SMSC®
SUCCESS BY DESIGN

LAN9500/LAN9500i LAN9500A/LAN9500Ai LAN9512/LAN9514

Software User Manual

Revision 1.2 (05-01-09)

0.1 Revision History

Table 0.1 Revision History

REVISION LEVEL AND DATE	SECTION/FIGURE/ENTRY	CORRECTION
1.2 (05-01-09)	All	Initial Revision

Table of Contents

List of Figures

List of Tables

Chapter 1 Introduction

This manual provides detailed instructions on the installation and uninstallation of LAN9500/LAN9500i, LAN9500A/LAN9500Ai, LAN9512, and LAN9514 software drivers under various operating systems:

- Windows XP 32/64-Bit Driver
- Windows Vista 32/64-Bit Driver
- MAC OSX Driver (10.5)
- Linux Driver (Kernel 2.6.12 or greater)
- Windows CE Driver

Additional software related information is provided, including appendices for EEPROM and customer requirement related information:

- Driver Customization
- Advanced Driver Parameters
- Pre-Execution Environment (PXE) Support
- Windows Manufacturing Utility
- DOS Utility Suite
- EEPROM
- Customer Requirements

The latest drivers and supporting documentation may be obtained by visiting the SMSC website:

http://www.smsc.com

Additional advanced information can be obtained through a free E-Services account. To create a free E-Services account, visit the SMSC E-Services webpage:

https://www2.smsc.com/main.nsf

Note: For the purpose of this documentation, the term “device” is used interchangeably with the following SMSC products:

- LAN9500/LAN9500i
- LAN9500A/LAN9500Ai
- LAN9512
- LAN9514

Note: The screen shots contained in this document are for illustration purposes only. The text contained therein may be different from what the user observes on his screen, due to driver and/or OS customization. Unless otherwise noted, all screen shots are shown in relation to the LAN9500/LAN9500i. With the exception of the part number, which may change or remain LAN9500/LAN9500i, the screens and procedures will be identical for the LAN9512, LAN9514, and LAN9500A/LAN9500Ai cases.

Note: Please refer to the respective software release notes for the latest information.

Chapter 2 Windows XP 32/64-Bit Driver

This chapter details the installation and uninstallation of the Windows XP 32/64-bit driver.

The Windows XP 32/64-Bit driver may be installed in two ways:

- Windows XP 32/64-Bit Driver Installation via EXE (preferred method)
- Windows XP 32/64-Bit Driver Installation via INF

Note: Official driver releases are provided by SMSC in EXE format only. Refer to Chapter 7, "Driver Customization," on page 57 for details on how to locate the files that allow INF-only installation.

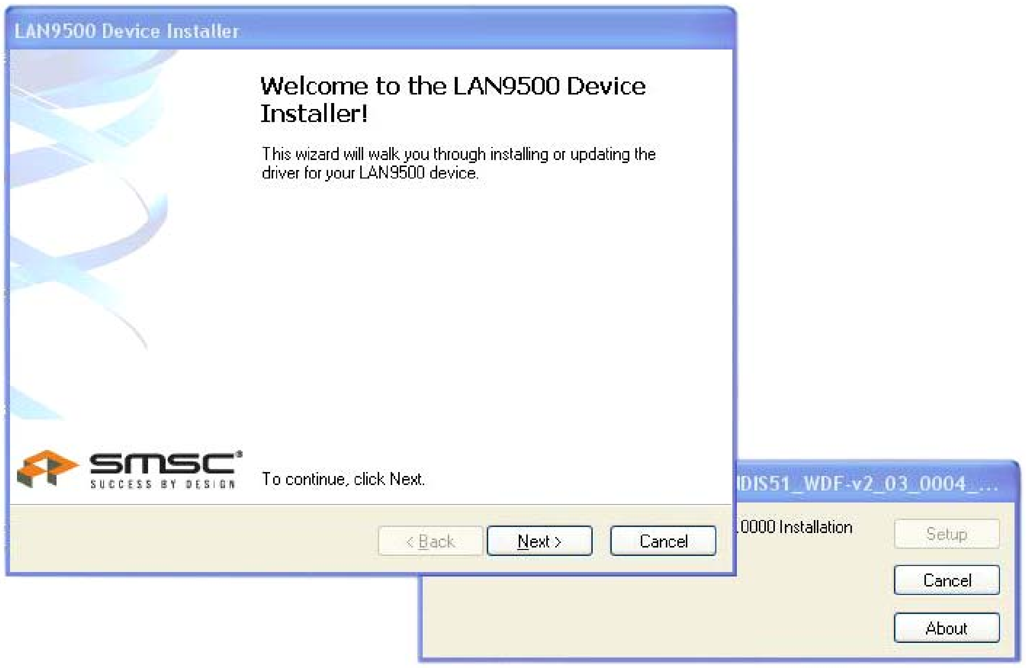
Windows XP 32/64-Bit driver uninstallation is detailed in Section 2.3, "Windows XP 32/64-Bit Driver Uninstallation," on page 18.

2.1 Windows XP 32/64-Bit Driver Installation via EXE

The folder containing the distribution files may be copied to the desktop or any other convenient, known, place within the directory structure. Clicking the folder will result in the installer EXE file and the release notes TXT file being displayed.

Note: The device must not be plugged into the computer prior to installing the driver software.

To begin installation, click on the installer icon. The following windows will then appear:


LAN9500 Device Installer

Welcome to the LAN9500 Device Installer!

This wizard will walk you through installing or updating the driver for your LAN9500 device.

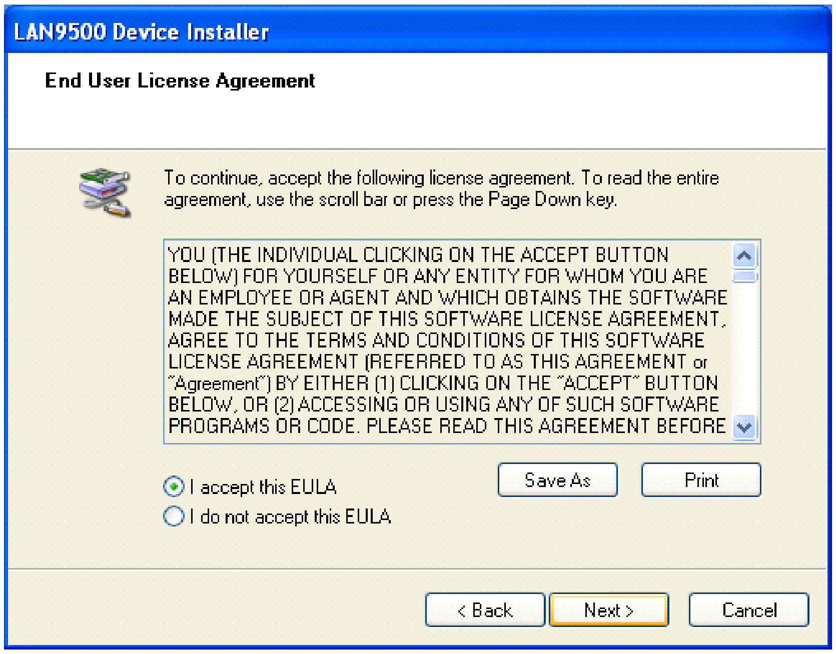
To continue, click Next.

Figure 2.1 Device Installer Invocation

Note: Two windows are launched when the device installer is invoked: the Device Installer window and the Winzip Self Extractor window (hidden behind the Device Installer window).

Continue the installation process by clicking the “Next” button in the Device Installer window.

The End User License Agreement (EULA) will appear within the Device Installer window. Click the “I accept this EULA” radio button to accept the End User License Agreement. The window will then display the “Next” button, as illustrated in Figure 2.2, which will permit the installation process to continue.



End User License Agreement

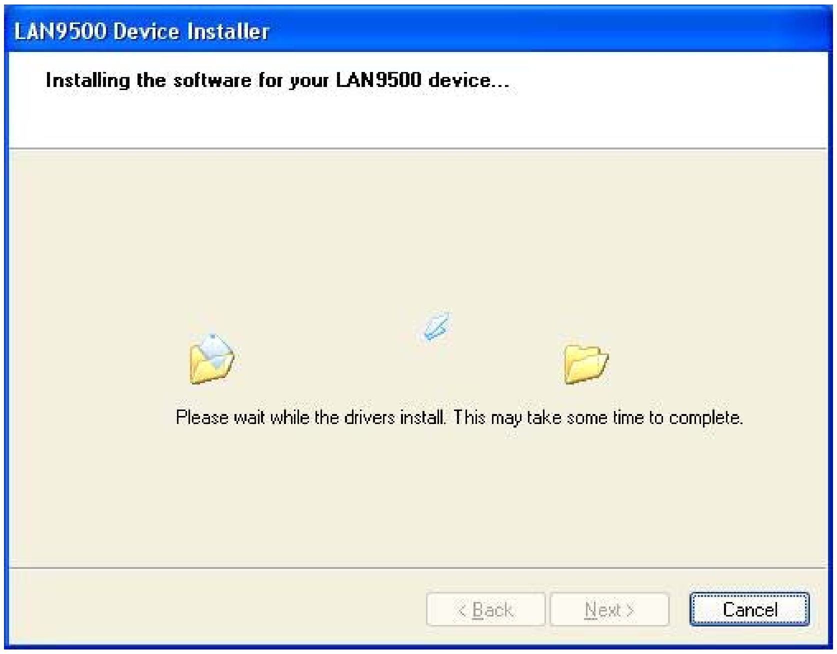
To continue, accept the following license agreement. To read the entire agreement, use the scroll bar or press the Page Down key.

YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) FOR YOURSELF OR ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE MADE THE SUBJECT OF THIS SOFTWARE LICENSE AGREEMENT, AGREE TO THE TERMS AND CONDITIONS OF THIS SOFTWARE LICENSE AGREEMENT (REFERRED TO AS THIS AGREEMENT or "Agreement") BY EITHER (1) CLICKING ON THE "ACCEPT" BUTTON BELOW, OR (2) ACCESSING OR USING ANY OF SUCH SOFTWARE PROGRAMS OR CODE. PLEASE READ THIS AGREEMENT BEFORE

[✓ I accept this EULA] I do not accept this EULA

Figure 2.2 End User License Agreement

Click the “Next” button to continue the installation process. The Device Installer window will change to a progress window, as shown in Figure 2.3, indicating some time may be necessary for the installation.



