

VERSION 5

NDS Maintenance

and Troubleshooting

NetWare<sup>5</sup><sup>TM</sup>  
NETWORK SOFTWARE



Novell<sup>®</sup>

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Procedures for replacing or upgrading the hardware on a server include

- ◆ Preparing NDS™ for a hardware upgrade or replacement
- ◆ Creating a backup of NDS
- ◆ Restoring NDS following a hardware upgrade or replacement

## Upgrading/Replacing Hardware

Menu options available in `nwconfig.nlm` allow you to prepare NDS information on a server for a planned hardware upgrade, volume sys: upgrade, or replacement of the server. The following instructions are designed for situations where a server is actually replaced. For naming purposes, the old server will be referred to as Server A and its replacement or the new server will be referred to as Server B.

**Note:** This functionality was formerly available through `dsmaint.nlm`.

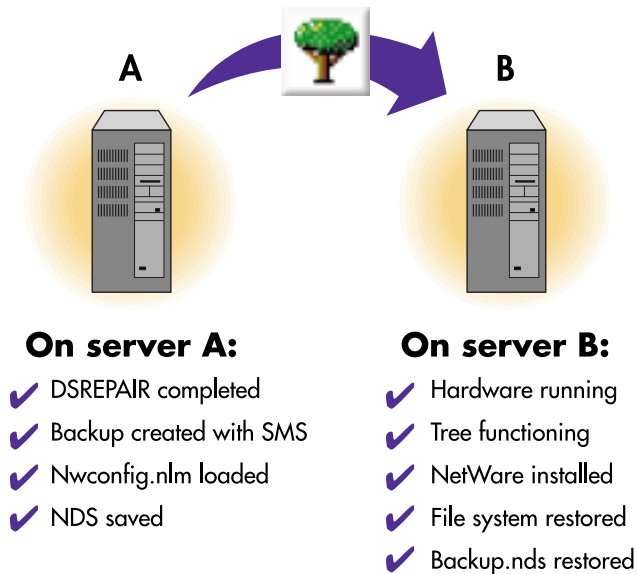
To prepare for the upgrade the NDS backup utility creates the file, `backup.nds` that stores all the Directory information on a server, including replica information. It also locks and disables the Directory on this server preventing any data change. To other servers that normally communicate with this sever, the server appears to be down. Any Directory information that is normally sent to the locked server is stored by other servers in the directory. The stored information is used to synchronize the server when it comes back online.

Because other servers in the NDS tree are expecting the server to come back online quickly, you should plan to complete the upgrade promptly and restore Directory information on the server as soon as possible.

The Restore Local DS Information after Hardware Upgrade option uses the `sys:system\backup.nds` file created by the Save option to restore Directory information on this server.

The following illustration depicts the procedure for replacing hardware.

Figure 1-1  
Replacing a Server



## Preparing for a Hardware Change

Use the following checklist to determine if you are ready to start this procedure.

- Make sure the tree Server A is in is healthy by running DSREPAIR on the server that holds the master of the [Root] partition. For information on using DSREPAIR, see *NDS Maintenance and Troubleshooting*. Address any errors that might appear.
- Make sure that time is synchronized. For information on using Time Synchronization, see *Network Time Management*. Address any errors that might appear.

- Run DSREPAIR on server A.
- Make a backup of Server A. Use SMS to make the backup. For information on using SMS, see *Backup and Restore Services*. This step ensures that your trustees will not be lost.
- Make sure that Server A has the latest version of NetWare® installed.
- Make sure that Server B is up and the latest version of NetWare is running.
- Install Server B in its own tree.

You are now ready to create the backup of NDS.

## Creating a Backup of NDS

The NDS backup utility creates a file named `sys:system\backup.ds` that stores all the Directory information on this server. Use the following instructions on the system console to prepare NDS for a hardware upgrade:

**1. Load `nwconfig.nlm` on Server A.**

At the server console prompt, enter

```
NWCONFIG
```

**2. Choose Directory Options > Directory Backup and Restore Options.**

The DS Backup and Restore Options menu appears.

**3. Choose Save Local DS Information Prior to Hardware Upgrade.**

A help screen appears with NDS backup information. Press Enter to continue after reading this screen.

