



3Com® DynamicAccess® Boot Services (DABS) and Disaster Recovery



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Who should read this paper:

This paper is for the system administrators who intend to use the 3Com® DynamicAccess® boot services (DABS) to create boot images for disaster recovery. The step-by-step instructions and the sample files are given in this document.

Introduction:

Many users' trials with Internet downloads have cost them trouble, taking several hours to recover, or, even worse, forcing a reinstallation of the entire operating system. 3Com DABS will give an administrator a chance to recover the client's PC in minutes, instead of hours.

Using DABS, different kinds of disaster recovery boot image files can be created, according to how badly the system is damaged. The examples used here include a "Healing Boot Image" and a "Disk Cloning Boot Image." A Healing Boot Image is applied to heal the system only when a few critical files and/or the registry of the system are impacted. If the system is damaged severely and cannot be healed, the Disk Cloning Boot Image will recover the whole system by rebuilding the disk (partition) with a saved disk (partition) image file.

Healing Boot Image:

Create a backup while the system is healthy. The backup may include the registry and critical files that a user defines in a backup list file. Many utilities in the field could be used to save/recover backups, such as File system Independent Resource Management (FIRM) from Altiris, Inc.¹, ConfigSafe from imagine LAN, Inc.², and LifeSaver from JB Systems³. In the example below, a file archiving utility—LHA⁴—is used to pack/unpack the registry and critical files.

Disk Cloning Boot Image:

Create a disk or disk partition image while the system is healthy. Several disk imaging tools are available, such as Norton GHOST from Symantec Corporation⁵, ImageCase IC3 from Innovative Software, Ltd.⁶, and eXpress from Altiris, Inc.¹ Norton GHOST, as the example in this document, creates the image of a whole disk or disk partition and rebuilds from scratch, or recovers the disk or disk partition using the saved image created earlier.

Requirements:

Client PCs:

- Networked client PCs with 3Com DynamicAccess managed PC boot agent (MBA) v3.0 or greater, or with any other Preboot eXecution Environment (PXE)-compatible boot ROM, installed.
- With 3Com MBA, the Boot Method can be set to PXE, BOOTP, or DHCP. In the example below, PXE is selected.
- The client PCs should be compliant with Wired for Management (WfM) v2.00 specifications.

Server:

- Microsoft Windows NT 4.0 (or above) server with Service Pack 4 or above.
- A DHCP server (such as Microsoft DHCP Server).
- 3Com DABS—3Com PXE Server, 3Com TFTP Server, 3Com BOOTPTAB Editor, and 3Com Boot Image Editor.
- File archiving utility or other utilities that save registry and critical files (such as LHA).
- Disk imaging tool (such as Norton GHOST).

Server Configuration:

1. Install DABS on the server (please refer to 3Com DynamicAccess boot services Quick Start Guide for installation information).
2. Configure and start Microsoft DHCP server (maybe on a different machine). If the DHCP server is running on the same machine as DABS, an option tag of DHCP server should be configured.
 - 2.1 On the Windows NT server, click Start → Programs → Administrative Tools → DHCP Manager.
 - 2.2 When the "DHCP Manager" window appears, double click the "Local Machine" displayed on the left panel—DHCP Servers of the window, select the scope that will be used.
 - 2.3 Select from the menu DHCP Options → Defaults... "DHCP Options: Default Values" window appears.

- 2.4 Click on “New...” button. When the “Add Option Type” window pops up, type in “ClassID” in “Name” input box, select “String” as “Data Type,” leave “Array” unchecked, and input “60” in “Identifier” box. The “Comment” is optional. Then click “OK.”
- 2.5 From the “DHCP Options: Default Values” window, select “060 ClassID” that just been created from “Option Name” list, type in “PXECClient” as the “Value,” then click “OK.”
- 2.6 Assign the option to the DHCP scope. From the “DHCP Manager” window, select from the menu DHCP Options → Scope.... When the “DHCP Options: Scope” window appears, select “060 ClassID” from “Unused Options” on the left panel of the window, click on “Add.” “060 ClassID” should be displayed in the “Active Options” list on the right panel of the window. Then click on “OK.”

Note: If the DHCP server is running on a different machine, this PXE option should not be configured.