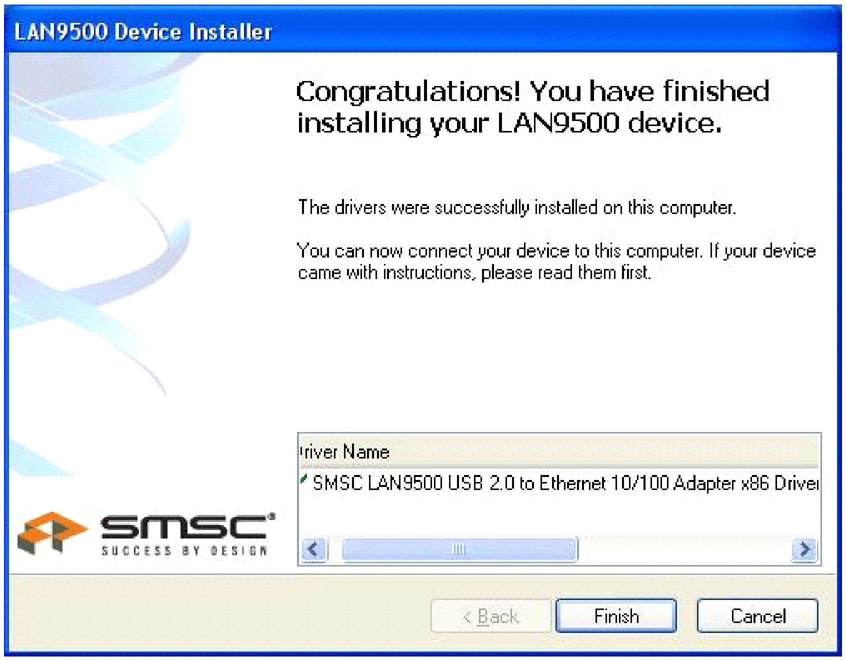
Installing the software for your LAN9500 device...

Please wait while the drivers install. This may take some time to complete.

Figure 2.3 Installation Progress Window

When finished, the installation progress window will change to indicate the driver has been installed. Click the “Finish” button to complete the driver installation.

Note: Only the appropriate 32- or 64-bit driver will be installed, dependent on the version of Windows XP being used. Figure 2.4 shows the installation of the 32-bit driver in a Windows XP 32-bit environment. Figure 2.5 shows the installation of the 64-bit driver in a Windows XP 64-bit environment.


LAN9500 Device Installer

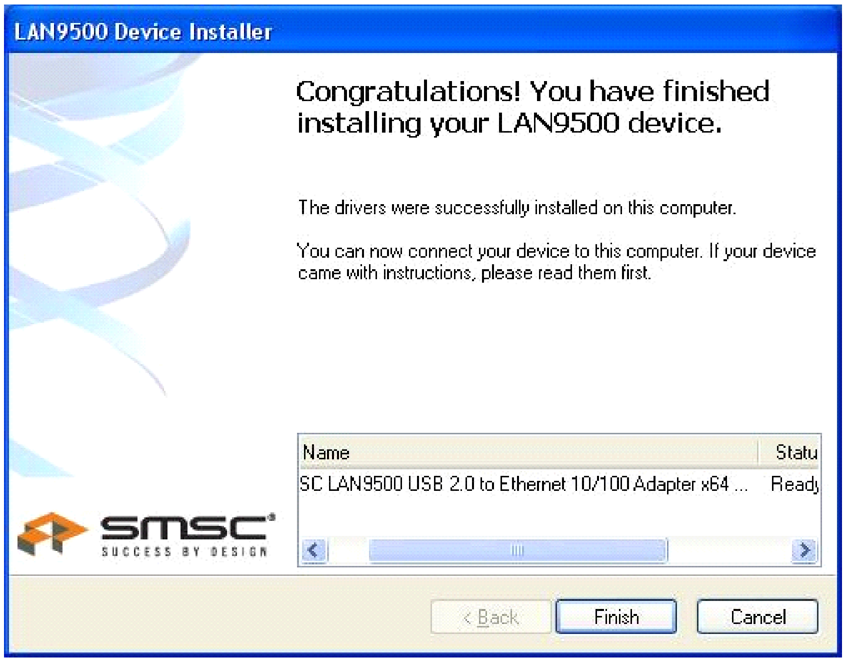
Congratulations! You have finished installing your LAN9500 device.

The drivers were successfully installed on this computer.

You can now connect your device to this computer. If your device came with instructions, please read them first.

'river Name
✓ SMSC LAN9500 USB 2.0 to Ethernet 10/100 Adapter x86 Drive

Figure 2.4 Device Driver Installation Complete Screen - Windows XP 32-bit


LAN9500 Device Installer

Congratulations! You have finished installing your LAN9500 device.

The drivers were successfully installed on this computer.

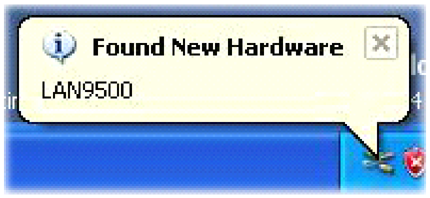
You can now connect your device to this computer. If your device came with instructions, please read them first.

Name	Statu
SC LAN9500 USB 2.0 to Ethernet 10/100 Adapter x64 ...	Ready

Figure 2.5 Device Driver Installation Complete Screen - Windows XP 64-bit

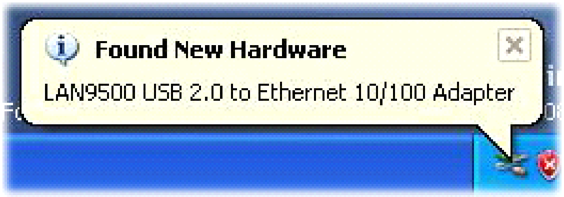
The device must now be plugged into a free USB port on the computer. Once this is accomplished, the balloon notifications messages shown in Figure 2.6 and Figure 2.7 will appear in the task bar.

At this point, the network device installation is complete. The device will be setup to have its IP address assigned by a DHCP server. If desired, this configuration can be changed to use a manually assigned IP address. This can be achieved from the properties of the internet protocol for the device, which is accessible through the “Network Connections” control panel. Details are outside of the scope of this document.


Found New Hardware

LAN9500

Figure 2.6 Found New Hardware Task Bar Notification 1


Found New Hardware

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Figure 2.7 Found New Hardware Task Bar Notification 2

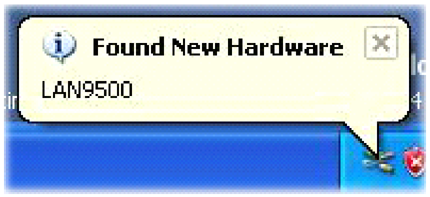
2.2 Windows XP 32/64-Bit Driver Installation via INF

The device driver may be alternatively installed via an INF file. This section details the INF installation method.

Note: The EXE method described in Section 2.1 is the preferred method of installation.

Before beginning installation, the folder containing the SMSC INF distribution files may be copied to the desktop or any other convenient, known, place within the directory structure.

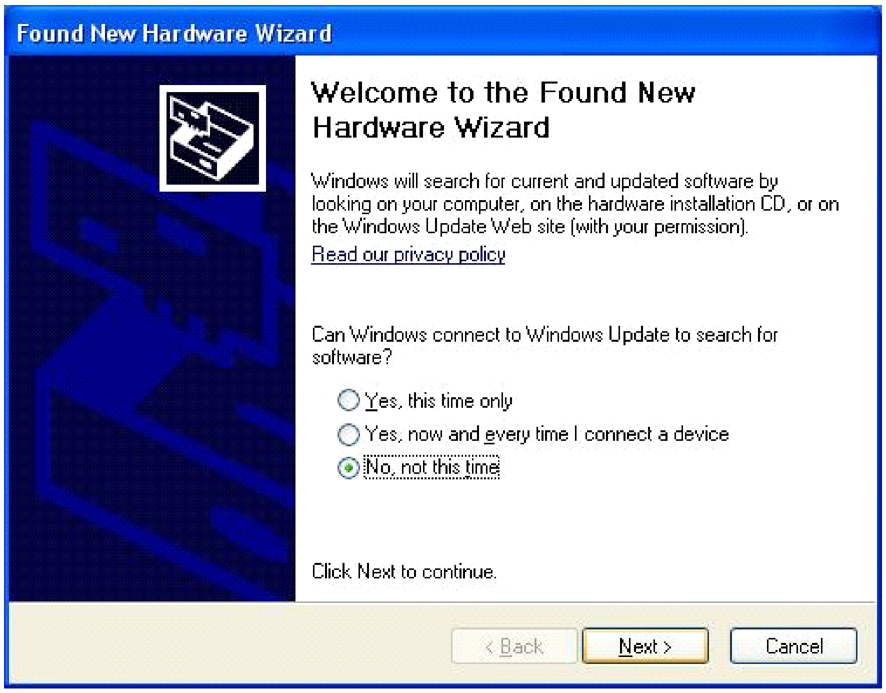
To begin installation, connect the device to a free USB port on the computer. Once this is accomplished, the balloon notifications messages shown in Figure 2.8 will appear in the task bar.


Found New Hardware

LAN9500

Figure 2.8 Found New Hardware Task Bar Notification

The Found New Hardware Wizard window will then pop-up as shown in Figure 2.9. Click the “No, not at this time” radio button and click “Next”.


Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).

