Ghost Manual

Introduction

Ghost is designed to minimize the installation times for operating systems such as Win95, WinNT and OS/2. This is particularly useful to organizations which have a large number of similarly configured workstations to install. For example, Ghost reduces the time to install a typical 300 megabyte Win95 system from an hour with substantial operator input to about 5 minutes with no operator input required. In addition, multiple workstations may be installed at the same time which further improves efficiency.

With Ghost tedious tasks such as FDISKing and FORMATing disks are a thing of the past - Ghost dynamically FDISKs and FORMATs the target disk, allowing FAT partitions to be expanded or contracted to fit the target.

Ghost is designed to be run under DOS and can be run from a DOS boot diskette. Although DOS-based it can handle Win95/WinNT long file names, NTFS partitions, OS/2 extended attributes and even OS/2 boot manager partitions.

Ghost has two modes of operation - a simple, robust, menu driven user interface, and, to further aid automating the installation process, a batch mode.

Prior to Win95 there was little need for a utility like Ghost, as systems could be installed by simply using the DOS XCOPY command. Win95 introduced long file names, XCOPY could no longer do the job - hence the need for a utility like Ghost.

Not only is Ghost the fastest way to install Win95, WinNT and OS/2, it has another handy use - it can make complete backups of disks, even copying "in-use" system files which are missed by other backup utilities.

Overview

Ghost is essentially a disk copying program. The entire contents of a disk may be copied from one disk to another, or they may be copied to a disk image file, and that image file can then be used as a template to create copies of the original disk.

Each disk is made up of a Master Boot Record and from 1 to 4 primary partitions. Primary partitions are *physical separate areas* of the disk, and are usually defined by the FDISK utility. Primary partitions may be further subdivided into logical drives, once again using the FDISK utility. However, it is not important to understand the exact details of how a disk is subdivided. Ghost copies *every* partition, regardless of type, from the source (disk or disk -image file) to the destination.

If the source and destination disks were identical in size and structure then all that would be needed is a sector by sector copy; but in practice this is seldom the case. Ghost positions each partition or logical drive on the target disk using the same rules as FDISK. In addition, if the partition is a FAT type (90% are, the most common exceptions are NTFS and HPFS), Ghost allows the target partition to be expanded or contracted.

Installation

Ghost requires no special installation procedures. It is supplied in a zip file (GHOST.ZIP) if downloaded from http://www.ghostsoft.com, or in unzipped form if supplied on diskette. Because Ghost is designed to be run on any PC (in accordance with the Ghost licensing rules) it does not need to be installed, but can be run from a DOS boot diskette. Of course the Ghost files can be copied onto a hard drive for improved performance.

From http://www.ghostsoft.com

Ghost started life as a product that could be downloaded from the Internet with a free 30 day evaluation. It still can - just click on the **Download** option and select **Ghost for Dos**. The file GHOST.ZIP will be copied to your system, use PKZIP or WinZip to unzip. The files contained are:

File	Description
readme.gho	Contains list of latest modifications, bug fixes, ordering and pricing information.
ghost.exe	This is the one that does all the work.
ghost.env	Sample Ghost environment file.
ghost.doc	The ghost manual in Word for Windows format

The evaluation copy is a fully functional single user version, but it will time-out at the end of the month. As of revision 1.4.7 of Ghost there is nothing to stop repeated downloading of Ghost at the start of each month, but there will be in future versions.

Do not try and change the system date to fool Ghost - it independently checks the system date and will not complete the clone/dump/load operation if the system date has been set back.

To convert an evaluation copy into a fully fledged version, see **Ordering** for more information.

From diskette with/without the manual

Ghost is supplied in a packaged form, either with or without the manual. The contents of the disk are the same as in the downloadable version - except, of course **ghost.exe** has no timeout.

Using GHOST inside of Windows95 from a DOS Window

Ghost has succsesfully run inside of Windows95 to save an image file of the Windows95 that your running ghost on. However it is not as reliable; the saving of the image file might fail. If it does fail, you will need boot from a bootable diskette that has the neccesary network driver allowing you to attatch to the network, and save the hard drive as an image file.

Using Ghost

Ghost should be used in interactive mode initially. Once the interactive procedure has been finalized, the process can be automated by using batch mode.

To start Ghost in interactive mode, type Ghost at the DOS prompt. A startup banner will be displayed, then the initial menu.