3. Start the 3Com PXE Server (BOOTP server may be used as well. However, in this document, PXE protocol is selected as the example.) and 3Com TFTP server.
 - 3.1 On the Windows NT server, click Start → Settings → Control Panel.
 - 3.2 Double click on “Services” icon in Control Panel window.
 - 3.3 When “Services” window displays, select 3Com PXE Server and Press “Start.”
 - 3.4 Select “3Com TFTP Server” and then press “Start.”
 - 3.5 If DHCP server is running on a different server, 3Com Proxy DHCP Server should be turned on from 3Com PXE Server. From the “Control Panel” window, double click on the “3Com PXE Server” icon. Check “Proxy DHCP” from “Options” tab.
4. Create a Healing Boot Image and a Disk Cloning Boot Image using 3Com Boot Image Editor that comes with DABS.
 - 4.1 Healing Boot Image:
 - 4.1.1 Make a DOS bootable floppy disk.
 - 4.1.2 Make the DOS bootable floppy a DOS Client of Windows NT. Use “Network Client Administrator” of Windows NT. Select the network interface

card (NIC) being used, or, if the NIC is not on the list, select the most similar one. Please refer to Microsoft Windows NT Server User Manual for further information.

- 4.1.3 Modify the PROTOCOL.INI and SYSTEM.INI file to use universal NDIS2 driver⁷.
The PROTOCOL.INI and SYSTEM.INI files are located in the subdirectory \NET of the bootable DOS client floppy. Modify them as shown in the examples in Appendix E, Sample Network Files. The universal NDIS2 drive, that is, NDIS.DOS file in the example, can be found on Intel’s Web site.
- 4.1.4 Copy the file archiving utility (LHA.EXE) onto the floppy.
LHA.EXE is a freeware, which can be downloaded from www.bekkoame.ne.jp/~h_ozawa/soft/lha/msdos.html.
- 4.1.5 Label the floppy as HEALIMAGE.

The floppy should have the following directory structure and files:

Volume in drive A is HEALIMAGE

Volume Serial Number is 392B-18F1

Directory of A:\

NET	<DIR>		09-18-99	
12:00a				
AUTOEXEC	BAT	989	04-01-99	1:07a
COMMAND	COM	54,645	05-31-94	6:22a
CONFIG	SYS	128	04-05-99	6:39a
DOSKEY	COM	5,861	05-30-94	9:22p
DRVSPACE	BIN	64,135	07-14-95	
12:00a				
HIMEM	SYS	33,191	05-11-98	3:01p
IFSHLP	SYS	4,644	08-08-96	3:00p
LHA	EXE	36,624	01-09-96	7:00p
PBOOT	EXE	3,805	09-23-99	2:12a
REBOOT	COM	14	08-13-98	2:14p
SHUTDOWN	COM	44	10-13-99	6:41a
WAIT	EXE	43,962	05-04-99	
11:22a				
	12 file(s)		248,042 bytes	

Directory of A:\NET

NDIS	DOS	27,056	09-01-99	4:39a
NDISHLP	SYS	4,468	10-13-96	4:38p

NET	EXE	450,342	10-13-96	4:38p
NET	MSG	74,016	11-11-95	7:57a
PROTMAN	DOS	21,940	10-13-96	4:38p
PROTMAN	EXE	13,782	10-13-96	4:38p
PROTOCOL	INI	523	08-10-98	7:31a
SHARES	PWL	622	04-05-99	6:44a
SYSTEM	INI	471	04-05-99	6:44a
WCSETUP	INF	1,477	10-13-96	4:38p
WFWSYS	CFG	840	10-13-96	4:38p
11 file(s)		595,537 bytes		
		527,872 bytes free		

Edit CONFIG.SYS, AUTOEXEC.BAT, PROTOCOL.INI, and SYSTEM.INI file to make sure the floppy boots up, connects to the server, and backs up/restores registry and critical files. See the sample files in Appendix C.

4.2 Disk Cloning Boot Image

- 4.2.1 Refer to steps 4.1.1 through 4.1.3 to make another bootable DOS client floppy disk.
- 4.2.2 Copy the file GHOST.EXE onto the floppy.
- 4.2.3 Label the floppy as CLONEIMAGE.

Edit CONFIG.SYS, AUTOEXEC.BAT, PROTOCOL.INI, and SYSTEM.INI file to make sure the floppy boots up, connects to the server, and backs up/restores the whole disk or disk partition. See the sample files in Appendix D.

Create boot image using 3Com Boot Image Editor (this utility comes with DABS):
Insert the HEALIMAGE floppy into the floppy drive (e.g., drive A:) on the NT server, and start "3Com Boot Image Editor." (See Figure 1 below.)