Read our privacy policy

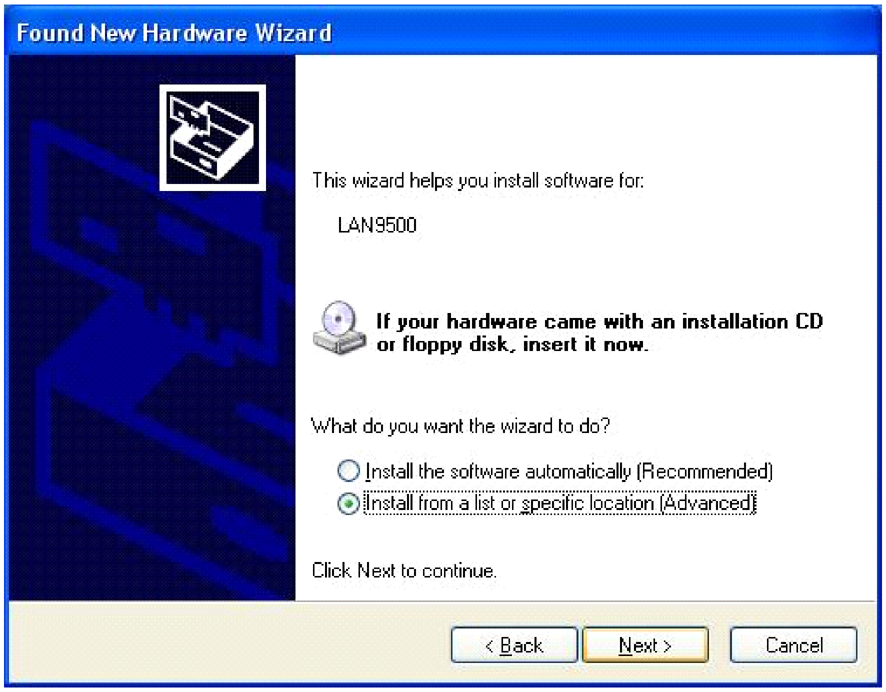
Can Windows connect to Windows Update to search for software?

- Yes, this time only
- Yes, now and every time I connect a device
- [✓ No, not this time]

Click Next to continue.

Figure 2.9 Found New Hardware Wizard

Select the “Install from a list or specific location (Advanced)“ radio button, as shown in Figure 2.10, and click “Next”.



This wizard helps you install software for:

LAN9500

If your hardware came with an installation CD or floppy disk, insert it now.

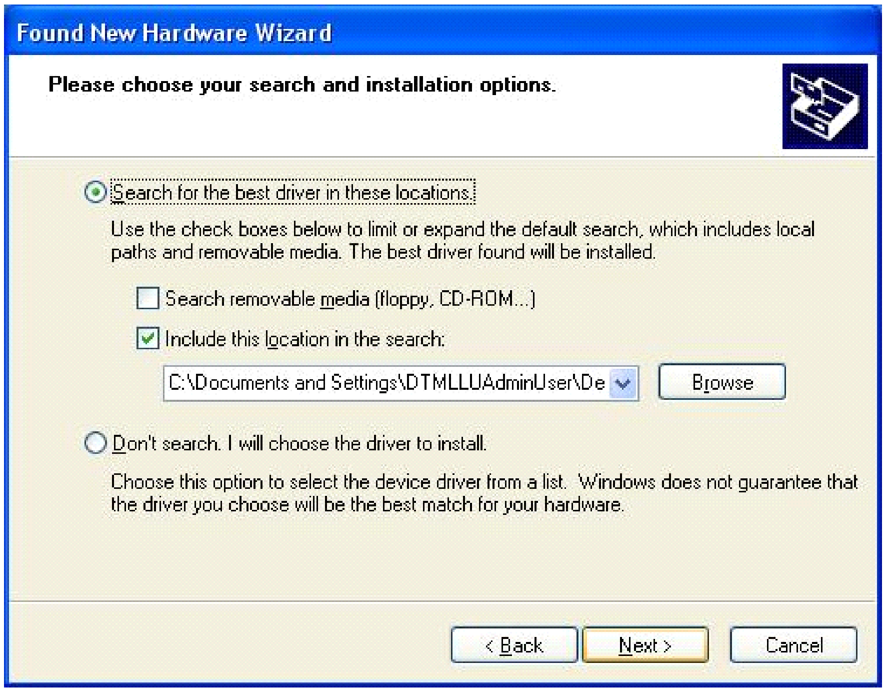
What do you want the wizard to do?

- Install the software automatically (Recommended)
- [✓ Install from a list or specific location (Advanced)]

Click Next to continue.

Figure 2.10 Found New Hardware Wizard 2

Select the "Search for the best driver in these locations" radio button. Check the "Include this location in the search" checkbox and click the "Browse" button.



Please choose your search and installation options.

[✓ Search for the best driver in these locations.]

Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.

- [ ] Search removable media (floppy, CD-ROM...)
- [✓] Include this location in the search:

C:\Documents and Settings\DTMLLUAdminUser\De

Don't search. I will choose the driver to install.

Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.

Figure 2.11 Search and Installation Options Window

Via the “Browse for Folder” window, browse to the location of the copied SMSC INF distribution files. Click “OK”, and then “Next” to install.

Note: For Windows 32-bit installations, browse to the “x86” folder within the copied SMSC INF distribution files, as shown in Figure 2.12. For Windows 64-bit installations, browse to the “x64” folder within the copied SMSC INF distribution files, as shown in Figure 2.13.

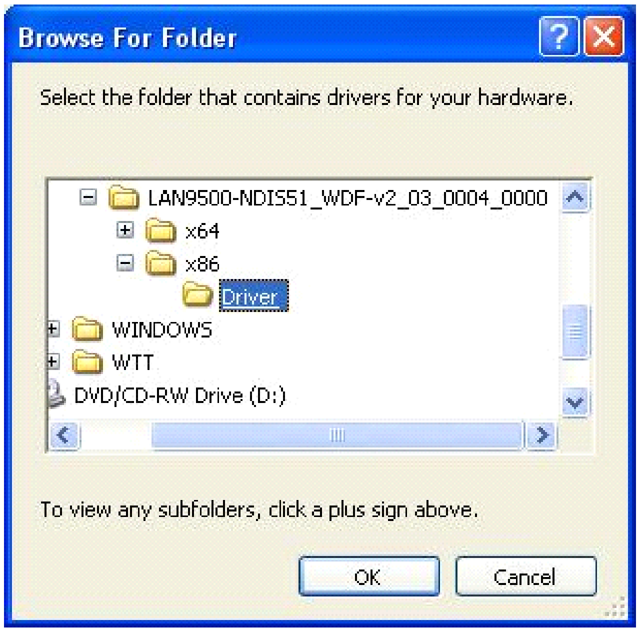

Browse For Folder
Select the folder that contains drivers for your hardware.
LAN9500-NDIS51_WDF-v2_03_0004_0000
x64
x86
Driver
WINDOWS
WTT
DVD/CD-RW Drive (D:)
To view any subfolders, click a plus sign above.
OK
Cancel

Figure 2.12 Browse Window - Windows XP 32-Bit

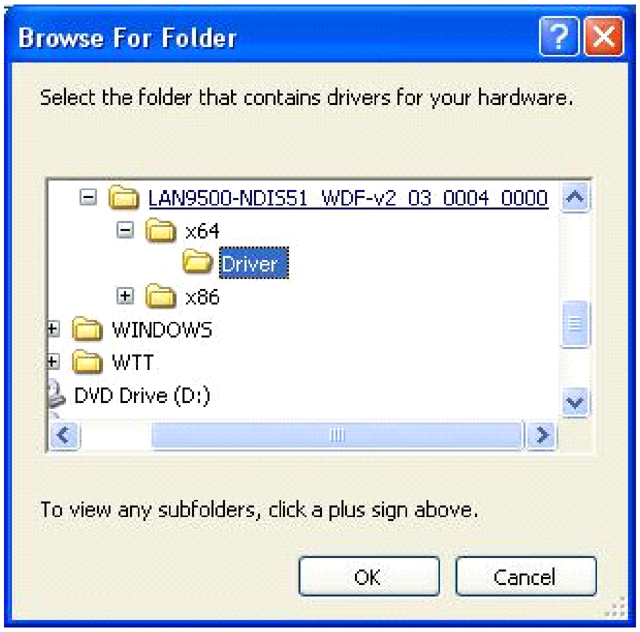
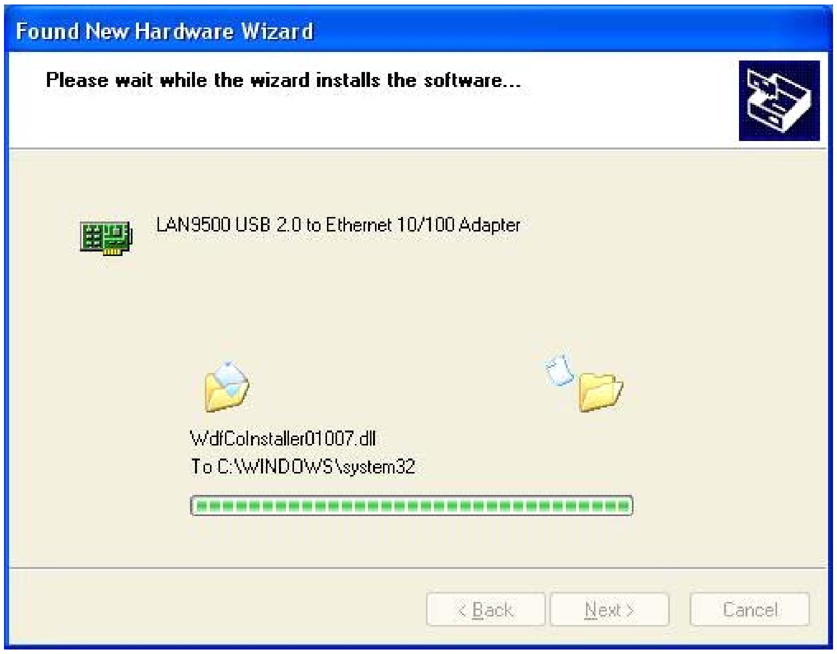

Browse For Folder
Select the folder that contains drivers for your hardware.
LAN9500-NDIS51_WDF-v2_03_0004_0000
x64
Driver
x86
WINDOWS
WTT
DVD Drive (D:)
To view any subfolders, click a plus sign above.
OK
Cancel

Figure 2.13 Browse Window - Windows XP 64-Bit

The Device Installer window will change to a progress window, as shown in Figure 2.14, indicating some time may be necessary for the installation.