The Directory Services Login/Authentication screen appears.

**4. Enter the administrator name and password.**

The system logs into the Directory and creates the `backup.nds` file.

5. **Save the backup.nds file to a location you know you can access.**

You can save to sys:system on Server B but only if it is up and running.

6. **Exit nwconfig.nlm and bring down Server A. Enter**

**DOWN**

Server A's DS database is now locked. Complete the upgrade promptly and restore Directory information on Server B as soon as possible.

## **Restore NDS Information after a Hardware Upgrade**

The Restore DS Information After a Hardware Upgrade option uses the sys:sytem\backup.nds file to restore Directory information on Server B. Before the Directory is restored, this utility ensures that the server is in the same relative state as before the upgrade. Nwconfig.nlm ensures that the server's object and authentication keys still exist and that the server still exists in all the replica rings for copies that were on this server before the upgrade.

1. **Rename Server B using the Server A's tree name, address, and server name in autoexec.ncf.**

2. **Load nwconfig.nlm on Server B.**

At the server console prompt, enter

**NWCONFIG**

3. **Choose Directory Options > Directory Backup and Restore Options.**

The DS Backup and Restore Options menu appears.

4. **Choose Restore Local DS Information after Hardware Upgrade.**

A screen appears that allows you to specify the path to the backup file.

5. **Verify the path to the backup.nds file or press F3 to enter a new path and save it to sys:system on Server B.**



6. **Use SMS to restore the backup you made of Server A that restores the file system and trustees.**
7. **Use NetWare Administrator to check the server. Make sure that login scripts and printing work correctly.**

If Server B does not work correctly and you need to make Server A functional immediately, do the following:

1. **Unplug Server B's network cable or down the server.**
2. **Reattach Server A to the network and start it.**

Ignore system messages requesting you to run DSREPAIR.

3. **Load NWCONFIG.NLM on Server A.**

At the server console prompt, enter

```
LOAD NWCONFIG
```

4. **Choose Directory Options > Directory Backup and Restore Options.**

The DS Backup and Restore Options menu appears.

5. **Choose Restore Local DS Information after Hardware Upgrade.**

6. **Enter the path to backup.nds as sys:system on Server A.**

This unlocks the NDS on the server and returns it to its state before the upgrade.

7. **Remove NDS from Server B and try the upgrade again.**



# 2 *Managing*

To merge NDS™ trees use DSMERGE. DSMERGE is a NetWare® Loadable Module™ (NLM™) that allows you to merge the [Root] of two separate NDS trees. Procedures for merging NDS trees include

- ◆ Preparing the source and target trees to be merged
- ◆ Merging the source and target trees
- ◆ Renaming the tree
- ◆ Completing additional tasks following the merge

# Merging NDS Trees

The DSMERGE utility allows you to merge the [Root] of two separate NDS trees. Only the [Root] objects are merged; container objects and their leaf objects maintain separate identities within the newly merged [Root].

The two trees you merge are called the source tree and the target tree. To merge two trees, you load DSMERGE on a server in the source tree.

DSMERGE does not change Directory names or contexts within the containers. Object and property rights for the merged objects are retained.

**Note:** You can't merge container or leaf objects with DSMERGE. To move leaf objects, use NetWare Administrator. To merge partitions, use NDS Manager.

## Merging the Source into the Target Tree

When you merge the trees, the servers in the source tree become part of the target tree. (The target tree is the tree that the source tree will be merged into.)

The target [Root] object becomes the new [Root] for objects in the source tree, and the tree name of all servers in the source tree is changed to the target tree name.

After the merge, the target tree name is retained.

The objects that were subordinate to the source [Root] object become subordinate to the target [Root] object.

## Partition Changes

During the merge, all replicas of the [Root] partition are removed from servers in the source tree. The server that contained the master replica of the source tree receives a replica of the target tree's [Root] partition.

During the merge, DSMERGE splits the objects below the source [Root] object into separate partitions.

The following two figures illustrate the effect on partitions when you merge two trees.