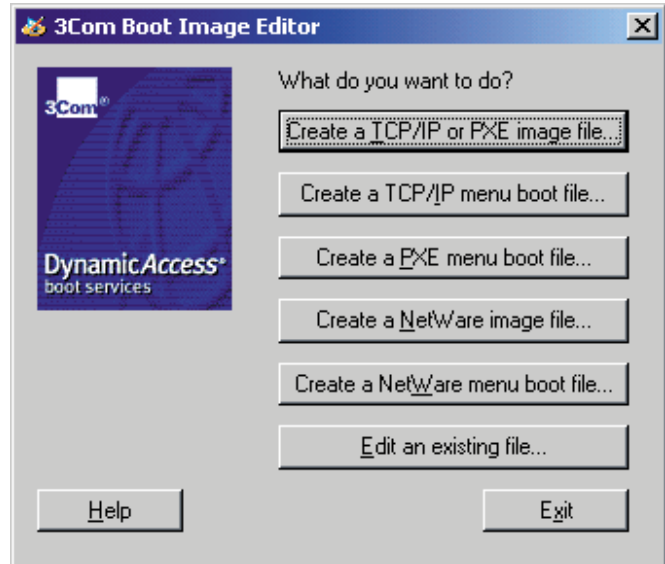


Figure 1: 3Com Boot Image Editor

- Select "Create a TCP/IP or PXE image file...."
- In the "Create TCP/IP Image File" dialogue box (see Figure 2), input the path and file name of the boot image file. For example, C:\TFTPBOOT\LHABACK.IMG for backup boot image, LHAREST.IMG for restore boot image.
- Choose the "Source Drive" (usually A:).
- Leave the "Capacity" as "Normal disk capacity" (that is, the same as your floppy diskette, 1.44 MB), or up to 16 MB as "Extended capacity" if more programs/utilities should be put into the same boot image.
- Under "Options," check "Writeable," and "Pre-OS" boxes.
- Click "Advanced...", and check "Keep UNDI in memory" in "Advanced Options" dialogue box. Click "OK."
- Click "OK" to create the boot image.

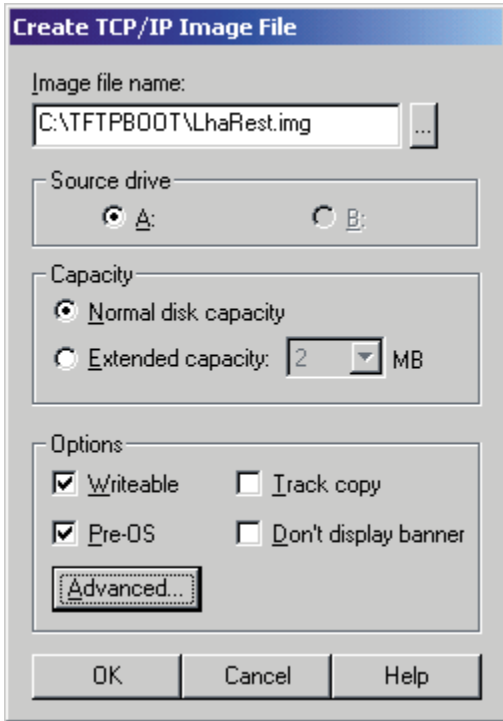


Figure 2: Create TCP/IP Image File

Put in the CLONEIMAGE floppy and follow the same procedure as creating Healing Boot Images to create Disk Cloning Boot Images. For example, GHOST-B.IMG for backup boot image and GHOST-R.IMG for restore boot image.

5. Add the Healing Boot Image and Disk Cloning Boot Image to all PXE menu boot files. Start the 3Com Boot Image Editor again, select "Create a PXE menu boot file....," "Create Menu File" window appears (see Figure 3).

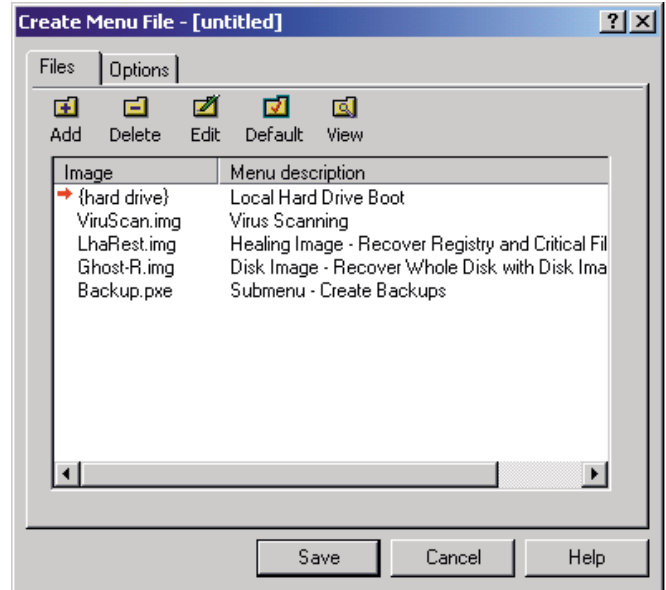



Figure 3: Create Menu File

Click on  to add a boot image into the menu (see Figure 4). Select or input the Image file name, enter descriptive text into "Menu description" input box. Repeat until all needed boot images are added into the menu. Click "Save" and give a name to this menu boot file, for example, DABS.pxe.