Found New Hardware Wizard

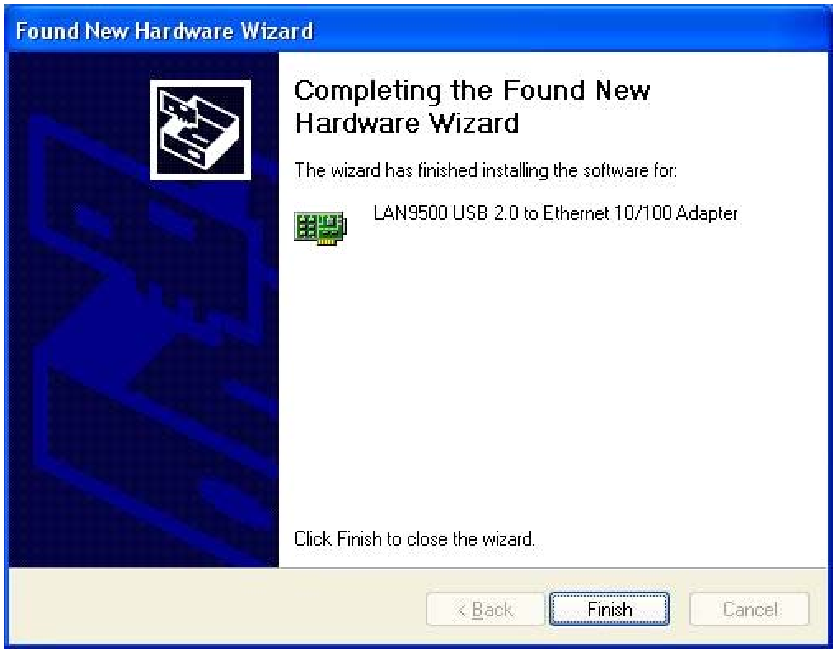
Please wait while the wizard installs the software...

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

WdfCoInstaller01007.dll
To C:\WINDOWS\system32

Figure 2.14 Installation Progress Window

When finished, the installation progress window will change to indicate the driver has been installed. Click the “Finish” button to complete the driver installation.


Found New Hardware Wizard

Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Click Finish to close the wizard.

Figure 2.15 Device Driver Installation Complete Screen

2.3 Windows XP 32/64-Bit Driver Uninstallation

Note: Manual uninstallation is the only supported form of uninstallation at this time. An automated uninstaller via the “Add/Remove Programs” dialog may be included in future revisions.

To uninstall the Windows XP 32/64-bit software, select “Run...” from the start menu, as shown in Figure 2.16.

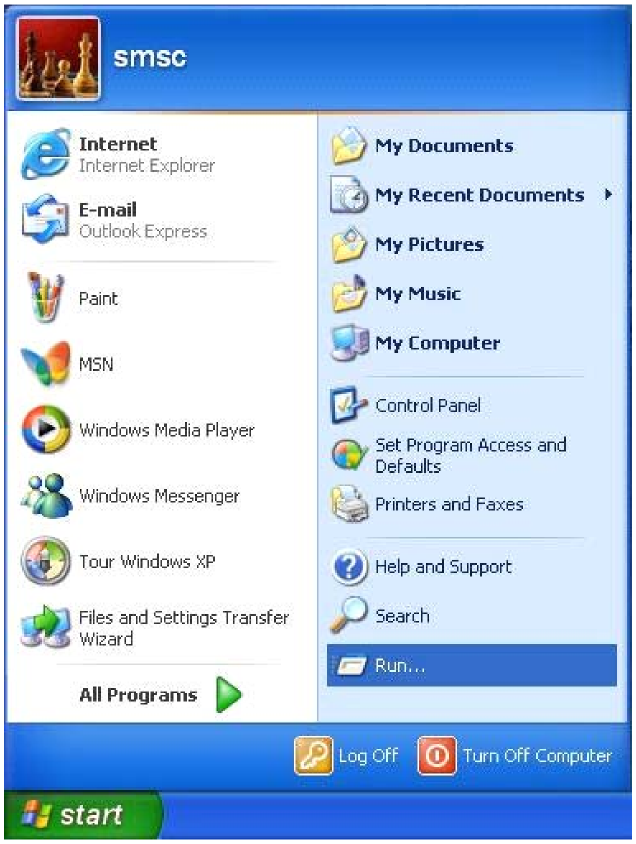
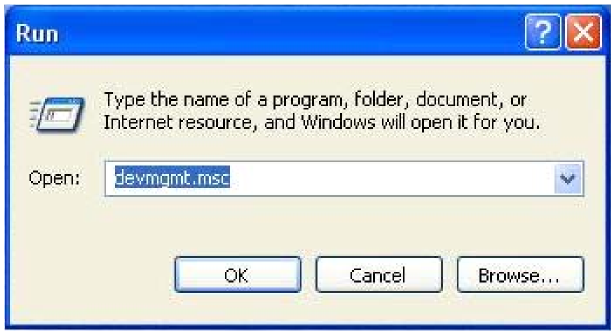


Figure 2.16 Start Menu - Run

In the Run window, type “devmgmt.msc” and click “OK”, as shown in Figure 2.17. This will open the Device Manager window.

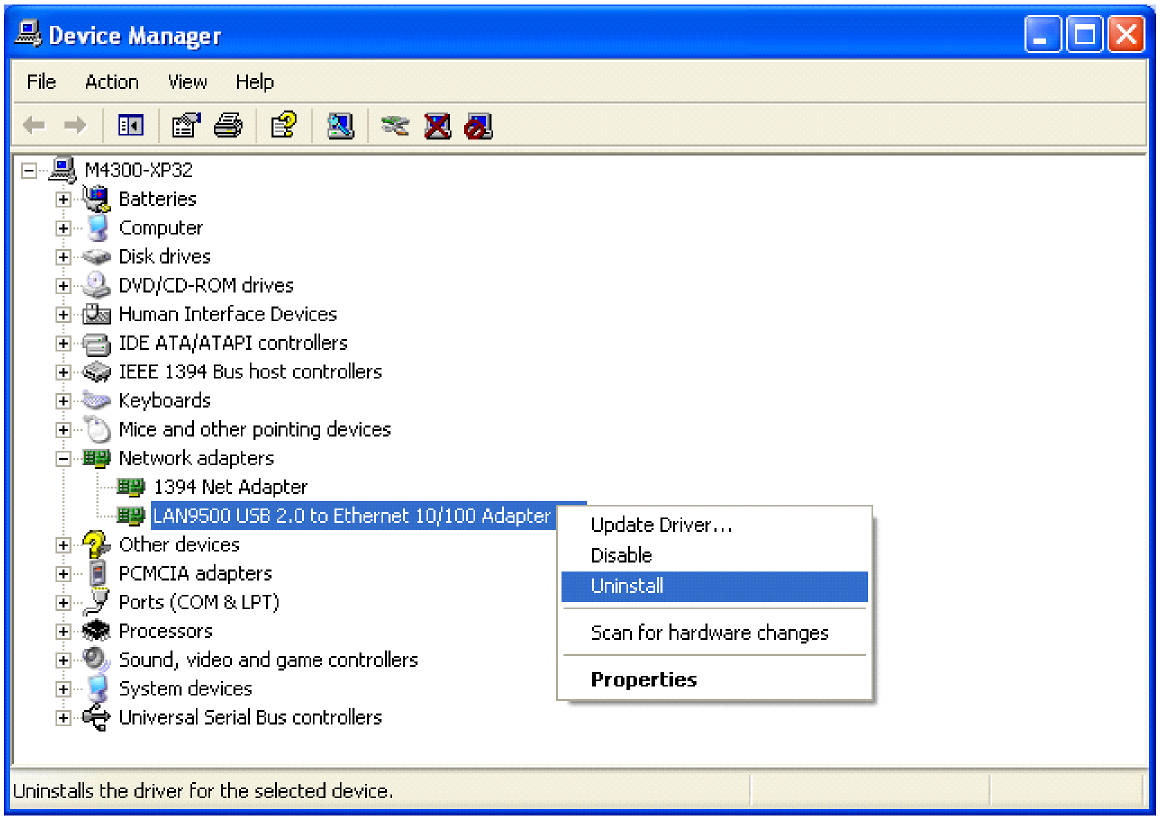


Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: devmgmt.msc

Figure 2.17 Run Window

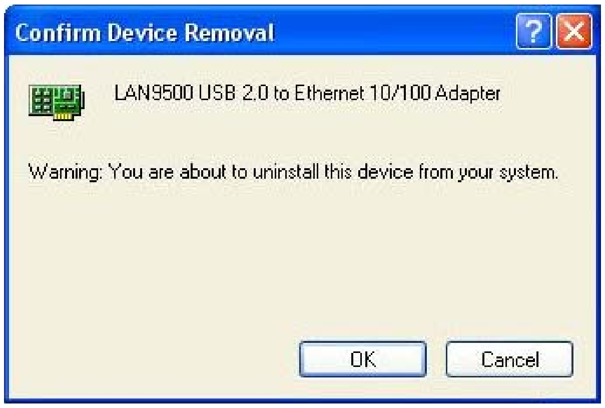
In the Device Manager window, browse to the “Network Adapters” section and select the device. Right click on the device and select “Uninstall”, as shown in Figure 2.18.



Uninstalls the driver for the selected device.

Figure 2.18 Device Manager Window - Uninstall

Click “OK” in the “Confirm Device Removal” window, as shown in Figure 2.19.