Figure 2-1  
Directory Trees before a Merge

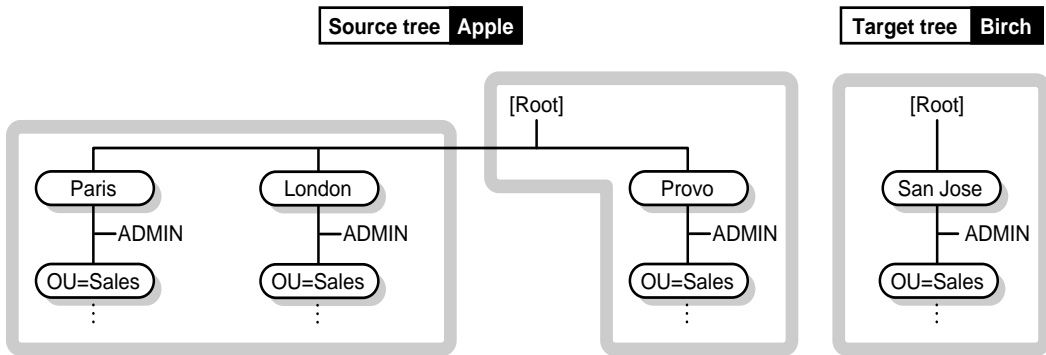
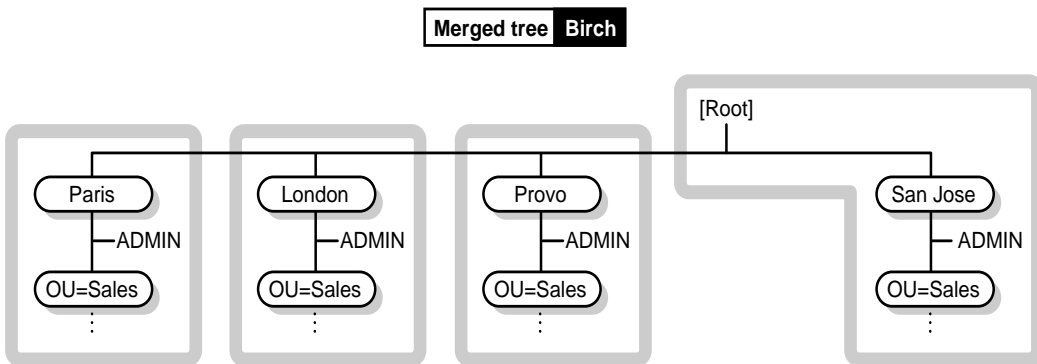


Figure 2-2  
Directory Tree after a Merge



## DSMERGE Options

After you load DSMERGE, you can use the following options:

Option	Use to
Check Servers in This Tree	<p>Contact all servers in the source tree to verify that each server has the correct version, status, and tree name.</p> <p>The server you are on must have a replica of the [Root] partition. It does not require the master replica.</p>
Check Time Synchronization	<p>Display a list of all servers in this tree, along with information about time sources and time synchronization.</p> <p>The server you are on must have a replica of the [Root] partition. It does not require the master replica.</p>
Merge Two Trees	<p>Merge the [Root] of the source tree to the [Root] of the target tree.</p> <p>The server you are on must have the master replica of the source tree's [Root] partition.</p>
Rename Tree	<p>Rename the source tree. Use this option if you are merging two roots with the same name.</p> <p>You can rename only the source tree with this option. To rename the target tree, you must load DSMERGE on a server in the target tree and rename it. Then load DSMERGE on the source tree to perform the merge.</p> <p>This option requires that the server you are on has the master replica of the [Root] partition.</p>

## Preparing the Source and Target Trees

Before performing a merge operation, ensure that the state of synchronization for all servers affected by the operation is stable. The following table provides recommendations for preparing source and target trees for merging.