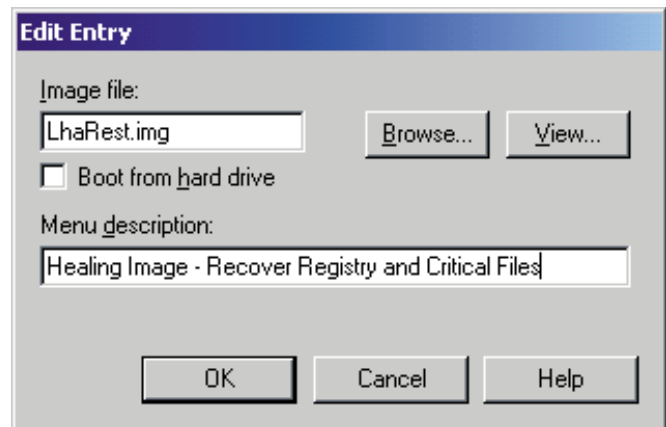


Figure 4: Edit Entry

6. Create/Edit a BOOTPTAB file including MAC addresses of all client PCs by using the BOOTPTAB Editor included with DABS. On the Windows NT server, start 3Com BOOTPTAB Editor. A window similar to Figure 5 will be displayed.

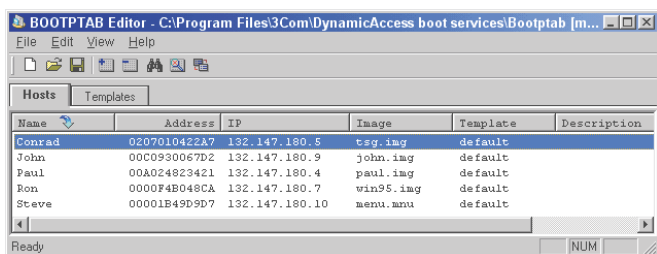



Figure 5: BOOTPTAB Editor

- 6.1 Set the Preferences. Select from Edit → Preferences..., and check “PXE” as the “Application” in “Preferences” window.
- 6.2 Click on the  button to add a host to the BOOTPTAB file. Input the Name and Node (MAC address) of the client, and select a boot Image for the client. See Figure 6. Select “default” Template from Options tab, and enter some descriptive text in Description tab (optional).

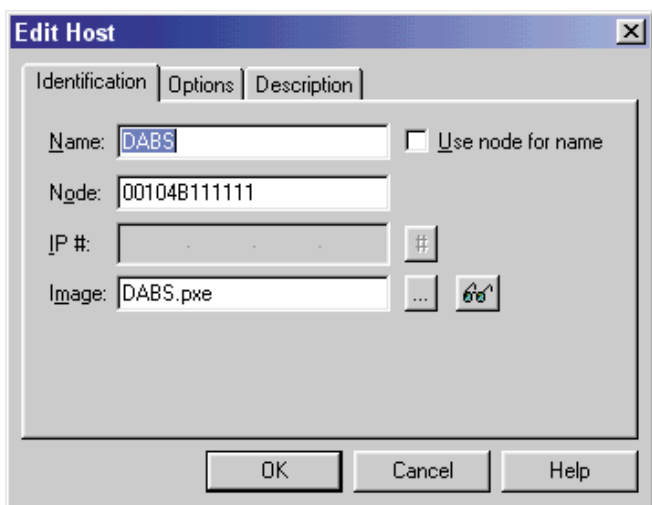


Figure 6: Add host

Repeat step 6.2 to add all clients to BOOTPTAB file and assign appropriate menu boot files to them.

Real world uses of Healing Boot Image and Disk Cloning Boot Image

Create the Healing Boot Image and Disk Cloning Boot Image the first time system is installed and every time the system configuration has been changed to ensure the backups are up-to-date. Do this by selecting the Backup submenu from the main menu of the PXE menu boot file when the client PC boots up. If the client system is impacted and cannot start properly, the administrator can guide the client to select Healing Boot Image from PXE menu when the system boots up and heal the system. If the system is severely damaged and cannot be healed by the Healing Boot Image, select the Disk Cloning Boot Image from the menu during system boot, which will recover the client system.