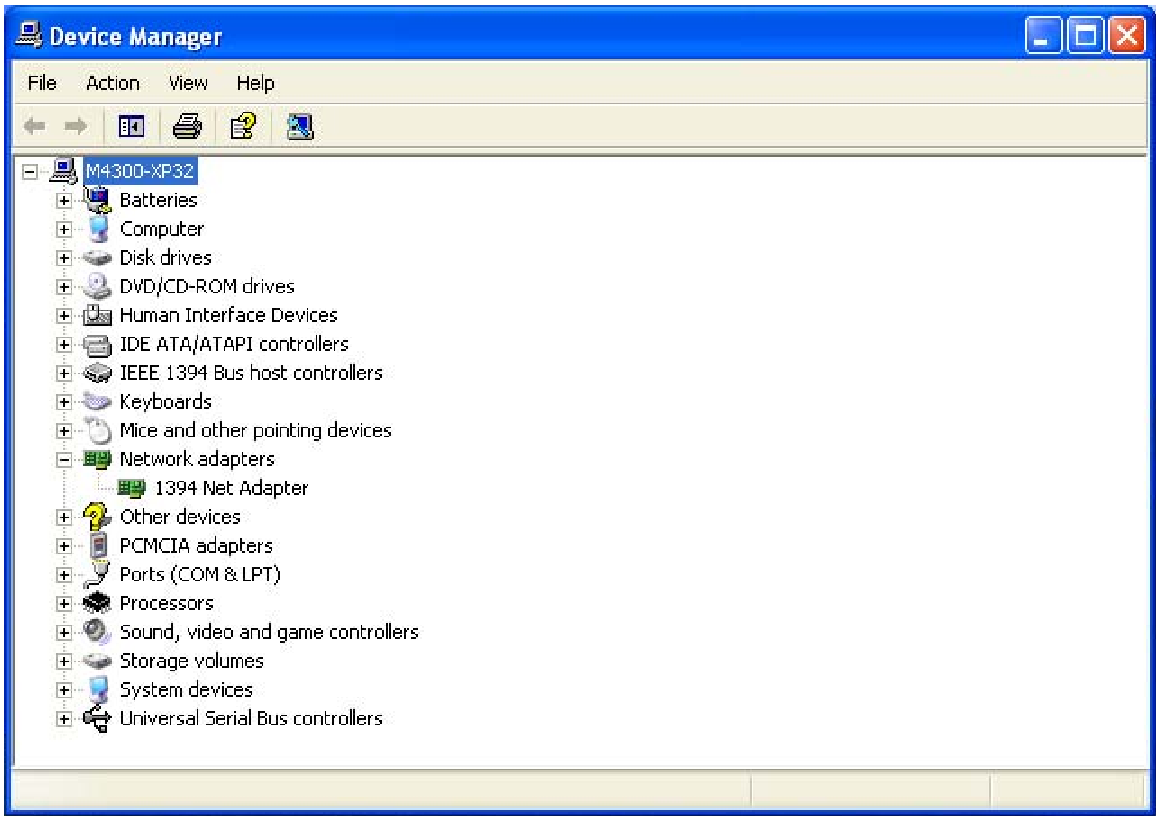
LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Warning: You are about to uninstall this device from your system.

Figure 2.19 Confirm Device Removal Window

For a full uninstall, the `oem<n>.inf` files that are a copy of the `net9500-<arch>-n51f.inf` file (which Windows created at installation time) must be removed from the `<WINDIR>\inf` folder. Do NOT remove `oem<n>.inf` files that are not a copy of the `net9500-<arch>-n51f.inf` files, since this could affect operation of other devices.

The uninstallation process is now complete. As illustrated in Figure 2.20, the device driver will no longer be listed in the Device Manager window. The Device Manger window may now be closed.



M4300-XP32
- Batteries
- Computer
- Disk drives
- DVD/CD-ROM drives
- Human Interface Devices
- IDE ATA/ATAPI controllers
- IEEE 1394 Bus host controllers
- Keyboards
- Mice and other pointing devices
- Network adapters
  - 1394 Net Adapter
- Other devices
- PCMCIA adapters
- Ports (COM & LPT)
- Processors
- Sound, video and game controllers
- Storage volumes
- System devices
- Universal Serial Bus controllers

Figure 2.20 Device Removed from Device Manager Window

Chapter 3 Windows Vista 32/64-Bit Driver

This chapter details the installation and uninstallation of the Windows Vista 32/64-bit driver.

The Windows Vista 32/64-bit driver may be installed in two ways:

- Windows Vista 32/64-Bit Driver Installation via EXE (preferred method)
- Windows Vista 32/64-Bit Driver Installation via INF

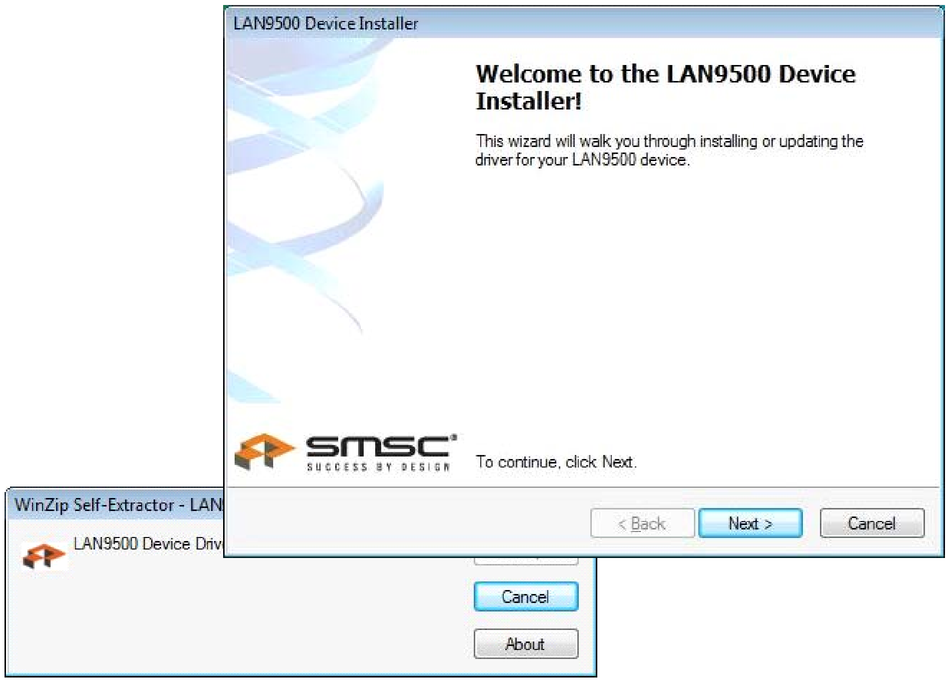
Note: Official driver releases are provided by SMSC in EXE format only. Refer to Chapter 7, "Driver Customization," on page 57 for details on how to locate the files that allow INF-only installation.

Windows Vista 32/64-bit driver uninstallation is detailed in Section 3.3, "Windows Vista 32/64 Bit Driver Uninstallation," on page 30.

3.1 Windows Vista 32/64-Bit Driver Installation via EXE

The folder containing the distribution files should be copied to the desktop or any other convenient, known, place within the directory structure. Clicking the folder will result in the installer EXE file and the release notes TXT file being displayed.

To begin installation, click on the installer icon. The following windows will then appear:



Welcome to the LAN9500 Device Installer!

This wizard will walk you through installing or updating the driver for your LAN9500 device.

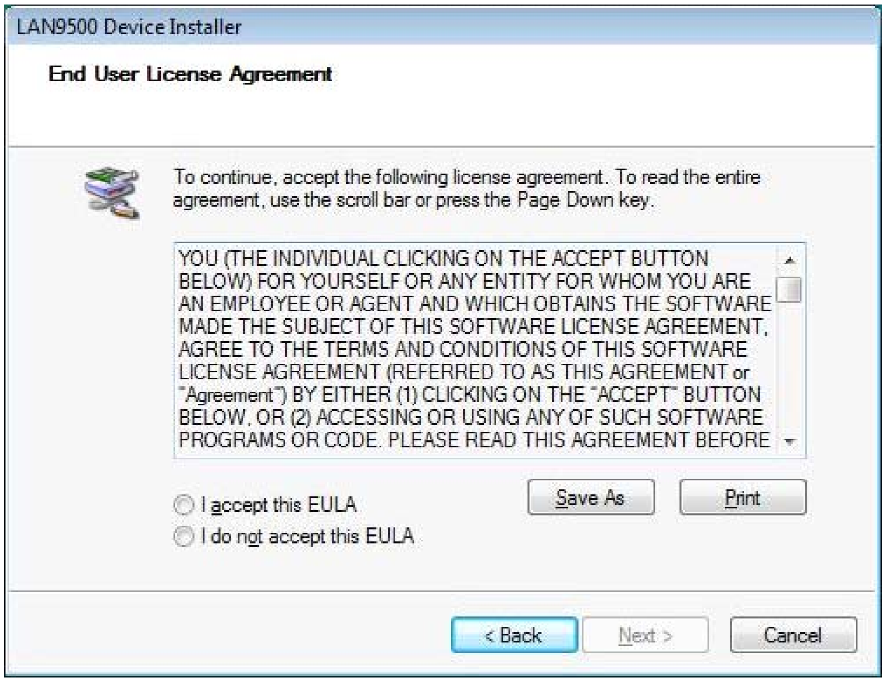
To continue, click Next.

Figure 3.1 Device Installer Invocation

Note: Two windows are launched when the device installer is invoked: the Device Installer window and the Winzip Self Extractor window (hidden behind the Device Installer window).

Continue the installation process by clicking the “Next” button in the Device Installer window.

The End User License Agreement (EULA) will appear within the Device Installer window. Click the “I accept this EULA” radio button to accept the End User License Agreement. The window will then display the “Next” button, as illustrated in Figure 3.2, which will permit the installation process to continue.


LAN9500 Device Installer

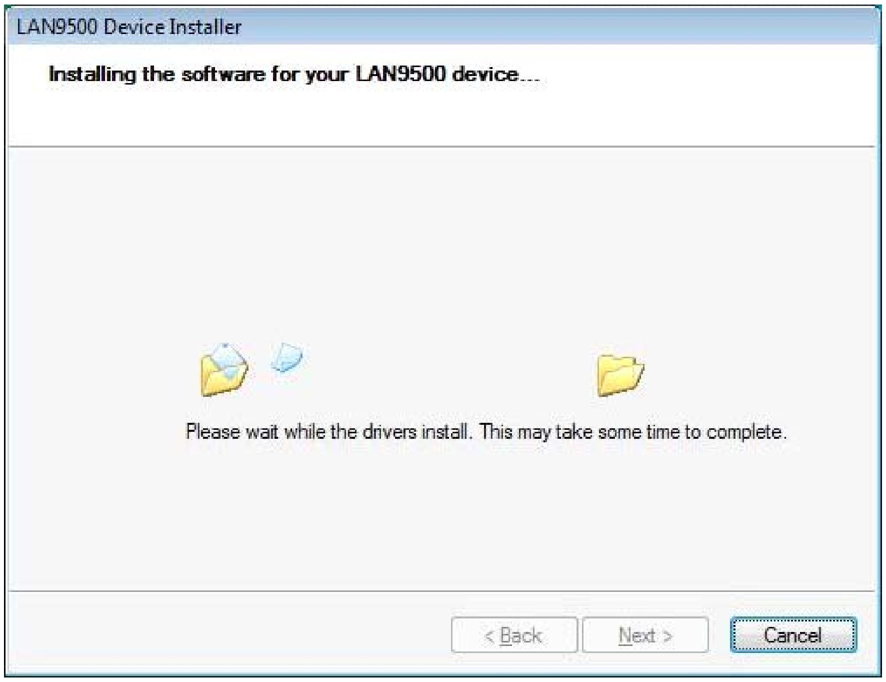
End User License Agreement

To continue, accept the following license agreement. To read the entire agreement, use the scroll bar or press the Page Down key.

YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) FOR YOURSELF OR ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE MADE THE SUBJECT OF THIS SOFTWARE LICENSE AGREEMENT, AGREE TO THE TERMS AND CONDITIONS OF THIS SOFTWARE LICENSE AGREEMENT (REFERRED TO AS THIS AGREEMENT or "Agreement") BY EITHER (1) CLICKING ON THE "ACCEPT" BUTTON BELOW, OR (2) ACCESSING OR USING ANY OF SUCH SOFTWARE PROGRAMS OR CODE. PLEASE READ THIS AGREEMENT BEFORE

Figure 3.2 End User License Agreement

Click the “Next” button to continue the installation process. The Device Installer window will change to a progress window, as shown in Figure 3.3, indicating some time may be necessary for the installation


LAN9500 Device Installer

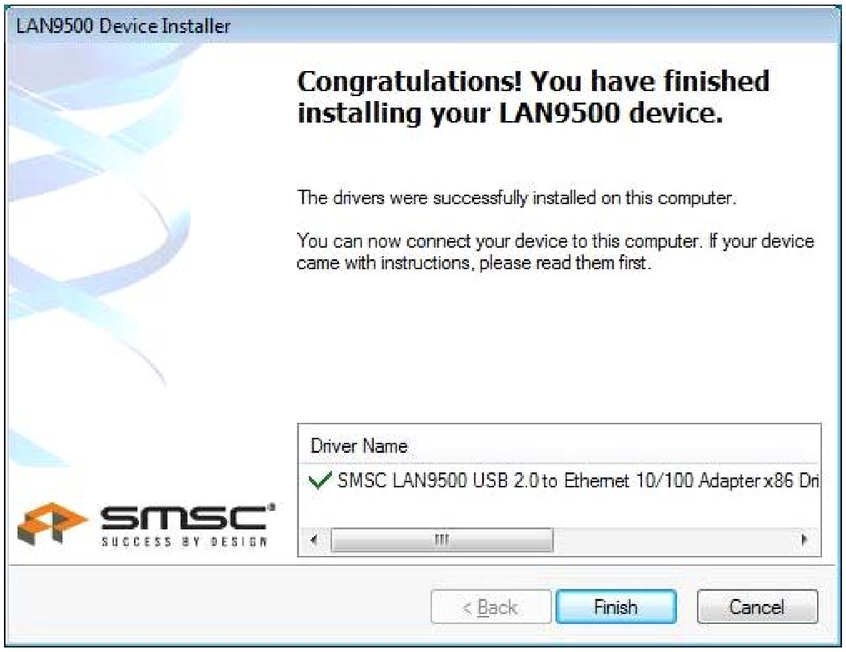
Installing the software for your LAN9500 device...

Please wait while the drivers install. This may take some time to complete.

Figure 3.3 Installation Progress Window

When finished, the installation progress window will change to indicate the driver has been installed. Click the “Finish” button to complete the driver installation.

Only the appropriate 32- or 64-bit driver will be installed, dependent on the version of Windows Vista being used. Figure 3.4 shows the installation of the 32-bit driver in a Windows Vista 32-bit environment. Figure 3.5 shows the installation of the 64-bit driver in a Windows Vista 64-bit environment


LAN9500 Device Installer

Congratulations! You have finished installing your LAN9500 device.

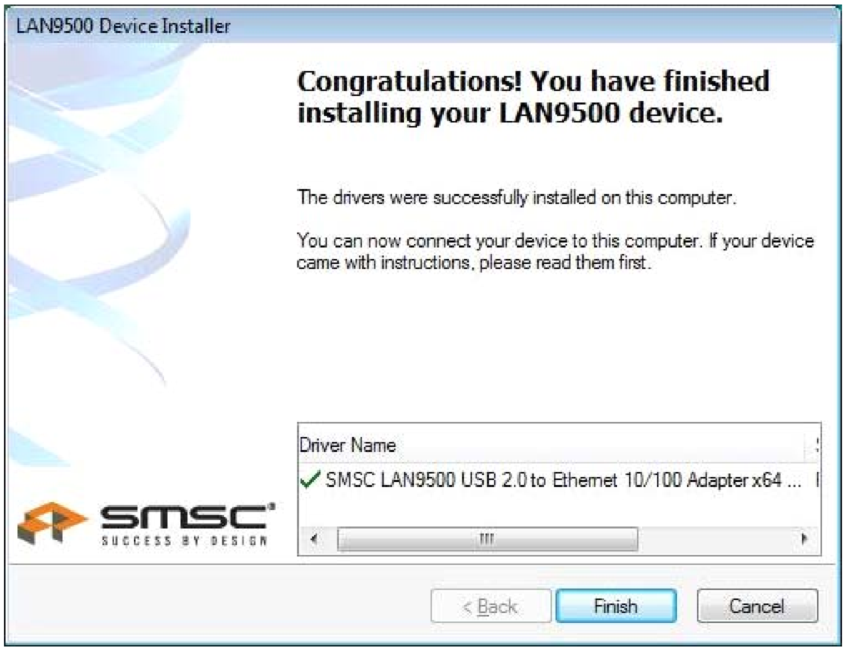
The drivers were successfully installed on this computer.

You can now connect your device to this computer. If your device came with instructions, please read them first.

Driver Name

✓ SMSC LAN9500 USB 2.0 to Ethernet 10/100 Adapter x86 Dri

Figure 3.4 Device Driver Installation Complete Screen - Windows Vista 32-Bit


LAN9500 Device Installer

Congratulations! You have finished installing your LAN9500 device.

The drivers were successfully installed on this computer.

You can now connect your device to this computer. If your device came with instructions, please read them first.

Driver Name

✓ SMSC LAN9500 USB 2.0 to Ethernet 10/100 Adapter x64 ...

Figure 3.5 Device Driver Installation Complete Screen - Windows Vista 64-Bit

The device must now be plugged into a free USB port on the computer. Once this is accomplished, the balloon notification message shown in Figure 3.6 will appear in the task bar.

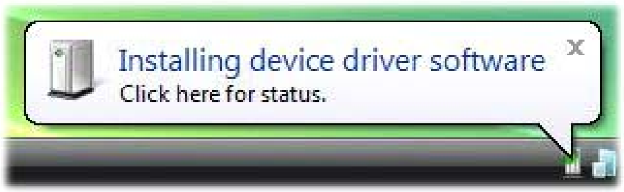

Installing device driver software
Click here for status.

Figure 3.6 Installing Device Driver Software Task Bar Notification

When the software installation is complete, the balloon notification message shown in Figure 3.7 will appear, signaling completion of the installation.

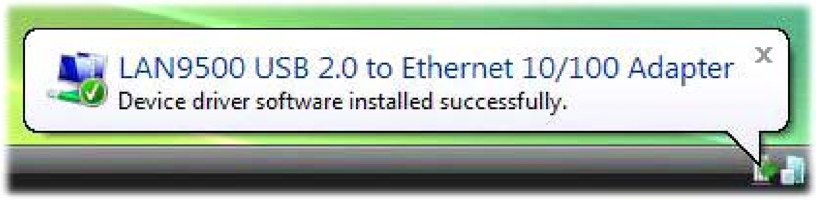

LAN9500 USB 2.0 to Ethernet 10/100 Adapter
Device driver software installed successfully.

Figure 3.7 Device Driver Software Installed Successfully Task Bar Notification

At this point, the network device installation is complete. The device will be setup to have its IP address assigned by a DHCP server. If desired, this configuration can be changed to use a manually assigned IP address. This can be achieved from the properties of the internet protocol for the device, which is accessible through the “Network Connections” control panel. Details are outside of the scope of this document

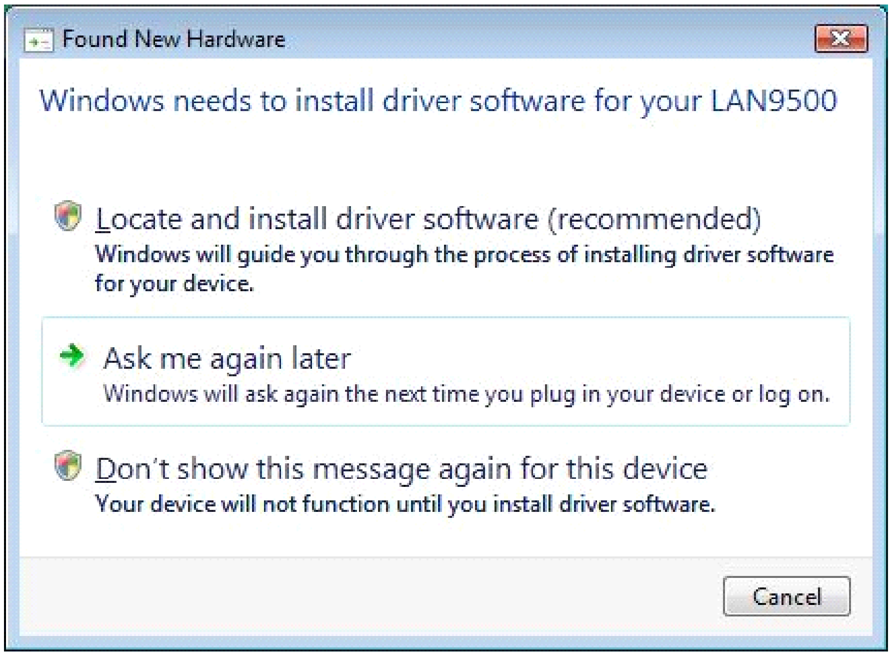
3.2 Windows Vista 32/64-Bit Driver Installation via INF

The device driver may be alternatively installed via an INF file. This section details the INF installation method.

Note: The EXE method described in Section 3.1 is the preferred method of installation.

Before beginning installation, the folder containing the SMSC INF distribution files may be copied to the desktop or any other convenient, known, place within the directory structure.