Prerequisite	Required Action
No aliases or leaf objects can exist at the [Root] of the source tree.	Delete any aliases or leaf objects at the [Root] of the source tree.
No similar names can exist between the source and target trees.	<p>Rename objects on the source and target trees if similar names exist.</p> <p>Move objects from one of the containers to a different container in its tree if you don't want to rename objects. Then delete the empty container before running DSMERGE. (See <i>NDS Object Administration</i>.)</p> <p>You can have identical container objects in both trees if they are not immediately subordinate to the [Root]. They are uniquely identified by their immediate container object.</p>
No login connections can exist on either the source or target trees.	Close all connections on the source and target trees.
The NDS version must be the same on both the source and target trees.	Upgrade all non-NetWare 5™ servers that have a replica of the [Root] object.
Any server that contains a replica of the [Root] object on both the source and target trees must be up and running.	<p>Ensure that all servers containing a replica of the [Root] partition on both the source and target trees are up and running.</p> <p>Ensure that any WAN links affected are stable.</p>
The schema on both the source and target trees must be the same.	Run DSMERGE. If reports indicate schema problems, use DSREPAIR to import the schema from the target tree and then again from the source tree. Run DSMERGE again.

Because the merge operation is one single transaction, it is not subject to catastrophic failure caused by power outages or hardware failure. However, you should perform a regular backup of the Directory database before using DSMERGE. See *Backup and Restore Services*.

## Synchronize Time before the Merge

**Important:** Proper configuration of time synchronization is a very involved process. Make sure you allow enough time to synchronize both trees before you merge the trees.

NDS will not work properly if two external time sources are used, or if all servers in a tree are not synchronized.

Before you do the merge, make sure that all servers in both trees are synchronized, and use only one time source.

There should be a maximum of one reference or one single reference time server in a tree. Likewise, after the merge, the tree should contain only one reference or one single reference time server.

If each of the trees you are merging has either a reference or one single reference time server, you must reassign one of them to refer to the reference or single reference time server in the other tree so that the final tree contains only one reference or single reference time server (if any).

For more information on time synchronization, see *Network Time Management*.

To view time synchronization information, see “Checking Time Synchronization (DSMERGE)” on page 15.



## Checking Servers in the Tree

Before you rename or merge trees, use this option to contact all servers in the tree and verify that all servers have the same tree name.

After you rename or merge trees, use this option to verify that all servers have the new tree name.

### Prerequisites

- Access to a server console on the source tree or an established RCONSOLE session with the server
- The Supervisor object right to the [Root] object of the source tree

### Procedure

1. **Load DSMERGE on the server where a replica of the [Root] partition of the source tree is stored.**

At the server console prompt, enter

```
LOAD DSMERGE
```

2. **Choose Check Servers in This Tree.**

Each server in the tree is listed in the Status of Servers in the Tree screen, with its corresponding status information. Any servers that have existing problems are flagged and then listed at the top of the server list.

You should confirm that each server's status is marked as Verified before completing a merge.

The following table describes the information provided in the Status of Servers in the Tree screen.

Field	Operation
Server Name	Lists the names of all servers DSMERGE contacted, and shows their context within the tree.
Version	Indicates the version of NetWare running on the server.
Status	<ul style="list-style-type: none"><li>◆ UP Indicates that the server is in the right tree.</li><li>◆ <i>Error number</i> All NDS errors are numbered between –600 and –799 in decimal notation.  For information about a specific error code, search the <i>Error Codes</i> information in Troubleshooting or Reference.</li><li>◆ Unknown Indicates the server is not responding. This is usually because of a downed server or communication problems.</li><li>◆ Wrong Tree Indicates that this server does not belong to this Directory tree.  This status might occur if the tree was recently merged or renamed because the server might take a few minutes to recognize the change.  Or, this status can occur if the server was reinstalled in another tree, but not properly removed from this tree. If so, delete this server's object from this tree.</li></ul>

## Checking Time Synchronization (DSMERGE)

Use this procedure on both trees before merging them.

### Prerequisites

- Access to a server console on both the source and target trees or an established RCONSOLE session with the servers
- The Supervisor object right to the [Root] object of both the source and target trees

### Procedure

1. **Load DSMERGE on the server that contains a master replica of the [Root] partition of the source tree.**

At the server console prompt, enter

```
LOAD DSMERGE
```

If you don't know where the master replica is, load DSMERGE on any server in the source tree. You will be prompted with the name of the server that contains the master replica when it is required.

2. **Choose Check Time Synchronization.**

The Time Synchronization Information for Tree *treename* screen appears.

This option displays a list of all servers in the tree, along with information about their time sources and the server time.

Verify that all servers in the tree are synchronized and that they are using the same time source.

The following table describes the information provided in the Time Synchronization Information for Tree *treename* screen.