Selecting connection type

```
          Connection type

     Local/Server
     NetBios Slave
     NetBios Master
     LPT Slave
     LPT Master
     Exit
```

In the vast majority of cases the default option of **Local/Server** is the best choice. Selecting it takes you to the **Transfer Option** menu. See next page for Transfer Options.

The other options (Netbios Slave/Master and LPT Slave/Master) are used only for peer to peer connections. If you have a client/server setup you are unlikely to need the peer-to-peer options. Netbios only works with Ethernet. Netbios is only used when you connect a PC to another PC via a twisted Ethernet cable or a Mini-Hub in "workgroup" mode with only the two nodes connected. The Netbios interface/protocol is NOT needed to save an image file onto a server. The only components needed to save an image file of a hard drive is the GHOST program along with a bootable disk with the network client components.

Peer to peer connections are typically used when there is no network - just two computers which you wish to connect.

Using Ghost(Continued)

Ghost gives you the choice of connecting via NetBios or via the LPT (printer) port. In both cases one computer becomes the master, the other the slave. To connect via the printer port you need a LapLink or FastLynx type cable plugged into the printer port of both computers. To connect via NetBios you need network cards in both computers, a twisted Ethernet cable, and the appropriate networking software. In general, connecting via the Network gives two to five times the performance of an LPT connection. A typical LPT connection speed is 5 Megs/minute, a typical NetBios connection speed is 20 Megs/minute.

Selecting which PC will be Master.

For **NetBios** and **LPT** connections, one machine must act as the **Master** and the other the **Slave**. *All operator input will be on the Master computer*.

Use the following table to choose which will be Master and which will be Slave.

Action	Master	Slave
Disk to Disk copy	PC containing source disk	PC containing destination disk
Disk to file copy	PC containing source disk	PC receiving destination image file
File to disk copy	PC containing destination disk	PC containing source image file

Connecting via LPT

Make sure both computers are connected via the printer port with a LapLink/FastLynx type parallel cable. Ghost must be running under DOS on both computers. Select Master and Slave computers based on table above. The parallel port MUST be set to Bi-Directional or EPP or ECP. You must experiment with the mode for best performance, Unidirection will not work.

Select the Slave first - it will not timeout while waiting for a signal from the Master. The Master will time-out after 30 seconds if a connection has not been made.

Once a connection has been made, the data transfer speed will be displayed and the Transfer Option menu will be displayed. See *Selecting Transfer Option.*

Connecting via NetBios(Peer to Peer)

Make sure both computers are connected via a twisted Ethernet network cable. Both computers must be running the minimum network software for a NetBios connection. See below for details. Select Master and Slave computers as per the decision table on previous page. Ghost will automatically connect the two computers generally in about 30 seconds.

It may be useful to have a special boot diskette which loads just the network software needed by Ghost for the NetBios connect.
Eg for an NE2000 network card the following files would be required. Your drivers and protocols migh vary, this is only an example….

> *NE2000.INS*
> *NE2000.COM*
> *IPXODI.COM*
> *LSL.COM*
> *NET.CFG*
> *NETBIOS.EXE*

A batch file such as the following GHNETB.BAT would be called from the AUTOEXEC.BAT file (ie CALL GHNETB.BAT)

> *rem GHNETB.BAT*
> *LH LSL*
> *LH NE2000*
> *LH IPXODI*
> *LH NETBIOS*

This will load the network drivers needed for the Ghost NetBios calls. Again, both machines will need a Network card, along with a twisted Ethernet cable and the neccesary network drivers. NetBIOS is available for www.novell.com or local BBS. If you are a Netware network, most likely you will have the NetBIOS interface on the server (Netbios.com or Netbios.exe).

Selecting Transfer Option

```
┌─────────────────────────────────────┐
│            Transfer Option          │
│                                     │
│  Clone disk to disk...              │
│  Dump disk image to file...         │
│  Load disk from image file...       │
│  Back to previous menu              │
│                                     │
└─────────────────────────────────────┘
```

The Transfer Option menu presents three choices. They are:

Clone disk to disk... Select this option if you wish to copy all partitions from one disk to another. When you select this option you are then prompted to *Select local source drive*. See next page.

Dump disk image to file.... Select this option if you wish to save an exact image copy of a disk in a file. The file can be on a local disk, a server drive, or on the drive of a PC connected via NetBios or the LPT port. When you select this option you are then prompted to *Select local source drive*. See next page.