To begin installation, connect the device to a free USB port on the computer. Once this is accomplished, the “Found New Hardware” window will appear, as shown in Figure 3.8. Click the “Locate and install driver software (recommended)” option.


Found New Hardware

Windows needs to install driver software for your LAN9500

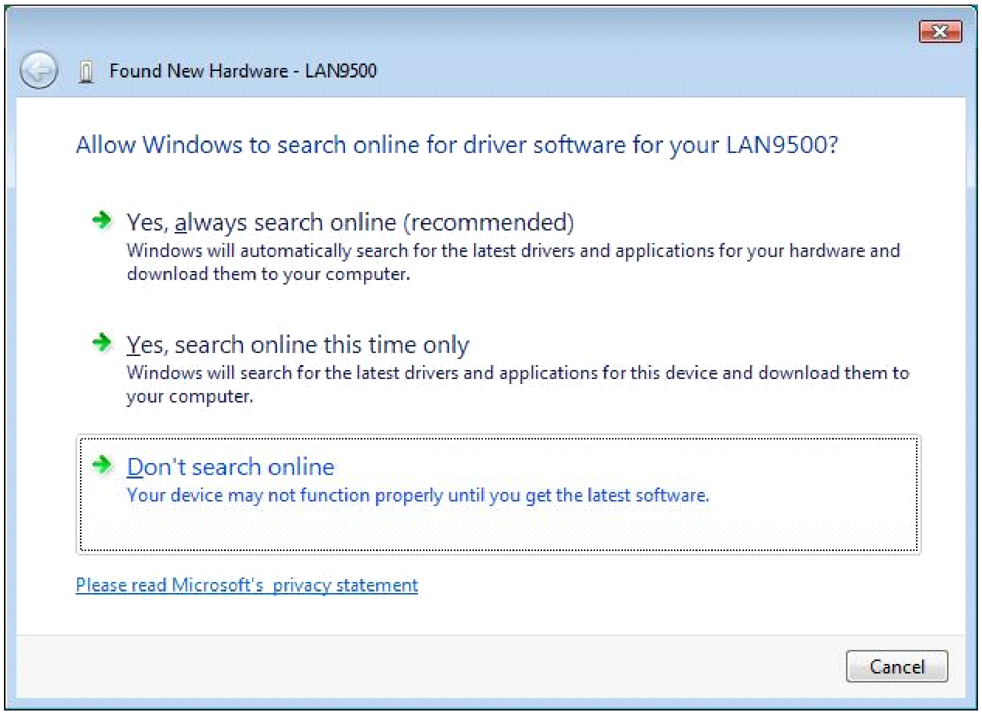
Locate and install driver software (recommended)
Windows will guide you through the process of installing driver software for your device.

Ask me again later
Windows will ask again the next time you plug in your device or log on.

Don't show this message again for this device
Your device will not function until you install driver software.

Figure 3.8 Found New Hardware Window

Click “Don’t search online”, as shown in Figure 3.9.


Found New Hardware - LAN9500

Allow Windows to search online for driver software for your LAN9500?

Yes, always search online (recommended)
Windows will automatically search for the latest drivers and applications for your hardware and download them to your computer.

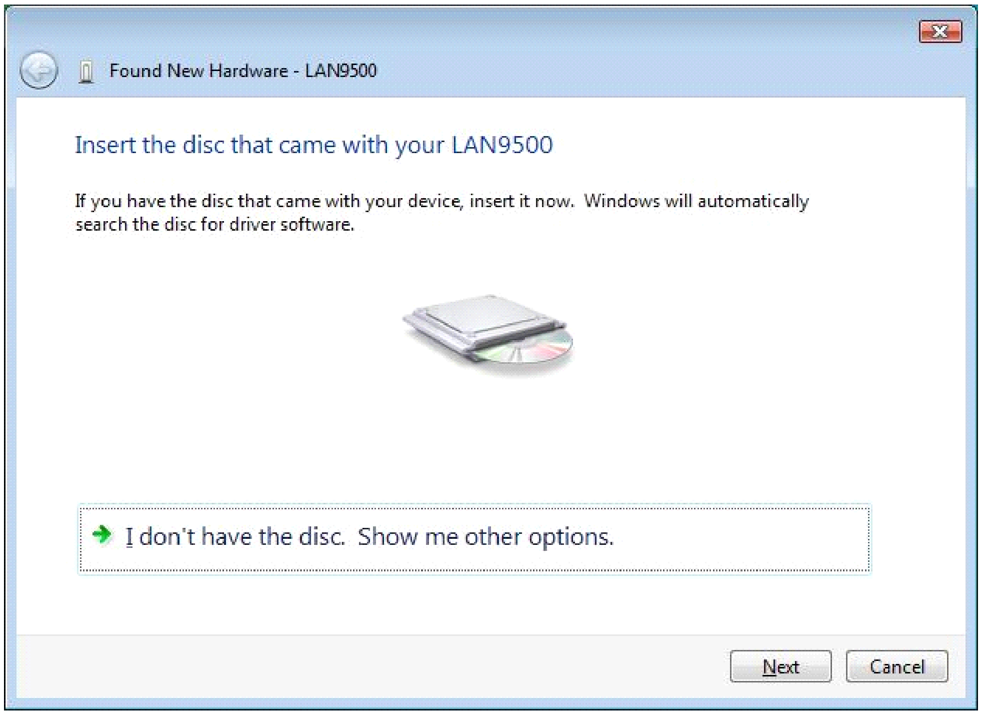
Yes, search online this time only
Windows will search for the latest drivers and applications for this device and download them to your computer.

Don't search online
Your device may not function properly until you get the latest software.

Please read Microsoft's privacy statement

Figure 3.9 Search Online Option Window

Click “I don’t have the disc. Show me other options”, as shown in Figure 3.10, and click “Next”.


Found New Hardware - LAN9500

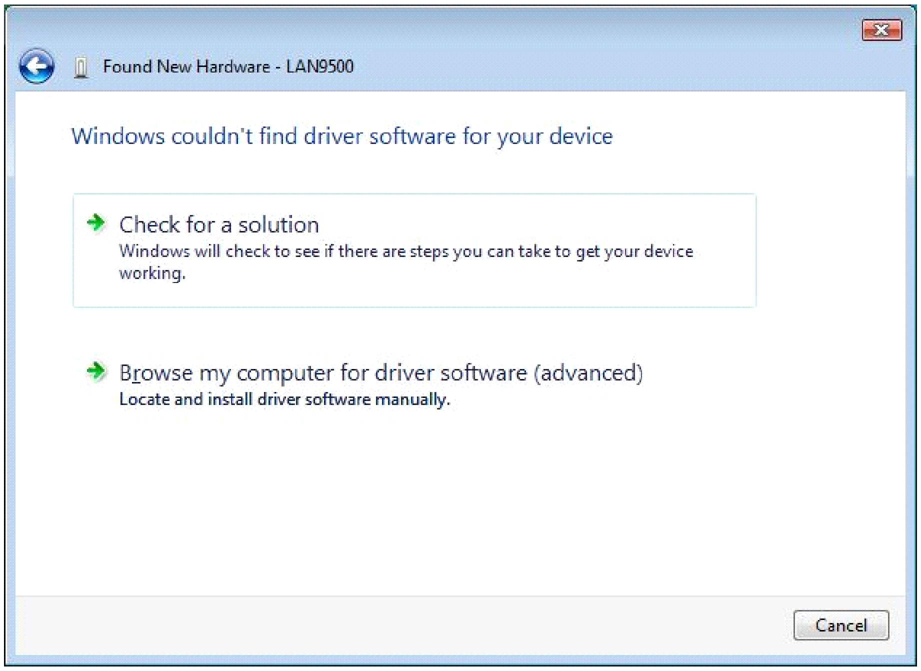
Insert the disc that came with your LAN9500

If you have the disc that came with your device, insert it now. Windows will automatically search the disc for driver software.

I don't have the disc. Show me other options.

Figure 3.10 Insert Disk Window

Click "Browse my computer for driver software (advanced)", as shown in Figure 3.11.



Found New Hardware - LAN9500

Windows couldn't find driver software for your device

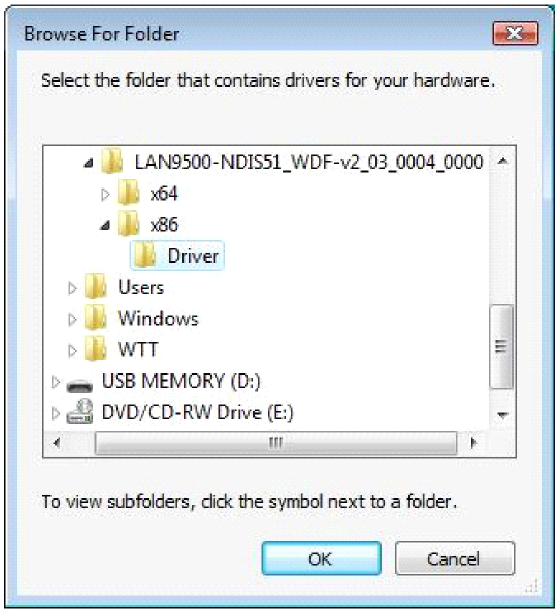
Check for a solution
Windows will check to see if there are steps you can take to get your device working.

Browse my computer for driver software (advanced)
Locate and install driver software manually.

Figure 3.11 Driver Install Options Window

Click the "Browse..." button and browse to the location of the copied SMSC INF distribution files. Click "OK", and then "Next" to install.

Note: For Windows 32-bit installations, browse to the "x86" folder within the copied SMSC INF distribution files, as shown in Figure 3.12. For Windows 64-bit installations, browse to the "x64" folder within the copied SMSC INF distribution files, as shown in Figure 3.13.



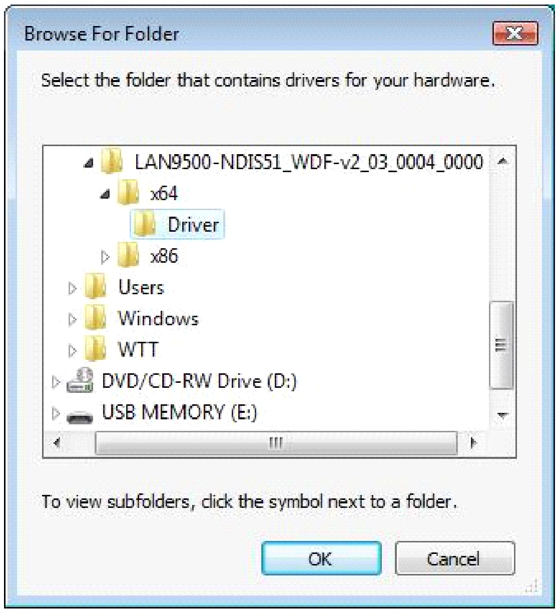
Browse For Folder

Select the folder that contains drivers for your hardware.