Appendix: Samples Files:

A. Sample BOOTPTAB file

```
# Sample BOOTPTAB file for 3Com BOOTP server, 3Com PXE server and BOOTPTAB Editor.
#
# Blank lines and lines beginning with '#' are ignored.
#
# Each entry in the file contains a name for the entry and a series of
# fields, separated by a colon. Fields are defined by a two-character
# "tag;" some supported tags are explained below:
# More supported tags are available. Please refer to 3Com white paper: "BPPatch".
#
#ha - hardware address
#ip - host IP address
#hd - home directory
#bf - bootfile name
#hn - return host name
#sm - sub-net mask
#tc - template host (points to similar host entry)
#to - time offset (seconds)
#
# Fields within entries may appear in any order. Spaces and tabs in lines
# are ignored. An entry can span more than one line in the file by ending
# continuing lines with a backslash.

default:hn:hd=\tftpboot\:sm=255.255.0.0:to=3600:

Conrad:tc=default:ha=0207010422A7:ip=132.147.180.5:bf=tsg.img:
John:tc=default:ha=00C0930067D2:ip=132.147.180.9:bf=john.img:
Paul:tc=default:ha=00A024823421:ip=132.147.180.4:bf=paul.img:
Ron:tc=default:ha=0000F4B048CA:ip=132.147.180.7:bf=win95.img:
Steve:tc=default:ha=00001B49D9D7:ip=132.147.180.110:bf=menu.mnu:
DABS:tc=default:ha=00104B111111:ip=0.0.0.0:bf=DABS.pxe:
```

B. Sample PXE menu boot file

DABS.PXE (Figure 7).

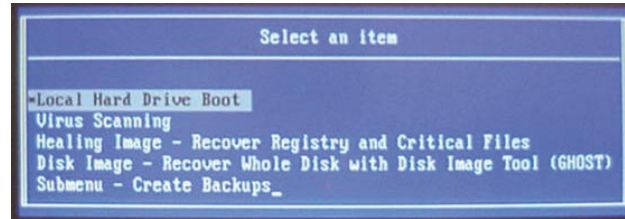


Figure 7: PXE menu boot file—DABS.pxe

Backup.pxe (Figure 8).

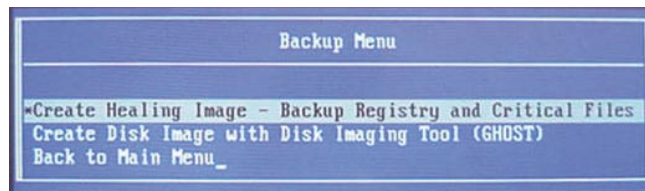


Figure 8: PXE menu boot file—Backup.pxe

C. Sample Healing Boot Image file

LhaBack.img

CONFIG.SYS (for LHABACK.IMG as Healing Boot Image)

```
device=ifshlp.sys
device=himem.sys /testmem:off
device=emm386.exe noems
dos=high,umb
files=30
buffers=50
lastdrive=z
```

AUTOEXEC.BAT (for LHABACK.IMG as Healing Boot Image)

```
@echo off
Rem Load NDIS2 drivers, initialize the network adapter, start network services,
Rem and logon to the server as superman (with "password" as the password).
Rem The administrator should create an account on NT server named "superman" and
Rem grant accordingly access privileges to this account.
net initialize
net start
net logon superman password /savepw:no /yes
Rem Map a network drive x: as drive D: on the server (McLaren)
net use x: \\McLaren\D$

echo.
echo Backing up the Registry and all critical files...

Rem Change the work directory to x:\back
x:
cd \back

Rem Make two historical backup copies: backup.lz1 and backup.lz2
Rem Delete or rename the old backups (if any)
```

```
Rem More historical copies could be archived this way
if exist backup.lz2 del backup.lz2
if exist backup.lz1 ren backup.lz1 backup.lz2
if exist backup.lzh ren backup.lzh backup.lz1
```

```
Rem Copy the backup list file to work drive
Rem The current backup list file is stored on the server
copy backup.lst A: > nul
```