Field	Operation
Server Name	Lists the name of each server recorded in the tree's [Root] partition. If the server could not be contacted, it is listed as Unknown.
Type	Indicates the kind of time server the server is using.
In Sync	<p>◆ YES</p> <p>Indicates that the server is in sync with the time server.</p> <p>◆ NO</p> <p>Indicates that the server is not in sync with the time server.</p> <p>This option does not indicate if the source server is in sync with the server you have selected. Check the type of time server each server is using to determine if they are using different time servers.</p>
Time Delta	<p>Displays the difference in time between the source server and the selected server in the list.</p> <p>If the difference in time is more than a few minutes, it might indicate that the servers are using different time servers.</p>

## Merging Two Trees

For complete functionality of all menu options in DSMERGE, load DSMERGE on a server that contains the master replica.

If you don't know where the master replica is stored, you will be prompted with the correct server name when you attempt an operation that requires the master replica.

To perform a merge operation, you must load DSMERGE on the source tree.

When merging large trees, it's significantly faster to designate the source tree as the tree with fewer objects immediately subordinate to the [Root]. By doing this, you create fewer partition splits during the merge, since all target tree objects result in new partitions.

**Important:** Because the source tree name no longer exists after the merge, you may need to change your client workstation configurations. For Novell Client for DOS and Windows, check the Preferred Tree and Preferred Server statements in the net.cfg files. For Novell Client for Windows NT and Novell Client for Windows 95 check the Preferred Tree and Preferred Server statements on the client Property Page.

To minimize the number of client workstations you need to update, designate the tree with the most client workstations as the target tree, because the final tree retains the name of the target tree.

Or, rename the tree after the merge operation so that the final tree name corresponds to the tree with the greater number of client workstations attaching to it. See "Renaming the Tree" on page 19.

## Prerequisites

- Access to the server console on the source tree or an established RCONSOLE session with that server
- The Supervisor object right to the [Root] object of both trees you want to merge
- A backup of the NDS database for the two trees
- All servers in both trees are synchronized and using the same time source
- (Optional) All servers in the tree are operational. (Servers that are down will update automatically when they are operational.)

## Procedure

1. **Load DSMERGE on the server where the master replica on the source tree is stored.**

At the server console prompt, enter

```
LOAD DSMERGE
```

If you don't know where the master replica is stored, you will be prompted with the correct server name when you attempt to merge the trees.

2. **Choose Merge Two Trees.**

The Merge Tree Information screen appears.

3. **Enter the administrator name and password to log in to the source tree.**

Log in as a user who has the Supervisor object right to the [Root] object on the source tree. Enter the typeless or typeful distinguished name, such as admin.novell or cn=admin.o=novell. Entering only admin is invalid because it is not the complete name of the User object.

4. **Choose Target Tree and select a target tree from the list of servers in the Available Trees window.**

If the tree you want is not in the list, press Insert and enter the target tree's network address.

5. **Enter the administrator name and password to log in to the target tree.**

6. **Press F10 to perform the merge.**

A message stating that the trees have been merged successfully is displayed.

## Renaming the Tree

You must rename a tree if the two trees you want to merge have the same name.

You can rename only the source tree name. To rename the target tree, run DSMERGE from a server on the target tree.

After you change a tree's name, you may need to change your client workstation configurations. For Novell Client for DOS and Windows, check the Preferred Tree and Preferred Server statements in the net.cfg files. For Novell Client for Windows NT and Novell Client for Windows 95, check the Preferred Tree and Preferred Server statements on the client Property Page.

When you merge two trees, to minimize the number of client workstations that need to be updated, designate the tree with the most client workstations as the target tree because the final tree retains the name of the target tree.

Or, rename the tree after the merge so that the final tree name corresponds to the tree name with the majority of client workstations.

Another option is to rename the merged tree to the name of the original source tree. If you choose this option, then you must update the net.cfg files on the target tree client workstations.

### Prerequisites

- Access to a server console on the source tree or an established RCONSOLE session with the server
- The Supervisor object right to the [Root] object of the source tree
- (Optional) All servers in the tree are operational. (Servers that are down will update automatically when they are operational.)

