

Subject:	Using BPPATCH in network boot image files
Category:	images, nt, BPPATCH
Doc Type	Application Note

Using BPPATCH in network boot image files

Overview

Many IT professionals will agree that centralized boot management goes a long way to reduce total cost of ownership (TCO). Administrators are using Managed PC Boot Agents (MBA) to perform OS rollouts and other desktop management functions from a Pre-OS network boot. However, new solutions sometimes create new challenges. A common question many administrators ask is how to reduce the number of Pre-OS boot image files residing on the boot server. This document explains how to use the Lanworks Technologies' BPPATCH utility to streamline your boot image files.

Intended Audience

Network Administrators and IT professional responsible for desktop management and OS deployment.

Synopsis

BPPATCH is a little-known but powerful utility that allows you to update any text file contained in a boot image file with information from DHCP/BOOTP reply packets. A copy of BPPATCH is included in the MBA Utility diskette accompanying the MBA ROM. A copy of BPPATCH is also included in the 3Com DynamicAccess boot services software. Instead of manually updating configuration data within the boot image file, BPPATCH automatically makes the changes. In simple terms, BPPATCH allows one to update a Pre-OS boot image file on-the-fly. What does this mean? To explain this here's an example:

You have 50 computers performing a Pre-OS network boot from an NT server. Each computer must have a unique computername. To make matters worse, half the computers are using the 3Com 3C905C NICs while the others are using the SMC SMC9432 network adapters. The system administrator must maintain 50 different boot image files even though all the computers boot the same way.

Using the scenario described above, BPPATCH allows creation of a single boot image file to support all 50 workstations by updating the configuration data at boot time.

How BPPATCH works

1. When the BPPATCH command line is encountered, BPPATCH opens the specified configuration or batch files that contain BPPATCH tags.
2. BPPATCH updates the tags in the batch/configuration file using the parameters (which are stored in the client PC's memory) from the BOOTP/DHCP packets received from the server.
3. The client PC executes the configuration file(s) with the assigned and patched parameters.

For example, consider a file called WATTCP.CFG with the following BPPATCH tags:

```
MY_IP=#@yip#####  
HOSTNAME=#@t130#####  
NETMASK=#@smf#####  
MULTICAST-TTL=1
```

To replace the tags with the appropriate information, run BPPATCH as follows:
BPPATCH WATTCP.CFG

After patching, the contents of this file will then become:

```
MY_IP=10.10.10.60  
HOSTNAME=CONRAD  
NETMASK=255.255.255.0  
MULTICAST-TTL=1
```

Note, BPPATCH works only when booting from TCP/IP boot image file created using the 3Com Boot Image Editor. As a result, you will not be able to test BPPATCH booting from a diskette or hard drive.

If the Microsoft DHCP server as the boot server instead of the 3Com BOOTP server, some information such as user-defined tags will not be available. This is a limitation with the DHCP server not BPPATCH.

The BPPATCH syntax

BPPATCH [options] [filename...]

Three BPPATCH command-line options are available: */s*, */v*, and */i*.

All option switches must be in lowercase.

The */s* option is used to display all the available tags and their values. Remember that BPPATCH builds a list of available tags from information it retrieves from BOOTP/DHCP packets. The output is formatted in such a way that it can be redirected to a batch file and then used to set DOS environment variables. Below is a sample output:

```
rem BOOTP Patch v1.6  
rem RFC951 BOOTP reply  
set yip=10.10.10.9  
set sip=10.10.10.1  
set bfn=\tftpboot\ghost.img  
set typ=6  
set iop=0x4  
rem RFC1048 fields  
set smf=255.255.255.0  
set t128=EL90X.DOS
```

The output can be redirected to a batch file using the DOS redirection character ">". The sample AUTOEXEC.BAT file illustrates how to use the */s* option to set environment variables.

```
prompt $p$g  
path a:\;a:\net  
bppatch /s > setenv.bat  
call setenv.bat
```

The */v* option enables verbose mode so that BPPATCH will display messages while it processes the text files. Normally, BPPATCH displays nothing on the screen.

The */i* option replaces periods in IP addresses with spaces for Microsoft network clients. For example, using this option, the IP address 141.148.109.2 becomes 141 148 109 2.