A:

```
Rem Archive the registry and critical files using LHA
Rem Syntax: LHA <command> [-<option>[-+012|WDIR]...] LZH [[DIR\] [FILE]...]...
```

```
Rem Parameters using for LHA:
```

```
Rem a <command> Add file to an archive file
Rem -x1 <option> Use extended file names (path name is saved along with the
Rem file name)
Rem -a1 <option> Compress all files with their attributes (file attribution
Rem is ignored when compressing, i.e. System and hidden files are
Rem also compressed)
Rem -n2 <option> Do not display progress report and file name
Rem -s1 <option> Do not display Skipped file message
Rem -f1 <option> Forcefully write files without checking free disk space
Rem x:backup Create the archive file backup.lzh on drive x:
Rem @backup.lst Add all files in the backup.lst to the archive
```

```
lha a -x1a1n2s1f1 x:backup @backup.lst
if errorlevel 0 goto done
if errorlevel 1 goto error1
if errorlevel 2 goto error2
if errorlevel 3 goto error3
```

:done

```
Rem pboot.exe is a 3Com pre-OS utility included in 3Com MBA Utility Diskette to allow
Rem the client system doing a local boot without reboot the machine after executing
Rem the pre-OS tasks
a:\pboot
```

```
:error1
echo Error in creating backups, system will be reboot.
Rem wait.exe8 is an external utility to wait a specific period of time (in second)
wait 5
Rem reboot.com10 is an external utility to reboot the machine
reboot
```

```
:error2
echo Fatal error in creating backups, system will be shutdown.
wait 5
Rem shutdown.exe9 is an external utility to shutdown the client PC with APM or ACPI
shutdown
```

```
:error3
echo Failed to convert temporary files to an archive file.
```

```
echo You may manually rename it later.
wait 5
pboot
```

LhaRest.img

```
CONFIG.SYS (for LHAREST.IMG as Healing Boot Image)
```

```
device=ifshlp.sys
device=himem.sys /testmem:off
device=emm386.exe noems
dos=high,umb
files=30
buffers=50
lastdrive=z
```

```
AUTOEXEC.BAT (for LHAREST.IMG as Healing Boot Image)
```

```
@echo off
```

```
Rem Load NDIS2 drivers, initialize the network adapter, start network services,
Rem and logon to the server as superman (with "password" as the password).
Rem The administrator should create an account on NT server named "superman" and
Rem grant accordingly access privileges to this account.
```

```
net initialize
net start
```

```
net logon superman password /savepw:no /yes
```

```
Rem Map a network drive x: as drive D: on the server (McLaren)
```

```
net use x: \\McLaren\D$
```

```
echo.
```

```
echo Restoring the Registry and all critical files...
```

```
Rem Archive the registry and critical files using LHA
```

```
Rem Syntax: LHA <command> [-<option>[-+012|WDIR]...] LZH [[DIR\] [FILE]...]...
```

```
Rem Parameters using for LHA:
```

```
Rem    x    <command>  Extract directory with files from the archive file
Rem   -x1   <option>   Use extended file names (path name is saved along with the
Rem                               file name)
Rem   -a1   <option>   Compress all files with their attributes (file attribution
Rem                               is ignored when compressing, i.e. System and hidden files
Rem                               are also compressed)
Rem   -c1   <option>   Ignore file modification day/time
Rem   -m1   <option>   Do not display query messages
Rem   -n2   <option>   Do not display progress report and file name
Rem   -s1   <option>   Do not display Skipped file message
Rem   -f1   <option>   Forcefully write files without checking free disk space
Rem    x:\back\backup  Extract from the archive file backup.lzh on drive
x:\back
```

```
lha x -x1a1c1m1n2s1f1 x:\back\backup
```

```
if errorlevel 0 goto done
if errorlevel 1 goto error1
if errorlevel 2 goto error2
if errorlevel 3 goto error3
```

```
:done
```

```
echo.
```

```
echo Registry and all critical files are fully restored.
echo Booting to recovered local OS.
```

```
Rem wait.exe8 is an external utility to wait a specific period of time (in second)
wait 3
Rem pboot.exe is a 3Com pre-OS utility to allow the client system doing a local boot
Rem without reboot the machine after executing the pre-OS tasks
a:\pboot
```

```
:error1
echo Error in recovering backups, system will reboot.
wait 5
Rem reboot.com10 is an external utility to reboot the machine
reboot
```

```
:error2
echo Fatal error in recovering backups, system will be shutdown.
wait 5
Rem shutdown.exe9 is an external utility to shutdown the system with APM or ACPI
shutdown
```

```
:error3
echo Failed to convert temporary files to an archive file.
echo You may manually rename it later.
wait 5
pboot
```

D. Sample Backup List File

Backup list file could include any system files and user data files, such as personal address book. System files may vary from one operating system to another. System files with any file attributes, such as System, Hidden, and Read-Only, could be specified in the backup list file, and they will be restored with the same attributes.