Load disk from an image file... This is the reverse of the previous option. Select this if you wish to load the contents of a disk image file onto the disk of the local PC. The image file must have been dumped (or saved) by Ghost previously. When you select this option you are then prompted to *Enter file name to load disk image from*. See next pages.

Select local source drive

		Select local source drive			
Drive	**Size in Megabytes**	**Primary Partitions**	**Cylinders**	**Heads**	**Sectors per Track**
1	**809**	**2**	**822**	**32**	**63**
2	1216	2	618	64	63

Ghost will display the details of every disk it can find on the local PC and allow you to select the disk you wish to copy from.

Use the up and down arrows to move the menu bar. Press *Enter* to select.

Select local/remote destination drive

			Select local destination drive			
Drive	**Size in Megabytes**	**Primary Partitions**	**Cylinders**	**Heads**	**Sectors per Track**
1	809	2	822	32	63
2	1216	2	618	64	63

Ghost will display the details of every disk it can find on the local/remote PC and allow you to select the disk you wish to copy **to**. If this is a local disk to disk copy then the source disk will be unavailable for selection.

Use the up and down arrows to move the menu bar. Press *Enter* to select.

Important: This is the disk that is going to get overwritten. Choose CAREFULLY.

Enter file name to load disk image from

Enter file name to load disk image from

G:\IMAGES\WIN95.DMP

When choosing **Transfer Option->Load disk from image file....** you will immediately be prompted for the name of the source disk image file.

Enter the full path name of the disk image file. Eg, if the disk image file resides on a server drive, you must enter the server's drive letter and any subdirectory names.

If you selected the **Connection type->Local/Server** then the destination disk image file must reside on either a server drive (the most common option) or a local drive (but not the one that is being copied to).

For any other **Connection type** (peer to peer via NetBios or LPT port) then the source disk image file must reside on one of the remote drives.

Enter file name to dump disk image to

Enter file name to dump disk image to

G:\IMAGES\WIN95.DMP

When choosing **Transfer Option->Dump disk image to file....** after selecting the local source disk you will be prompted for the name of the destination disk image file.

Enter the full path name of the disk image file. Eg. if you are dumping (copying) the entire contents of a workstation disk to a server drive, you must enter the server's drive letter and any subdirectory names.

If you selected the **Connection type->Local/Server** then the destination disk image file must reside on either a server drive (the most common option) or a local drive (but not the one that is being copied from).

For any other **Connection type** (peer to peer via NetBios or LPT port) then the destination disk image file must reside on one of the remote drives.

Destination drive details

If loading from a disk image file, or doing a disk to disk copy, Ghost will display a suggested partition layout for the target disk.

By default, Ghost will allocate any extra space that the new disk has to the first FAT16 partition that it discovers.

Important: You can change the size of any target FAT partition at this stage, simply by entering the new size (in megabytes).

Use up and down arrow to move between fields. Ghost will not allow you to enter a value which exceeds the available space, or which is not large enough to contain the data held in the source partition.

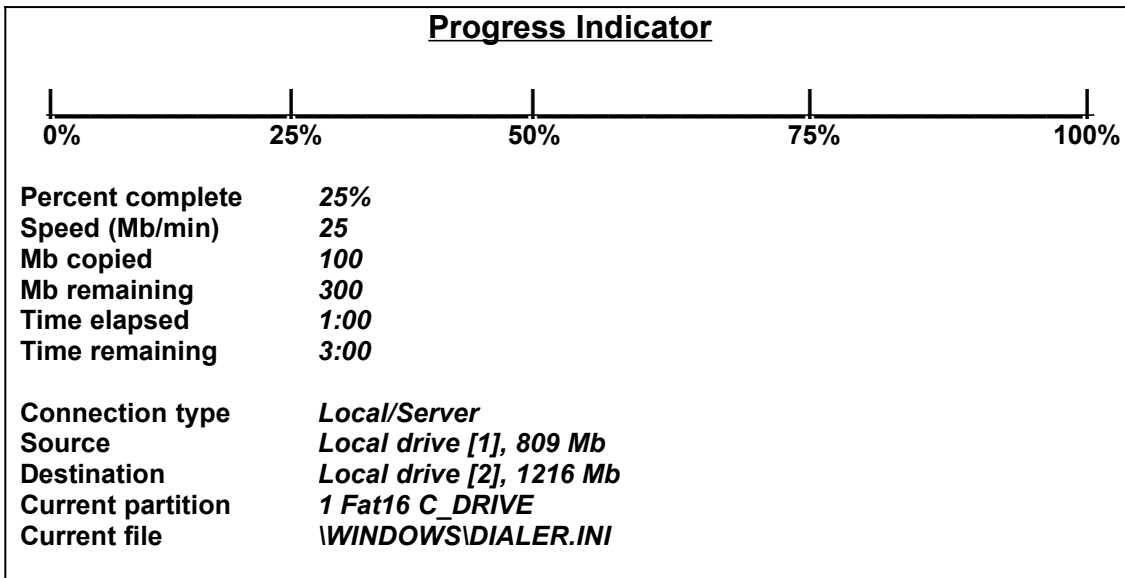When you are satisfied with the allocation of space between partitions, press *Enter*