More than one text file can specified at once. BPPATCH will patch both the SYSTEM.INI and PROTOCOL.INI files in the example below.

BPPATCH /i PROTOCOL.INI SYSTEM.INI

BPPATCH Tags

All tags begin with the character sequence "#@" followed by a three character tag name. Following the tag name are additional # characters used to specify the tag length. The total tag length is counted from the first # character to the last # character. It is important to make the tag large enough to contain all the characters that may be in the field. If the field is smaller than the tag length, the field is padded with spaces. If the field is larger than the tag length then it is truncated.

If you need to patch parameters for commands in the AUTOEXEC.BAT file, you must place these commands in a second batch file so that you can run BPPATCH before the second batch file is executed.

Environment Variables

Another great feature of BPPATCH is the ability to patch text files with DOS environment variables. Environment variable tags use a slightly different format than regular BOOTP tags. Environment variable tags begin with "#%" followed by the name of the environment variable and ending with the "%" sign. Unlike the BPPATCH tags described earlier, environment variable tags do not require trailing #'s to accommodate the full length of their values. This means the tag format for the PATH variable would be "#%path%" regardless of the number of characters contained in that variable.

Tip: You can redirect the BPPATCH tags to a batch file, then execute that batch file. In the example below, the tags are redirected to a batch file named setenv.bat. When this batch file is called, it sets DOS environment variables using the BPPATCH tags.

```
prompt $p$g
path a:\;a:\net
bppatch /s > setenv.bat
call setenv.bat
```

Now, instead of using the tag #@cha##### placeholder for the client's MAC address, the simpler environment variable tag #%cha% may be used. This will eliminate having to worry about putting the correct number of trailing #'s. Using the example above, one could use the #%path% tag to reference the path set earlier.

RFC1048 Vendor Fields

In addition to the regular Carnegie-Mellon University tags, in BOOTP (rather than with DHCP server) environments, BPPATCH supports custom RFC1048 user-defined fields (tag numbers 128-254). To specify a user-defined field within the boot image file, use the tag "#@t" followed by the field number. For example, to specify user-defined field 129, the tag would be #@t129####. In the BOOTPTAB file, user-defined field 129 would have the tag t129=, followed by the appropriate value in quotations and a colon (for example, t129="ELNK3\$").

The following table provides a short list of some of the tags available.

Tag	BOOTPTAB fieldname	Description
#@chn#	Client's hostname	The 1st field in a BOOTPTAB record
#@yip#	ip	Client's IP address. The cip tag is used for PXE booting.
#@smf#	sm	The client's subnet mask
#@typ#		Each MBA model has a unique type code.
#@bfn#	bf	The name of the boot file
#@cha#		The hardware (MAC) address of the client's network adapter.
#@gip#	gw	Gateway IP address
#@shn#		The hostname or computername of the boot server
#@sip#	bs	The boot server's IP address
#@t128#	t128	User-definable tag. t128-t254 can be used as you see fit.

For IP address fields in which more than one IP address can be specified, select the address that you want by including the number in the tag. For example, to indicate the IP address of the first domain name server, the tag would be #@ds0#, the second domain server IP address would be #@ds1#, and so on.

To address correct the problem mentioned in the synopsis section, the **NT Client Administrator** is used to create the Network Client v3.0 Startup diskette. Since the NT Client Administrator supports only a limited number of network adapters, you may choose any network adapter if your particular adapter is not listed. In this example, the 3Com Etherlink III adapter was chosen. Select the protocol appropriate for your environment. See Figures 1 and 2 below.