BACKUP.LST (for Healing Boot Image)

```
c:\autoexec.bat
c:\command.com
c:\config.sys
c:\io.sys
c:\msdos.sys
c:\msdos.——
c:\windows\system.dat
c:\windows\user.dat
c:\windows\control.ini
c:\windows\explorer.exe
c:\windows\progman.ini
c:\windows\system.ini
c:\windows\win.com
c:\windows\win.ini
c:\windows\winsock.dll
c:\windows\system\kernel32.dll
c:\windows\system\krnl386.exe
```

E. Sample Disk Cloning Boot Image file

Ghost-B.img

CONFIG.SYS (for GHOST-B.IMG as Disk Cloning Boot Image)

```
device=ifshlp.sys
device=himem.sys /testmem:off
device=emm386.exe noems
device=smartdrv.exe 8192
dos=high,umb
files=30
buffers=50
lastdrive=z
```

AUTOEXEC.BAT (for GHOST-B.IMG as Disk Cloning Boot Image)

```
@echo off
Rem Load NDIS2 drivers, initialize the network adapter, start network services,
Rem and logon to the server as superman (with "password" as the password).
Rem The administrator should create an account on NT server named "superman" and
Rem grant accordingly access privileges to this account.
net initialize
net start
net logon superman password /savepw:no /yes
Rem Map a network drive x: as drive D: on the server (McLaren)
net use x: \McLaren\D$
```

echo The client system will be backed up onto the server with Ghost.

```
Rem wait.exe10 is an external utility to wait a specific period of time (in second)
wait 3
```

```
Rem Change the work directory to x:\ghost
x:
cd \ghost
```

```
Rem Make two historical backup copies: dell.gh1 and dell.gh2
Rem Delete or rename the old backups (if any)
Rem More historical copies could be archived this way
if exist dell.gh2 del dell.gh2
if exist dell.gh1 ren dell.gh1 dell.gh2
if exist dell.gho ren dell.gho dell.gh1
```

A:

```
Rem Syntax: ghost -clone,MODE={copy|load|dump|pcopy|pload|pdump},SRC={drive|file|
Rem drive:partition|@MCsessionname|@MTx},DST={drive|file|
Rem drive:partition|@Mcsessionname|@MTx},SIZE{E|F|L|n={nnnnM|nnPIF|V}}
Rem Parameters using for GHOST:
Rem -clone Clone operation
Rem mode=pdump Partition-to-file dump
Rem src=1:1 Source partition number, the first partition of the first disk
Rem dst=x:Dell Partition image filename, Dell.gho on drive x:
Rem -sure Avoid being prompted with the final question "Proceed with disk clone – destination drive will be
overwritten?"
```

```
ghost -clone,mode=pdump,src=1:1,dst=x:dell.gho -sure
if errorlevel 0 goto finish
```

```
echo GHOST could not successfully complete.
echo Please try it again later.
wait 4
Rem reboot.com10 is an external utility to reboot the machine
Reboot
```

Ghost-R.img

```
CONFIG.SYS (for GHOST-R.IMG as Disk Cloning Boot Image)
device=ifshlp.sys
device=himem.sys /testmem:off
device=emm386.exe noems
device=smartdrv.exe 8192
dos=high,umb
files=30
buffers=50
lastdrive=z
```

```
AUTOEXEC.BAT (for GHOST-R.IMG as Disk Cloning Boot Image)
@echo off
Rem Load NDIS2 drivers, initialize the network adapter, start network services,
Rem and logon to the server as superman (with "password" as the password).
Rem The administrator should create an account on NT server named "superman" and
Rem grant accordingly access privileges to this account.
net initialize
net start
net logon superman password /savepw:no /yes
Rem Map a network drive x: as drive D: on the server (McLaren)
net use x: \McLaren\D$
```

```
echo.
echo The client asked to recover its hard drive with a saved Ghost Image.
echo All the contents on the hard drive will be rewritten.
```

```
Rem wait.exe10 is an external utility to wait a specific period of time (in second)
wait 3
```

```
Rem Syntax: ghost -clone,MODE={copy|load|dump|pcopy|pload|pdump},SRC={drive|file|
Rem      drive:partition|@MCsessionname|@MTx},DST={drive|file|
Rem      drive:partition|@Mcsessionname|@MTx},SZE{EIFILIn={nnnnMInnP|FV}
Rem      Parameters using for GHOST:
Rem      -clone          Clone operation
Rem      mode=pload      File-to-partition load
Rem      src=x:\ghost\dell.gho:1  Partition image filename
Rem      dst=1:1         Destination partition, the first partition of the first disk
Rem      -sure           Avoid being prompted with the final question "Proceed with disk clone – destination drive
Rem                      will be overwritten?"
ghost -clone,mode=pload,src=x:\ghost\dell.gho:1,dst=1:1 -sure
if errorlevel 0 goto finish
```

```
echo GHOST could not successfully complete.
echo Please try it again later.
wait 4
reboot
```

```
:finish
echo The disk partition is fully restored.
echo Booting from local hard disk.
```

```
wait 3
```

```
Rem pboot.exe is a 3Com pre-OS utility to allow the client system doing a local boot
Rem without reboot the machine after executing the pre-OS tasks
a:\pboot
```