			Destination drive details			
Part	**Type**	**Description**	**Volume Label**	**New size in Mb**	**Old size in Mb**	**Change in Mb**
1	06	Fat16	C_DRIVE	800	400	400
2	04	Fat16 extended	MY_DATA	200	200	0
3	07	NTFS extended	NT_DRIVE	650	650	0
4	07	HPFS extended	OS2DRIVE	350	350	0
		Free		0	0	0
				1600	1200	400

Proceed with disk clone

Before starting to overwrite the destination disk, Ghost displays the source and destination details and gives you a chance to back out. The default is to back out.

Only select Yes if you are really sure - the target drive will be completely overwritten, with NO chance of recovering any data.

Once the copy/dump has started Ghost keeps updating the Progress Indicator with information as shown.

```
                          Progress Indicator

     |              |              |              |              |
     0%            25%            50%            75%           100%

     Percent complete     25%
     Speed (Mb/min)       25
     Mb copied            100
     Mb remaining         300
     Time elapsed         1:00
     Time remaining       3:00

     Connection type      Local/Server
     Source               Local drive [1], 809 Mb
     Destination          Local drive [2], 1216 Mb
     Current partition    1 Fat16 C_DRIVE
     Current file         \WINDOWS\DIALER.INI
```

Ghost finishes

After finishing a *Dump a disk image to a file* action Ghost will emit a beep and return to the Dos prompt.

When *Cloning disk to disk* or *Loading disk from an image file* the target disk is completely overwritten with the source data. The target PC will need to be rebooted (as after a change made by FDISK). By default Ghost prompts with

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Press Ctrl-Alt-Del to reboot.

This can be overridden. See the **-RB** and **-FX** under *Ghost Switches*.

Connecting a Workstation to a Server under DOS.

The primary aim of this exercise is to make the server drive(s) visible as they will be used for dumping/loading the disk image file(s). Because the target workstation must be running under DOS (or Win95 in single user mode) it is important to know how to connect a workstation booted under DOS to a variety of different operating systems.

The method varies, depending on the operating system used by the server.

Connecting to NT Server, Windows for WorkGroups or Win95

For servers running Microsoft operating systems such as NT Server, Windows for WorkGroups or Win95, the method is the same.

Use Microsoft's ***Workgroup Add-On for MS-DOS.*** Run the setup program to generate the network configuration files needed. Once generated they can be copied to a DOS boot diskette for convenience.

Once the network files and drivers are generated, the following commands can be used to connect the DOS workstation to the server:

Command	Function
net start work	*load network drivers*
net view	*Display list of machines*
net view \\rat	*Display list of shared resources belonging to machine \\rat*
net use F: \\rat\client	*Connect F: to the shared path client on machine rat*
net use /d F:	*To disconnect the shared drive F:*
net stop work	*Unload network drivers*
net stop	

Connecting to OS/2

Use IBM's DOS LAN Services product to generate and install the network drivers and configuration files needed.

If you have the OS/2 Warp Server CD then you can generate the diskettes needed from this. Once installed a boot diskette can be made with just the drivers and files needed.

To connect use the *net* commands shown on the previous page.

Cloning Windows NT

Cloning WinNT is similar to cloning Window's 95, but there are some problems specific to WinNT. WinNT supports NTFS partitions, as well as FAT partitions, and although Ghost will copy NTFS partitions, it does it on a sector by sector basis. This can cause problems - large disks with only a small amount of data can take a long time to copy, and disk image files can become unacceptably large. The other problem is the WinNT network Security Identifier or SID. Cloning a WinNT workstation disk can produce another workstatiion with a duplicate SID - something the NT Server will object to. Happily there ways to get around both problems.