## Procedure

1. **Load DSMERGE on the server where a master replica of the [Root] partition is stored.**

At the server console prompt, enter

```
LOAD DSMERGE
```

If you don't know where the master replica is, load DSMERGE on any server in the source tree. Then you will be prompted with the correct server name when you attempt to rename a tree.

2. **Choose Rename This Tree.**
3. **Enter the administrator name and password to log in to the source tree.**

Log in as a user who has the Supervisor object right to the [Root] object on the source tree. Enter your complete name, such as admin.novell or cn=admin.o=novell. Entering only admin is invalid since it is not a complete name.

4. **Enter the new tree name.**
5. **Press F10 to perform the rename.**

## Completing the Tree Merge

Following the merging of two trees, it might be necessary to complete the following tasks:

1. (Optional) Choose Checking Servers in the Tree in the DSMERGE main menu to confirm that all tree names were changed correctly. See "Checking Servers in the Tree" on page 13.
2. Check the new partitions that the merge operation created. If you have many small partitions in the new tree, or if you have partitions that contain related information, you might want to merge them. See *NDS Database Management*.
3. Copy a new replica to any non-NetWare 5 servers after the merge is complete, if you did not upgrade before running DSMERGE.



4. Recreate any leaf objects or aliases at the [Root] that were deleted before you ran DSMERGE.
5. Evaluate partitioning of the NDS tree.

Merging trees might significantly change replica placement on the source tree. You should carefully evaluate and change the partitioning as needed.

6. Update your client workstation configuration. For Novell Client for DOS and Windows, check the Preferred Tree and Preferred Server statements in the net.cfg files. For Novell Client for Windows NT and Novell Client for Windows 95, check the Preferred Tree and Preferred Server statements on the client Property Page. Or rename the target tree.

Only the target tree name is retained after the merge.

**Hint:** To minimize the number of net.cfg files you need to update, designate the tree with the most client workstations as the target tree because the final tree retains the name of the target tree.

Or rename the tree after the merge operation so that the final tree name corresponds to the majority of the client workstations' net.cfg files. See "Renaming the Tree" on page 19.

The target [Root] object becomes the new [Root] for servers moved from the source tree. The Access Control List (ACL) for the [Root] object of the source tree is preserved. Therefore, the rights of the source tree's user admin to the [Root] object are still valid.

After the merge is complete, both admin users still exist and are uniquely identified by different container objects.

**Important:** For security reasons, you might want to delete one of the two admin User objects or restrict the rights of the two objects.

---

<b>For more information about</b>	<b>See</b>
Object and property rights	<i>NDS Object Administration</i>
Partitions and replicas	<i>NDS Database Management</i>
[Root] object	<i>NDS Concepts and Planning</i>
Time synchronization	<i>Network Time Management</i>
DSMERGE	"DSMERGE" in <i>Utilities Reference</i>

---

# 3 *Troubleshooting*

To restore NDS after a hardware failure, use NWCONFIG. NWCONFIG is a NetWare® Loadable Module™ (NLM™) that allows you to restore NDS on a server in a multiple-server environment, when the rest of the servers in its replica list remain intact. Procedures for restoring NDS include

- ◆ Restoring server-specific information from an SMS backup
- ◆ Installing new hardware
- ◆ Reinstalling NetWare 5
- ◆ Restoring NDS

## Restoring NDS After a Hardware Failure

In a multiple-server environment, it is possible for one server to go down while the rest of the servers in its replica list remain intact. If the hard disk containing volume `sys:` on one server becomes damaged, the entire server is affected since a hard disk failure involving volume `sys:` affects the entire server and halts all NetWare operating system activities. Because the NDS files are stored on volume `sys:`, losing this volume is equivalent to removing NetWare 5 and NDS from the file server. If volume `sys:` fails, you must reinstall NetWare 5 and NDS before you restore your data. The following procedure assumes you have a current backup of the server-specific information for the failed server.

1. **From your backup host server, run SMS and restore Server Specific Information from a tape backup.**

For information on using SMS, see *Backup and Restore Services*.

The server-specific information files (`servdata.nds`, `dsmisc.log`, `volsinfo.txt`, `startup.ncf`, and `autoexec.ncf`) will be restored to a subdirectory under `sys:system` on the server you have selected. The subdirectory name will be a DOS 8.3 name derived from the source server name. These files will be used throughout the restore procedure.