Sample network files

PROTOCOL.INI (for all boot image files both)

```
[network.setup]
version=0x3110
netcard=ms$ndis,1,MS$ndis,1
transport=ms$ndishlp,MS$NDISHLP
transport=ms$netbeui,MS$NETBEUI
lana0=ms$ndis,1,ms$netbeui
lana1=ms$ndis,1,ms$ndishlp
```

```
[ms$ndis]
drivername=undis$
; INTERRUPT=3
; IOADDRESS=0x300
; DMACHANNEL=none
; DMAMODE=burst
; MAXTRANSMITS=12
; MAXREQUESTS=8
```

```
[protman]
drivername=PROTMAN$
PRIORITY=MS$NDISHLP
```

```
[MS$NDISHLP]
drivername=ndishlp$
BINDINGS=ms$ndis
```

```
[ms$netbeui]
drivername=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=ms$ndis
LANABASE=0
```

SYSTEM.INI (for all boot image files both)

```
[network]
filesharing=no
printsharing=no
autologon=no
computername=Universal
lanroot=a:
```

```
username=Superman
workgroup=workgroup
reconnect=no
directhost=no
dospophotkey=N
lmlogon=0
logondomain=NT4test1
preferredredir=full
autostart=full
maxconnections=8
```

```
[network drivers]
netcard=ndis.dos
transport=ndishlp.sys,*netbeui
devdir=a:
LoadRMDrivers=yes
```

```
[Password Lists]
SUPERMAN=A:\SUPERMAN.PWL
*Shares=A:\Shares.PWL
BOOTROM=A:\BOOTROM.PWL
```

References:

1. FIRM, eXpress, Altiris, Inc., www.altiris.com/
2. ConfigSafe, imagine LAN, Inc., www.configsafe.com/
3. LifeSaver, JB Systems, www.lifesaverbackup.com/
4. LHA, www.bekkoame.ne.jp/~h_ozawa/soft/lha/msdos.html
5. Norton GHOST, www.symantec.com/sabu/ghost/indexB.html
6. ImageCase IC3, Innovative Software, Ltd., www.innovativesoftware.com/
7. Universal NDIS2 Driver, <http://developer.intel.com/ial/wfm/tools/pxepdk20/index.htm>
8. WAIT.EXE, <http://www.lanworks.com/download>
9. SHUTDOWN.EXE, <http://www.lanworks.com/download>
10. REBOOT.COM, <http://www.lanworks.com/download>

**3Com Corporation**

P.O. Box 58145
5400 Bayfront Plaza
Santa Clara, CA
95052-8145
Phone: 1 800 NET 3Com
or 1 408 326 5000
Fax: 1 408 326 5001
World Wide Web:
www.3com.com

Asia Pacific Rim

Sydney, Australia
Phone: 61 2 9937 5000
Fax: 61 2 9956 6247
Melbourne, Australia
Phone: 61 3 9866 8022
Fax: 61 3 9866 8219
Beijing, China
Phone: 86 10 68492 568
Fax: 86 10 68492 789
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Carrier and Client Access
Phone: 33 1 41 97 46 00
Fax: 33 1 49 07 03 43

3Com GmbH

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Fax: 49 30 34987999
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Fax: 49 89 62732233

3Com Iberia

Portugal
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Fax: 351 1 3404575
Spain
Phone: 34 1 509 69 00
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3Com Latin America

U.S. Headquarters
Phone: 1 408 326 2093
Fax: 1 408 764 5730
Miami, Florida
Phone: 1 305 261 3266
Fax: 1 305 261 4901
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Fax: 39 6 52799423

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Fax: 41 844 833 934

3Com UK Ltd.

Edinburgh
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Fax: 44 131 240 2903
Ireland
Phone: 353 1 820 7077
Fax: 353 1 820 7101
Manchester
Phone: 44 161 873 7717
Fax: 44 161 873 8053
Marlow
Phone: 44 1628 897000
Fax: 44 1628 897003

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