Note: Unlike Win95 where Ghost can run in a Dos window on the source workstation, under WinNT the source PC must be booted under DOS.

Copying NTFS partitions

Currently Ghost copies NTFS partitions on a sector by sector basis, which has the following disadvantages:

- If the source NTFS partition is large then the copy can take a long time as Ghost will copy all the empty sectors as well as as those with data.

- If the source NTFS partition is large, and a disk image file is being created, then this file will be correspondingly large.

- NTFS partitions cannot be re-sized (expanded or contracted) on the target disk, whereas FAT partitions can. This means the target disk has to be at least as big as the source NTFS partition. Although this limitation will be overcome in a future Ghost release it does present a problem now.

There are a couple of ways of getting around this problem and the solution really depends on how many PC's that have to be setup. If you only have a few, consider using the peer to peer connection options, either via NetBios or the LPT port(s). This gets around the large disk image file problem of the dump/load option.

If there are a lot of workstations to install, the best option is to set up your source (template) workstation with FAT partitions, create a disk image file of the template workstation on a server drive, then use the clone multiple workstations facility. The target workstations can then be converted to NTFS using WinNT - this only takes a few minutes per workstation.

Avoiding problems with the SID (Security Identifier)

The solution to this problem relies on the way the WinNT workstation and the WinNT server assign the workstation a SID. It is not until the workstation **first connects** to the NT Server that the SID is assigned. Up to that point it is in a "waiting to be assigned" state. Therefore, the source NT workstation must be cloned (copied to a disk image file or to a destination disk) **before** the NT workstation makes it's first official NT connection to the NT Server.

The sequence of actions is:

• Install the WinNT operating system from the NT installation CDROM.

• Before the NT workstation connects to the NT Server, boot it under DOS, and connect to the server (**See Connecting a workstation to a Server under DOS**).

• Make a disk image file of the source/template NT Workstation.

• Boot the target workstations under DOS, connect to the Server.

• Load the disk image file on to the target (see Cloning Multiple Workstations if you wish to do more than one at a time).

• When the disk load has finished, reboot the workstation under WinNT and when it first connects to the NT Server it's SID will be created.

Cloning Multiple Workstations.

To clone multiple workstations as the same time, you must have a multi-user version of Ghost. *The evaluation copy which is downloadable from http://www.ghostsoft.com and the single user version will **<u>not</u>** allow cloning multiple workstations.*

See ***Ordering*** if you need to upgrade to the multi-user version.

To clone multiple workstations at the same time:

- Make a disk image file of the system you wish to clone and save on a server drive.

- Boot the target workstations under Dos and connect to the server (***See Connecting a workstation to a Server under DOS***).

- Use the ***Local/Server->Load disk from image file...*** option to load all target PC's from the same image file.

- To further automate the process, see the following section on ***Using Ghost in batch files.***

  Note that the number of workstations that run Ghost at the same time depends on the speed of the Network and the speed of the Server. A medium speed network/server can generally handle five-ten concurrent Ghost loads, a high speed network/server can handle 15-25.

Using Ghost in Batch files

Ghost has two modes of operation: *Interactive* (the default) and *Batch*. Batch is useful in repetitive situations - especially when a large number of workstations need to be loaded. Most of the Ghost switches are to allow Ghost to run in batch mode. They specify such parameters as the source (a disk or an image file), the target (a disk an image file), the type of connection (Local/Server, NetBios or LPT port) and whether to wait for user confirmation before starting.

See *Switches* for a detailed explanation of batch switches.

Some common examples of using Ghost in batch mode:

To load the disk image file SAVEDSK.IMG held on the server drive E: onto drive one of the local PC. Do not prompt if OK to proceed. **ghost -clone,mode=load,src=E:\SAVEDSK.IMG,dst=1 -sure** This example is typical of those that would be in a batch file to automate installation of workstations from a network server.
To copy drive one to drive two on a PC, without final prompt **ghost -clone,mode=copy,src=1,dst=2 -sure**
To connect via NetBios to another PC running Ghost in slave mode, and dump a disk image of local drive two to the remote file C:\DRIVE2.IMG **ghost -nbm -clone,mode=dump,src=2,dst=C:\DRIVE2.IMG**

Ghost and CDROMs

Ghost can be used to install a complete Windows'95 system (or WinNT) from a single disk image file held on a CDROM. This technique is being exploited by several Universities who are issuing students with a CDROM containing a Ghost disk image file and Ghost. Students can re-load their Notebook computers from the CD-Rom at any stage, just by clicking on the Ghost icon. No further user-input is required.

