorded.
- > *Choose Volume Options.* Recreate the former server volumes according to the server environment information you recorded.
- > Mount all volumes when prompted.

For NetWare 3.1x servers

- > *Choose Disk Options. Choose Partition Tables.* Recreate the NetWare partition according to the server environment information you recorded.
- > After recreating the partitions, choose *Volume Options* and press <<**Insert**>> to create the volumes as they existed prior to the disaster according to the server environment information you recorded.

Mount Volumes

8. If you haven't already, at the server console prompt, type:

MOUNT ALL

(to mount all volumes on your server)

9. At the server console prompt, type:

SEARCH ADD C:\RECOV\SYSTEM

10. Load LAN drivers and bind the proper protocols to them. Reference the AUTOEXEC.NCF file found in the PALSDUMP printout.
11. For NetWare 3.12 and above servers, license the server. From INSTALL.NLM, choose the license option and license the server. Press <<**F3**>> to specify a different path then type in:

C:\RECOV\SYSTEM

Restoring NetWare Modules

1. Load any name space modules (e.g. MAC.NAM) and add name spaces as appropriate using the "ADD NAME SPACE <<name>> to <<volume>>" command for all name

spaces on all mounted volumes.

2. At the server console prompt, type:

LOAD CLIB

3. At the server console prompt, type:

LOAD PALFCOPY C:\RECOV*.* SYS:\ /S

This command copies all NetWare and Palindrome NLMs to the appropriate directory on the SYS: volume.

4. To load server resources type the following commands depending on your version of NetWare. You may want to review your PALSDUMP.DAT file to determine what modules to load.

LOAD IPXS

LOAD MATHLIB (or MATHLIBC)

LOAD TSA41 (or appropriate TSA for your server)

LOAD DS.NLM

LOAD TSANDS (if necessary)

NetWare Directory Services (NDS) for 4.x Servers

Because the NDS database is located on the SYS: volume, a hard drive crash involving the SYS: volume is equivalent to removing NetWare 4.1 from the file server. In recovering the server, you will need to re-install NDS. This also requires the server be removed and then re-installed into the tree.

To re-install NDS, it is imperative to understand how the NDS tree is partitioned and which servers in the tree contain the replicas. It is also important to understand which servers contain a master compared to which servers contain read/write replicas.

To re-install NDS

1. At a workstation on the network, use NWADMIN'S Partition Manager and select each partition and record the replicas listed. Be sure to document what type of replica (if any) the server to be recovered contains. If the server contains the master of a partition, go to step 2; otherwise skip to step 4.
2. If the server to be recovered contains a master of a partition, you must designate a new master on a different server within the tree.

Locate another server in the tree which contains an up-to-date read/write replica of the partition you need to change and run DSREPAIR. (Refer to Novell documentation for proper procedures on how to designate a new master).

3. At this point, the server to be restored should NOT contain a master of a partition.
4. Use NETADMIN to delete the volume objects associated with the server to be

recovered.

5. Run INSTALL.NLM to install Directory Services onto the server.
6. From INSTALL.NLM's *Installation Options* menu, choose *Directory Options*. Choose *Install Directory Services Onto This Server*.
7. Select the tree on which the server resided, and then log in to NDS and re-establish the server into the tree with the same context that it had before. It is imperative that the server is placed into the tree exactly as it was before.
8. Since the server object already exists in the tree, you will receive the following messages from NetWare:

An NCP server object (or an unknown object) with name <<server name>> already exists in context "OU=SE.O=PALINDROME". Press <<Enter>> to continue. Install-4.1-389.

9. Press <<**Enter**>> to continue. The following message appears: Delete the existing NCP server object and continue?
10. Choose **YES**.

After Directory Services Installation is complete, Install the mounted volumes into the directory tree.

From INSTALL.NLM Installation Options menu, choose Directory Options. Choose *Install/Reinstall Mounted Volumes into Directory*. Be sure to install ALL volumes into the tree.

NOTE: The volume objects may have already been installed into Directory Services via the Directory Services install.

Restoring Backup Director

NOTE: If this is not the Backup Director installation server, skip this section.

1. Load the SCSI device drivers. For example, type:
LOAD AHA1740.DSK port=XXX
reference the PALSDUMP printout to verify the command syntax.
If your ASPI module isn't autoloaded, load it now.
2. Ensure the most recent backup tape is inserted in the backup device. If any of the following operations causes a PLSM-53 error, verify the appropriate SMDR and TSA have been properly loaded.
3. If this is the backup server, restore the System Control Database. If necessary, add a search statement to your Backup Director NLM files first.
4. At the server console prompt, type:

LOAD PAL

5. Select Recover System Control Database.
6. Select the volume and path of your installation (the location of your System Control Database [AS*.PAC] files).
7. Type your auto login user name and password in the appropriate fields. Select *Start Recovery*.

If you receive a PLSM-110 error, this indicates the auto login user or password defined in the System Control Database (AS*.PAC files) does not have login rights to the server using the TSA.

If the bindery does not exist, type **Supervisor** with no password in the auto login user name and password fields. On 4.x servers, type in the fully qualified name of the ADMIN user (for example, .cn=ADMIN.OU=SALES).

8. If you typed in an auto login name different than that which is in the restored System Control Database, you will be prompted to use the original user or the new user.

If the bindery or NDS needs to be recovered, continue to use the users you specified above. After they are restored, update the System Control Database with the original auto login user name using the *Upgrade Auto Login Information* option on the Palindrome Server Console.

9. After the System Control Database is restored, select *Backup or Restore Resources*.
10. Highlight a resource on the server you are restoring (if recovering a 3.x server, recover the Bindery resource first). Select <<**Restore**>>. Repeat this step for each volume on the server you are restoring.

Final Steps

This section details the final tasks necessary to completely restore your server.

4.1 Servers

- > After server restoration is complete, verify your NDS partitions are replicated properly according to Novell's recommendations.
- > Verify the time server type is correct on the recovered server.
- > Verify the recovered server's time is synchronized on the network by typing TIME at the server console.
- > If the recovered server contains partition replicas or a master, verify the server's synchronization state. To do this, at the server console, type the following commands:

SET DSTRACE=ON

SET DSTRACE=*H

Toggle to the directory services screen and check it for the message "ALL processed=YES" for each partition on the

server.

All Servers

> When the last restore command is complete, at the server console, type the following commands:

DOWN

EXIT

> At the DOS prompt, type:

SERVER

Your server is now restored to its former operating state.