Figure 1

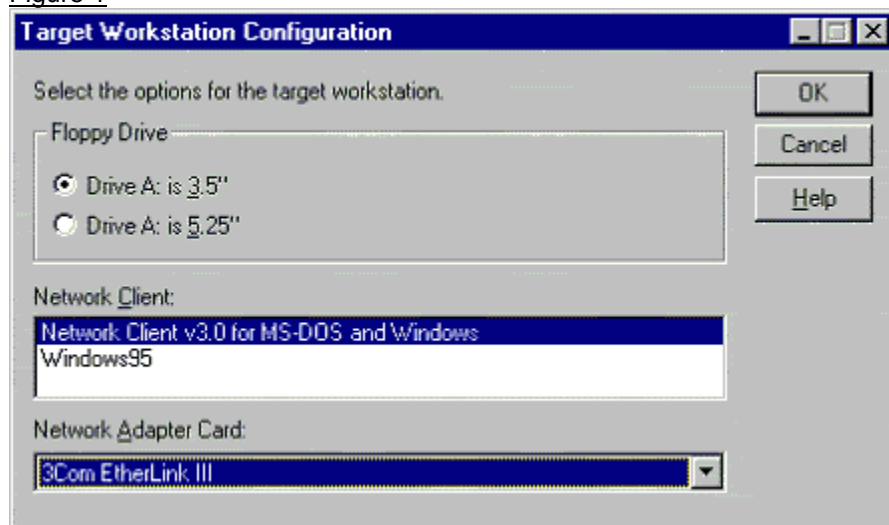
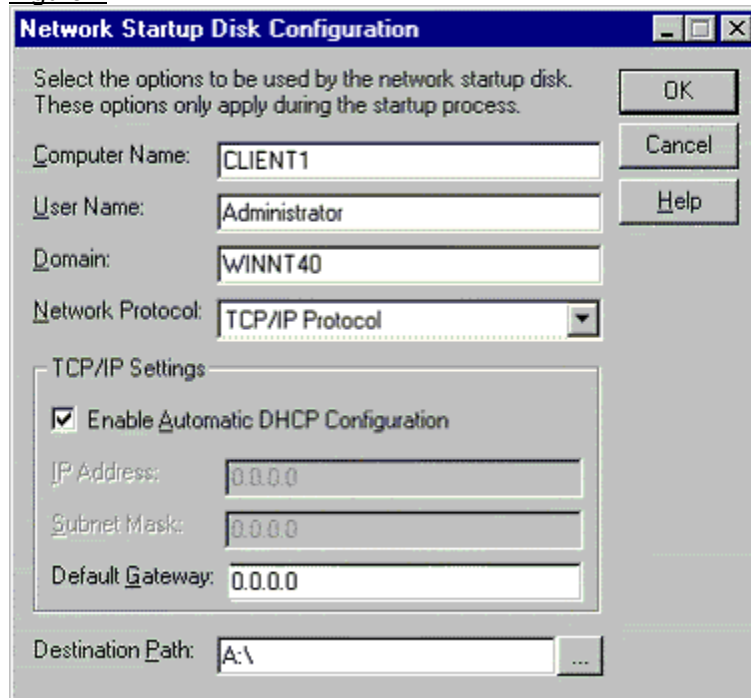


Figure 2



If your adapter is not supported, you must manually configure the Startup diskette by copying the NDIS2 driver for your adapter to the \NET directory and modify the SYSTEM.INI and PROTOCOL.INI accordingly. For example, when using the 3Com 3C905C adapter, the SYSTEM.INI file must be modified to change the netcard value to EL90X.DOS. Also, the drivename value in the PROTOCOL.INI file must be set to EL90X\$. But why not let BPPATCH make these changes?

Once the Startup diskette is created, the following steps must be completed:

1. To free up disk space on the floppy diskette, you can safely delete the following files:
NET\ELNK3.DOS
NET\NETH.MSG
DRVSPACE.BIN
2. Copy the NDIS drivers – SMCPWR.DOS and EL90X.DOS - to the \NET directory on the floppy diskette. These drivers are for the SMC9432 and the 3C905B adapters respectively.
3. Modify the CONFIG.SYS file to include the /TESTMEM:OFF switch when loading HIMEM.SYS. This is very important. Failing to do so will result in a corrupted boot image file.
DEVICE=HIMEM.SYS /TESTMEM:OFF
4. Copy BPPATCH.EXE onto the floppy diskette. BPPATCH is located in the TCPIP directory on the MBA Utility disk.
5. Rename the AUTOEXEC.BAT to NETSTART.BAT
6. Create a new AUTOEXEC.BAT that executes BPPATCH to the SYSTEM.INI and PROTOCOL.INI files before calling NETSTART.BAT. Use /v option to run BPPATCH in verbose mode so that patching process can be monitored.

```
A:\BPPATCH /v \NET\SYSTEM.INI \NET\PROTOCOL.INI  
CALL NETSTART.BAT
```

7. Update the configuration files with the required BPPATCH tags so that they will be patched.

a) Use the MAC address as the computername to ensure that all clients will have unique computernames. To do this, modify the SYSTEM.INI file as follows:

```
computername=#@cha#####
```

Note, the environment variable format - %#cha% - may be used.