"Burning" a Ghost disk image file onto a CDROM is a useful technique for any organization which distributes updates via CDROMS.

Switches

Ghost may be run in interactive or batch mode. Batch mode is useful for automating installation or backup using Ghost. Most of the Ghost switches are used to assist with batch mode operation. To list switches from Ghost, use:

ghost -h

*All switches must be preceded with a **-** (hyphen) or / (slash). Switches are case insenstive - they may be entered in upper, lower or mixed case. A detailed list of switches with explanations follows.*

Switch	Explanation
-CLONE	**,mode={COPY|LOAD|DUMP},src={drive|file},dst={drive|file}** **CLONE** using arguments. This is the most useful of the batch switches and has a series of arguments which define: (a) The **_mode_** or type of clone command (a disk to disk **copy**, file to disk **load**, or disk to file **dump**) (b) The **_src_** argument defines the **drive** (eg C:) or the image **file** (eg G:\SYSTEM2.IMG) which is the source of the copy. (c) The **_dst_** argument defines the **drive** (eg D:) or the image **file**(eg G:\SYSTEM3.IMG) which is the target of the copy. A few examples will help illustrate: *To copy drive one to drive two on a PC, without final prompt* **ghost -clone,mode=copy,src=1,dst=2 -sure** *To connect via NetBios to another PC running Ghost in slave mode, and dump a disk image of local drive two to the remote file C:\DRIVE2.IMG* **ghost -nbm -clone,mode=dump,src=2,dst=C:\DRIVE2.IMG** *To load the disk image file SAVEDSK.IMG held on the server drive E: onto drive one of the local PC. Do not prompt if OK to proceed.* **ghost -clone,mode=load,src=E:\SAVEDSK.IMG,dst=1 -sure** This example is typical of those that would be in a batch file to automate installation of workstations from a network server.
-DI	**Di**agnostics. This is useful for debugging purposes. For each **disk** present on the PC, the physical attributes such as **Drive, Cylinders, Heads, Sectors per track and Total sectors** are displayed. For each **partition** present on each **disk**, the **Number, Type, Physical/Logical flag, Starting sector and number of sectors** are displayed. The diagnostics may be redirected to a file and emailed or faxed to Binary Research to assist with problem solving. Eg ghost -di >diag.ls will output disk diagnostics to the file *diag.ls*

-FX	**F**lag E**x**it. Normally when Ghost has finished copying a new system to a disk it prompts the user to reboot with a ***Press Ctrl-Alt-Del to Reboot*** window. However if Ghost is being run as part of a batch file it is sometimes useful to have it just exit back to the Dos prompt after completion so that further batch commands may be processed. **-FX** enables this. See **-RB** for another option on completing a clone.
-IA	**Image A**ll. When copying a partition from a disk to an image file or another disk, Ghost examines the source partition and decides whether to copy just the files and directory structure, or to do an image (sector by sector) copy. If it understands the internal format of the partition it defaults to copying the files and directory structure. Generally this is the best option, but occasionally if a disk has been set up with special hidden security files which are in specific positions on the partition, the only way to reproduce them accurately on the target partition is via an image or sector by sector copy. The ***Image All*** switch forces Ghost to do a ***sector by sector*** copy of all partitions.
-NBS	**N**et**B**ios **S**lave mode. This switch causes Ghost to automatically go into NetBios slave mode, and is the equivalent of selecting the ***NetBios Slave*** option from the ***Connection type*** menu. See **Using NetBios connection** for more information on connecting via NetBios.
-NBM	**N**et**B**ios **M**aster mode. This switch causes Ghost to automatically go into NetBios master mode, and is the equivalent of selecting the ***NetBios Master*** option from the ***Connection type*** menu. See **Using NetBios connection** for more information on connecting via NetBios.
-RB	**R**e**B**oot after finishing a ***load*** or ***copy.*** After completing a ***load*** or ***copy*** operation, the target PC must be rebooted so that the operating system can load the new disk / partition information. Normally Ghost prompts the user to ***Press Ctrl-Alt-Del to reboot***, in a similar way to FDISK. **-RB** tells Ghost to automatically reboot after completing the clone, and is useful when automating Ghost in a batch command file. See the **-FX** switch for another option on completion of a clone.
-SURE	Use the **-SURE** switch in conjunction with **-CLONE** to avoid being prompted with the final ***Proceed with disk clone - destination drive will be overwritten?*** question. This command is useful in batch mode.