2. **If the failed server held a master replica of any partition, use DSREPAIR to designate a new master replica on a different server in the replica list. (Use the information contained in the `dsmisc.log` file to determine which replicas were stored on the failed server.) For information on using DSREPAIR, see the online help.**

If no other server contains the same replicas as the failed server, repeat step 2 on another server that contains the missing replicas. Use the replica list in `dsmisc.log` to determine which servers to load DSREPAIR on to complete this step.

To change the replica type, run DSREPAIR on another server in the replica list that has an active Read/Write replica of the partition, as follows:

**2a. Load DSREPAIR -a**

If used incorrectly, DSREPAIR -a options can cause damage to your tree. For more information on these options, refer to Technical Information Document TID #2938493.

**2b. Choose Advanced Options Menu.**

**2c. Choose Replica and Partition Operations.**

Normally, you should use NDS Manager to perform partition operations. This option in DSREPAIR is to be used only when the master replica of a partition is lost because of a server or hardware failure.

**2d. Choose the partition you want to edit.**

**2e. Choose View Replica Ring to see a list of servers that have replicas on the partition.**

**2f. Choose the server you want to hold the master replica and select Designate this server as the new master replica.**

**3. If the failed server contained any non-master replicas, you need to remove all replica pointers to the failed server. If no other server contains the same replicas as the failed server, repeat step 3 on another server that contains the missing replicas.**

Use dsmisc.log to determine which other replica types the failed server contained and to determine which servers to load DSREPAIR on to complete this step.

Remove the failed server from the replica ring, as follows:

**3a. From the DSREPAIR Available Options menu, select View Replica Ring.**

**3b. Select the name of the failed server.**

**3c. Select Remove this Server from the Replica Ring and log in as admin. After reading the warning message, enter your agreement to continue.**

**3d. Exit DSREPAIR.**

**4. Install the new hard disk or server hardware.**

Follow any instructions provided by the manufacturer to verify that the server's hard disks are working. The new hard disk should have the same (or larger) storage capacity as the drive it replaces. Use the server-specific information files to verify configuration information.

**5. At the system console prompt, enter the following to install NetWare 5 on the new server:**

**INSTALL**

**5a. When prompted re-enter the same server name, NDS context, and internal IPX number that the server had prior to the failure.**

Use the startup.ncf and autoexec.ncf files included with the server-specific information for needed information.

**5b. When prompted to enter a tree name, enter a new tree name so the server will install into its own temporary tree.**

The installation is now complete.

**6. Load NWCONFIG. From the Directory Services Options menu choose Remove Directory Services and log in to the tree.**

**7. From the Directory Services Options menu choose Directory Backup and Restore Options > Restore Local Server Information after a Hardware Failure. Specify the path to servdata.nds or to the Server Specific Information.**

**8. Press F3 to specify the path to where the server-specific information files were stored in step 1. Press Enter to copy the files to the new server.**

Dsmisc.log and volsinfo.txt are copied to a subdirectory of the sys:system directory along with autoexec.ncf. Startup.ncf is copied to the c:\nwserver directory.

NDS is also restored at this time, using the information contained in `servdata.nds`. Once this is done, NDS is fully functional on the server, except that the partitions and replicas have not yet been re-established.

Now you are ready to do a file system restore.

**9. At the console, load the file system TSA and enter**

```
LOAD TSA500.NLM
```

Use SMS to start the restore of the file system for each volume affected by the failure.

If the server that failed was the host server for the backup program, first take the steps necessary to reinstall the backup software and storage device drivers.

If the server had volumes other than `sys:` that were unaffected by the failure, no further action is needed because the `servdata.nds` file preserves the trustee assignments on these other volumes.

- 10. After the restore of the file system is completed, down the server and bring it back up.**
- 11. Re-establish replicas on the failed server using NDS Manager. For information on using NDS Manager, see the online help.**
- 12. Use `dsmisc.log` to aid in this process. It contains a copy of the replica list that resided on the server at the time the backup was made.**

From the server console, enter the following to view the log file contents:

```
load edit dsmisc.log
```





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