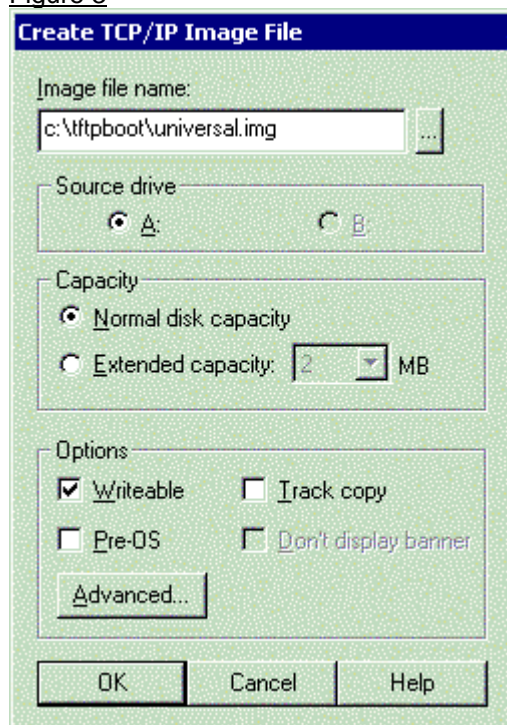
b) Modify the netcard entry in the SYSTEM.INI file with the user defined tag t128.

```
[network drivers]
```

```
netcard=#@t128#####
```

8. Run the 3Com Image Editor to create the boot image file from the startup diskette. Make sure that the Writeable option is checked. See Figure 3 below.

Figure 3



9. Update the BOOTPTAB file with the user defined tags t128 and t129. See Figure 4.

10. Instead of adding tags t128 and t129 to each host record individually, use the DABS BOOTPTAB Editor and create 2 templates - SMC and 3Com - then add tags in the Options field. See Figures 4 and 5 below. Both templates will be identical except for the t128 and t129 tag values.