Glossary of Terms

Term	Meaning
Cylinders	A parameter which along with heads and sectors/track defines the size of a disk.
Disk	A hardware device to store data, typically made up of a Master Boot Record and a number of partitions.
Drive	Another name for a partition. Each drive is accessed by a drive letter. Eg C:
FAT	File allocation table. Used by DOS, Win95 and sometimes OS/2 to allocate space to files and directories.
Head	Each disk has a fixed number of heads. A head will read from a single platter of a disk.
HPFS	High Performance File System - an alternative to a FAT file system which is used by OS/2
NetBios	A high level Network programming interface which is supported by lower level Network protocols such as IPX/SPX and TCP/IP.
NTFS	New Technology File System. An alternative to FAT and HPFS file systems used by WinNT
Partition	A contiguous area on a disk, defined in the Master Boot Record and which has a specific file system such as FAT, HPFS or NTFS
Sector	A 512 byte area on a disk. The smallest addressable unit.
Track	A group of sectors which make up one ring on a disk platter.

FAQ

Can Ghost for DOS handle long file names for Windows'95, Window's NT and OS/2?

Yes.

Will it work with mixed SCSI and IDE drives?

This depends on the operating system. It will do the copy successfully, but if you try and reboot then the correct disk drivers may not be present, Win95 tends to be more forgiving than OS/2 and WinNT.

Can the disk image be compressed?

The disk images for FAT (Win 3.x) and VFAT (Win95) only include the data for directories and files. For other partition types the partition is treated like a "black box" and all sectors are copied. We are currently investigating ways of compressing NTFS partitions.

Will it work on systems with multiple Operating Systems loaded.

Yes - subject to any limitations on the operating systems. Eg for Linux and SCO Unix the target disk must be identical to the source disk.

Does Ghost support the beta Win9x with it's FAT32 tables?

It will by 15-Dec-96.

Does it work over TCP/IP? What network protocols do work?

For general usage, all that is required by Ghost in Local/Server mode is that the server drive(s) are visible. Eg. if the server drive was **G:** then the workstation would need to connect to the server with the appropriate network software so that the workstation could access the **G:** drive. In this way Ghost is independent of the underlying network protocol. In the less common peer-to-peer connection situation via NetBios, then NetBios must be supported by the network protocol. Most protocols do support NetBios eg TCP/IP, IPX/SPX.

Does Ghost work with NTFS? How about HPFS?

Ghost will currently work with both NTFS and HPFS but it is clumsy. Ghost currently does not understand the internal format of NTFS or HPFS, so it resorts to a sector by sector copy. This is slower than just copying the data and does not allow expanding or contracting the partitions. Making Ghost understand NTFS partitions is a top development priority.

Can Ghost work with WinNT? What about SIDS (Security Identifiers)?

Yes, Ghost will work with WinNT. Care must be taken when cloning WinNT workstations to avoid SID problems. See **Cloning WinNT** for more information.

Does Ghost work with NetWare (by Novell) servers?

Ghost can dump and restore workstation disk images to and from a NetWare server, however it has not been tested duplicating a NetWare server. It is unlikely to work.

Can GHOST do a push install to a client running just TCP/IP?

No.

Why is it the only backup that doesn't clobber long file names in Win95?

Because GHOST gets underneath the usual file system interface and deals directly with the low level file structure.

Can a WinNT system be replicated to a different size disk?

If the partition type is FAT, then yes. If the partition type is NTFS, then yes (providing the target disk is at least as big as the source disk). When Ghost is fully NTFS capable then the target disk may be smaller then the source (providing there is enough room for the data).

When I do a dir /a /s on the original hard drive from the root I get 4,295 files, but on the target drive I get 4,294 files. Why?