Figure 4

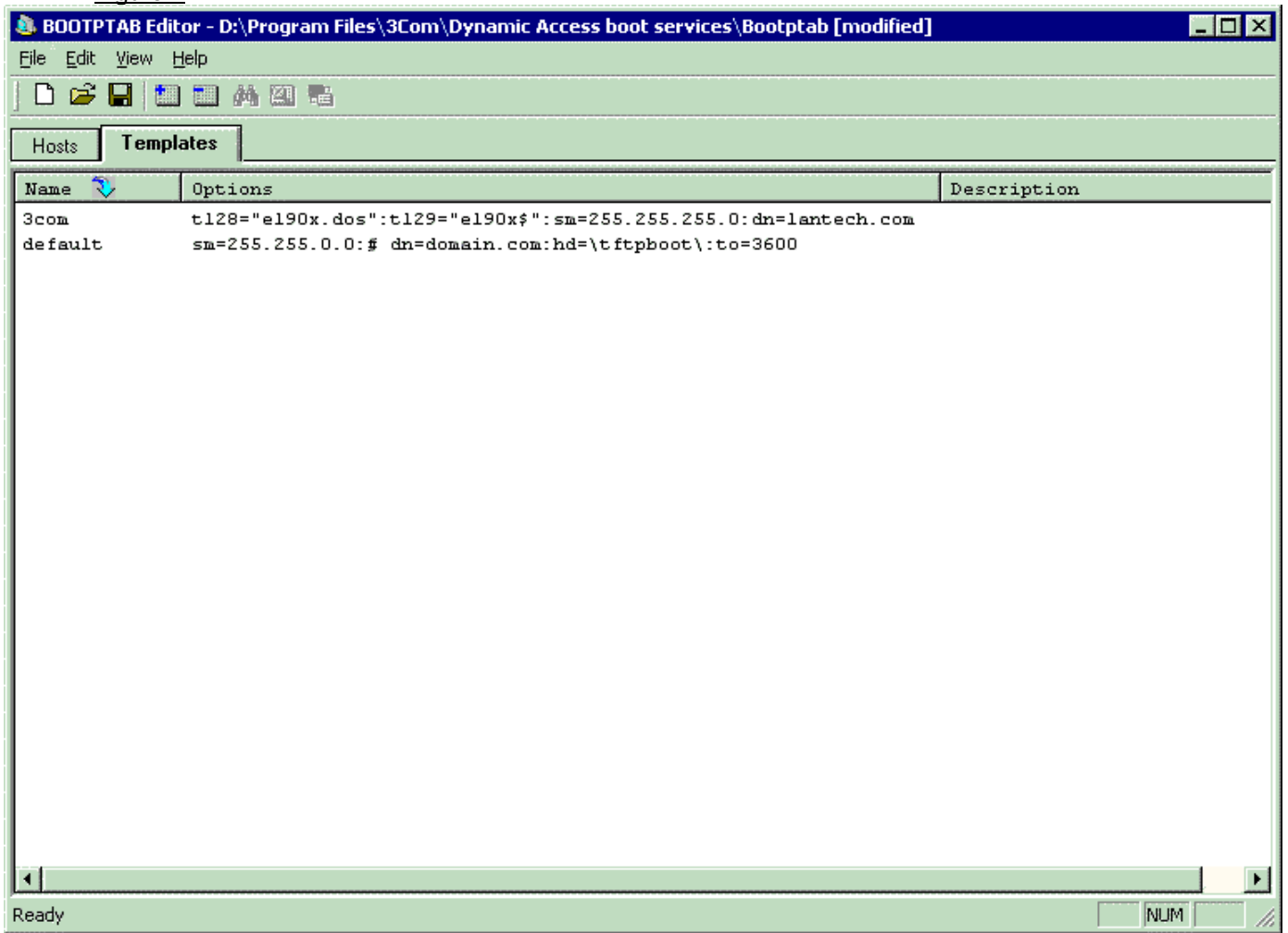
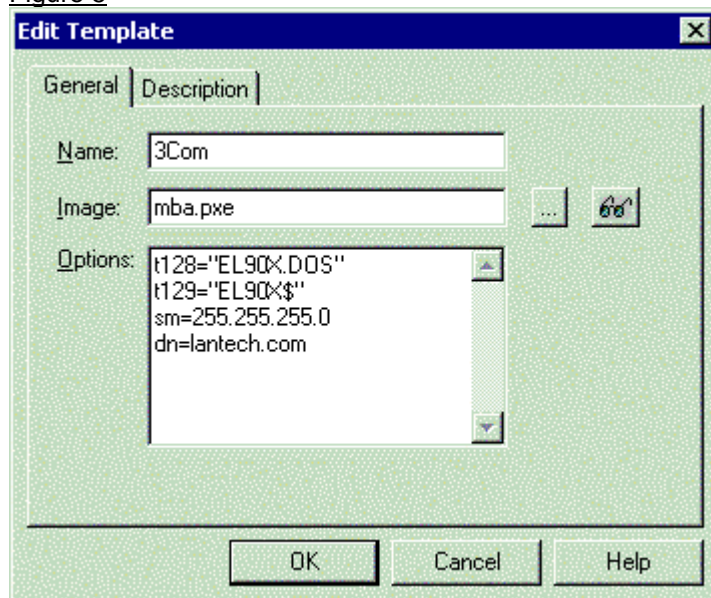
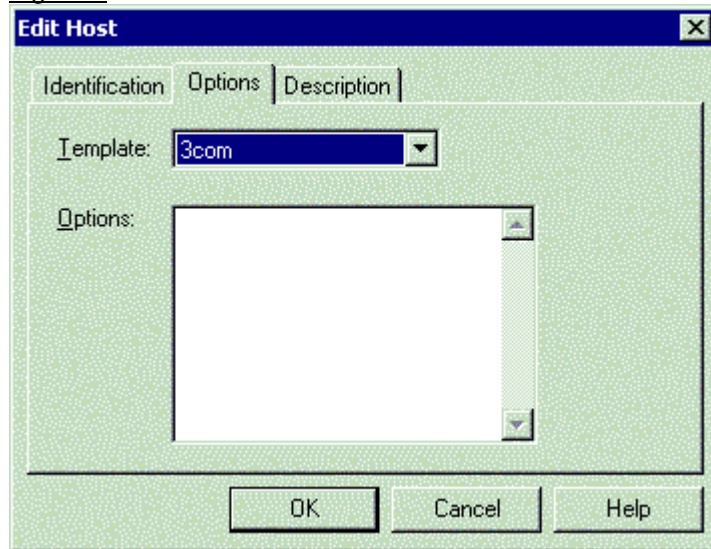