Some temporary files are not included when copying a FAT partition. These are: SWAPPER.DAT, WIN386.SWP, SPART.PAR, PAGEFILE.SYS and 386SPART.PAR

Excluding these files speeds the copy and reduces the size of the disk image files.

Does Ghost transfer data from one computer to another like Laplink or Fastlynx?

Yes, Ghost is capable of data transfer via the printer ports. Typical data transfer speed is 5-6 megabytes/minute.

How does Ghost load an image back to the hard drive without first formatting the hard drive?

To save time, Ghost formats "on the fly".

When I copy an image from a 200 Megabyte hard drive to a 1 gigabyte hard drive what about the rest of the 800 megabyte free space?

It gets formatted and is made part of the partition. The free space is available for use immediately.

How fast does Ghost work?

This depends on what Ghost is doing and the speed of the system. For a disk-to-disk copy speeds range from 20 megs/minute to 100 megs/minute. For a Network copy speeds range from 10 megs/minute to 70 megs/min.

Ordering

There are a number of ways to order Ghost:

- Use the **Print'n'Fax** form found on our www site: **www.ghostsoft.com**

- Use our toll free number **1 (800) 817 5119** and supply credit card details (inside U.S. and Canada only)

- Outside the toll free area, call **+1 (414) 964 2200**

- Email to **ghost@execpc.com**

- Fax your order directly to **+1 (414) 964 2201**

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Ghost Software Keys

This information does not apply to customers who purchase Ghost in packaged format - only to those who download an evaluation copy from http://www.ghostsoft.com

Background

Until revision 1.4.5 *Ghost* has been sold as either a single user version which required a hardware key (or dongle) in the printer port to run, or as a site license version which was a customised version of *Ghost* with the site license details displayed on startup.

The disadvantages of dongles from a customer viewpoint are obvious. The major disadvantage of a customised version of *Ghost* for site licenses was that customers were locked into the revision that they bought - and as the number of site licenses has been growing quickly it had become a lot of work for us sending out updates.

Ghost 1.4.5 addressed these problems by allowing customers to customize their own version of *Ghost* with an environment file. This means the latest version can be downloaded from http://www.ghostsoft.com at any time and customized.

Details

After purchasing Ghost customers are emailed or faxed their own environment file. *To avoid having to key in the environment file, its a good idea to include an Internet email address when you order.* A sample environment file called GHOST.ENV is included in GHOST.ZIP which is downloadable from our www site. The format is as follows:

Format of Ghost environment file

```
Banner        :Ghost Professional
Switches      :load=y,dump=y,write=y

Keynum      : 12345
License     : BM-512
MaxUsers    : 10
Name        : ABC Inc
Address1    : 200 John Wayne Blvd
Address2    : Irvine, CA 1024
```

The fields in italics are optional fields and allow tailoring Ghost for specific users. Eg it might not be advisable to let all users overwrite a disk with the load option. The other fields are self explanatory. Binary Research supplies the **Keynum** and the **License** values. There is only one valid **Keynum** value that corresponds to the rest of the information. The **MaxUsers** field is the maximum number of licensed concurrent users.

Entering the key from the faxed form

If you don't have an Internet or Compuserve email address, include a fax number on your order form. Binary Research will fax your software key within one working day of receiving your order.

Use an editor such as EDIT to enter this file. Please use spaces, not tabs. Punctuation and spelling must be exact. Case may be upper or lower. Spacing need not be exact. You may wish to use the **ghost.env** sample included in **ghost.zip** as a template.

Applying the key to Ghost

If the name of your ghost environment file is (for Example) **bm512.env**, customize using the following command line:

ghost -#e=bm512.env

Ghost must be at least revision **1.4.5** for this to work. If your version is earlier then download the latest version from **http://www.ghostsoft.com**

It may pay to make a backup of your ghost environment file in case it is accidentally deleted.

Ghost Technical Support

If you experience a problem with Ghost, the first step is to load the latest version from http:www.ghostsoft.com to see if the problem persists. If it does then please fill out the following sheet and fax to **+1 (414) 964 2201** or email the details to *ghost@execpc.com*

Ghost Problem Report Sheet

Bug Number		Date	
Author			
Company			
Contact Name			
Phone number			
Internet address			
State, Country			
Abort Number			
Abort Message			
Reproducible (Y/N)		Urgency (1-5)	
Parallel,Serial,NetBios or Local			
Brief Description of problem			
Hardware Make and Model			
Notes			