Figure 5



11. Next, assign the templates to the appropriate host records by:
- While within 3Com BOOTPTAB Editor, double-click on the host record.
 - Click on the Options tab then select the appropriate template from the list. See Figure 6.

Figure 6



12. Boot one of the client computers and see if everything works as planned. Run the Boot Image Editor to modify the boot image as needed.

13. Finally, configure all 50 workstations to use the same boot image file and rely on BPPATCH to make the necessary updates at boot time.

Summary

A few things to remember:

- BPPATCH must be placed in the boot image file.
- You cannot test BPPATCH while booting from a floppy or hard drive. BPPATCH is only functional when booting from a boot image file created using the 3Com Boot Image Editor.
- The boot image file must be writeable; otherwise BPPATCH will fail.
- Be sure to include the /TESTMEM:OFF option when loading HIMEM.SYS.
- Environment tags can be used instead of the traditional BPPATCH tags. However, the DOS environment variables must be declared in advance.
- The Microsoft NT DHCP server does not relay user-defined tags in the DHCP reply packets.

Conclusion

BPPATCH is a powerful utility that helps to eliminate redundant boot image files. Some network administrators are even using BPPATCH to update Windows 95 registry settings.

Reference

Microsoft has written a document on how to create a Microsoft Network Client for MS-DOS that you can download from <ftp://ftp.microsoft.com/bussys/winnt/winnt-docs/papers/>. The document file is doslnt.exe.

Examples

The following list the configuration files with the BPPATCH tags in place.

CONFIG.SYS

```
files=30
device=a:\net\ifshlp.sys
lastdrive=z
DEVICE=A:\NET\HIMEM.SYS /TESTMEM:OFF
DEVICE=A:\NET\EMM386.EXE NOEMS
DOS=HIGH,UMB
```

AUTOEXEC.BAT

```
A:\net\bppatch /v \net\system.ini \net\protocol.ini
call netstart.bat
```

NETSTART.BAT

```
path=a:\net
a:\net\net initialize
a:\net\netbind.com
a:\net\umb.com
a:\net\tcptsr.exe
a:\net\tinyrfc.exe
a:\net\nmtsr.exe
a:\net\lemsbfr.exe
REM /savepw – stops net logon from prompting to save password
REM /y – stop additionally prompting.
REM supply a valid user and password in <> brackets below
a:\net\net logon <username> <password> /savepw:no /y
net use g: \\WINNT40\apps
net use h: \\WINNT40\data
```

SYSTEM.INI

```
[network]
filesharing=no
printsharing=no
autologon=no
; The client's MAC address will be used as the computername to assure uniqueness.
computername=#@cha#####
lanroot=A:\NET
username=Administrator
workgroup=LANTECH
reconnect=no
dospophotkey=N
lmlogon=0
logondomain=WINNT40
preferredredir=full
autostart=full
maxconnections=8
[network drivers]
; The appropriate NDIS2 driver name contained in the user-defined tag t128 will be patched in.
netcard=#@t128#####
transport=tcpdrv.dos,nemm.dos
devdir=A:\NET
LoadRMDrivers=yes
```

PROTOCOL.INI

[network.setup]

version=0x3110

netcard=ms\$elnk3,1,MS\$ELNK3,1

transport=tcpip,TCPIP

lana0=ms\$elnk3,1,tcpip

[ms\$elnk3]

; The correct drivename is derived from the user-defined option tag t129.

DRIVERNAME=#@t129#####

[protman]

drivename=PROTMAN\$

PRIORITY=MS\$NDISHLP

[tcpip]

NBSessions=6

DefaultGateway0=

SubNetMask0=

IPAddress0=

DisableDHCP=0

DriverName=TCPIP\$

BINDINGS=ms\$elnk3

LANABASE=0