LAN9500-NDIS51_WDF-v2_03_0004_0000
x64
x86
Driver
Users
Windows
WTT
USB MEMORY (D:)
DVD/CD-RW Drive (E:)

To view subfolders, click the symbol next to a folder.

Figure 3.12 Browse Window - Windows Vista 32-Bit



Browse For Folder

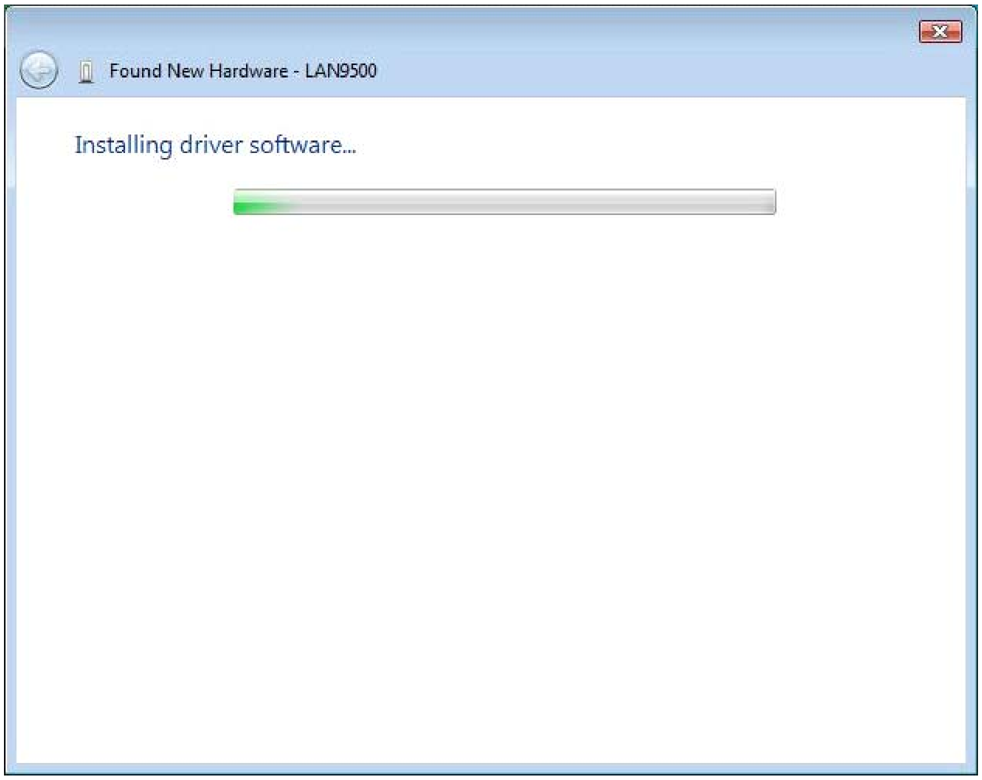
Select the folder that contains drivers for your hardware.

- LAN9500-NDIS51_WDF-v2_03_0004_0000
  - x64
    - Driver
  - x86
- Users
- Windows
- WTT
- DVD/CD-RW Drive (D:)
- USB MEMORY (E:)

To view subfolders, click the symbol next to a folder.

Figure 3.13 Browse Window - Windows Vista 64-Bit

The Device Installer window will change to a progress window, as shown in Figure 3.14, indicating some time may be necessary for the installation.

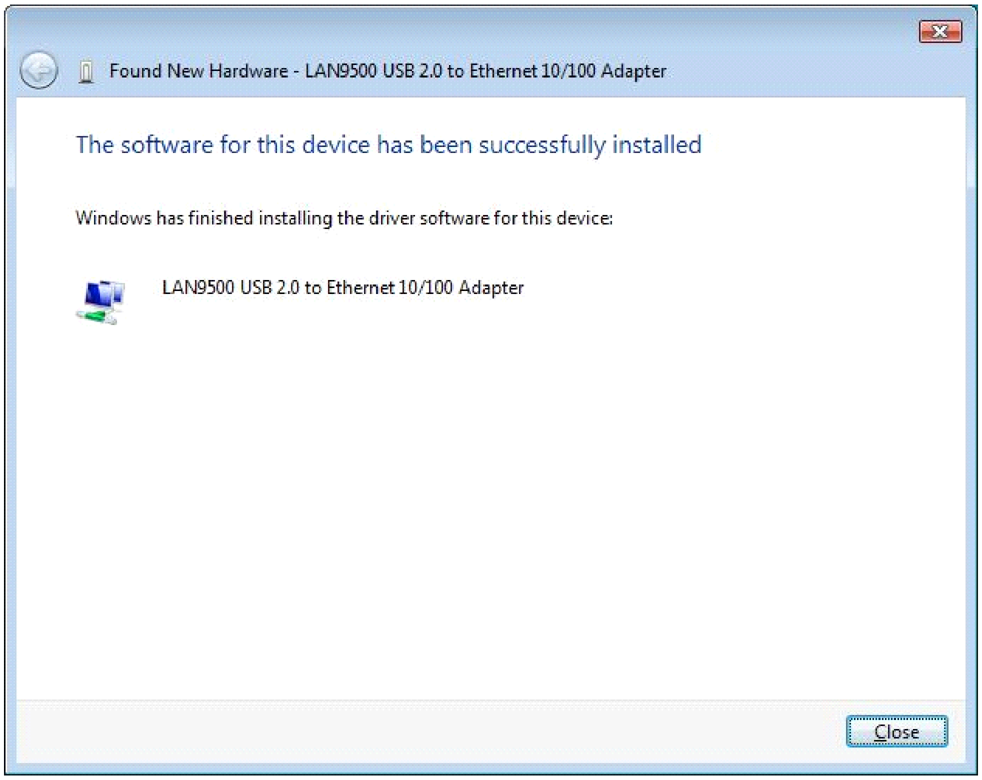


Found New Hardware - LAN9500

Installing driver software...

Figure 3.14 Installation Progress Window

When finished, the installation progress window will change to indicate the driver has been installed. Click the “Close” button to complete the driver installation.


Found New Hardware - LAN9500 USB 2.0 to Ethernet 10/100 Adapter

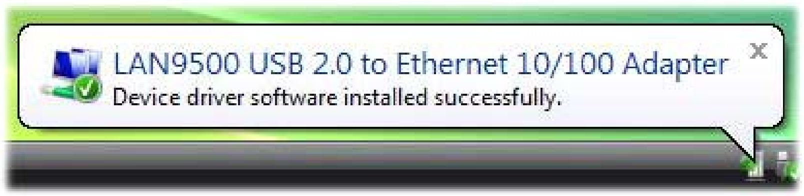
The software for this device has been successfully installed

Windows has finished installing the driver software for this device:

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Figure 3.15 Device Driver Installation Complete Screen

A device driver installation notification will pop-up as shown in Figure 3.16, indicating the driver installation is complete.


LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Device driver software installed successfully.

Figure 3.16 Device Driver Installation Success Task Bar Notification

3.3 Windows Vista 32/64 Bit Driver Uninstallation

Note: Manual uninstallation is the only supported form of uninstallation at this time. An automated uninstaller via Vista's "Programs and Features" may be included in future revisions.

To uninstall the Windows Vista 32/64-bit software, type "Run" in the Start menu search field and click on "Run" in the programs list, as shown in Figure 3.17.

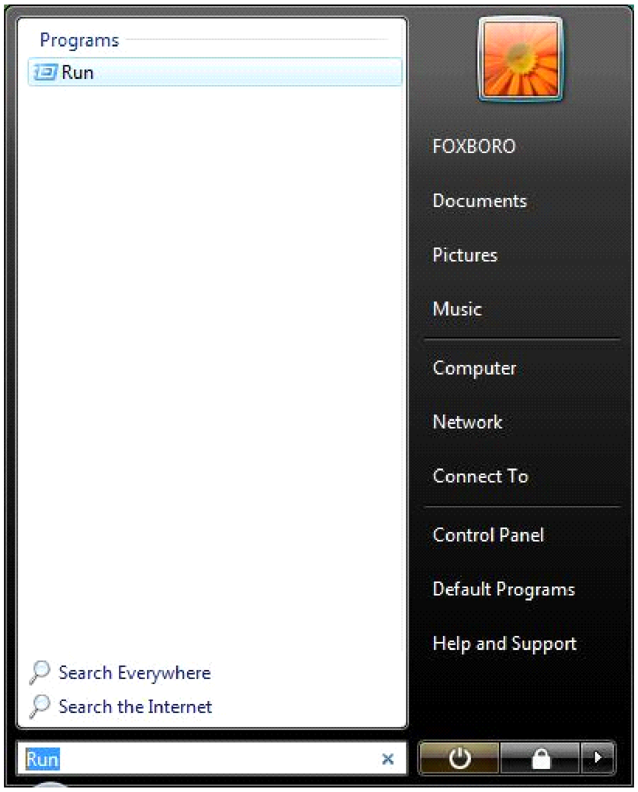
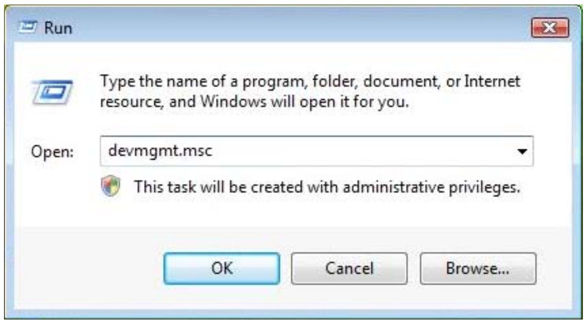


Figure 3.17 Start Menu Search

In the Run window, type "devmgmt.msc" and click "OK", as shown in Figure 3.18. This will open the Device Manager window.



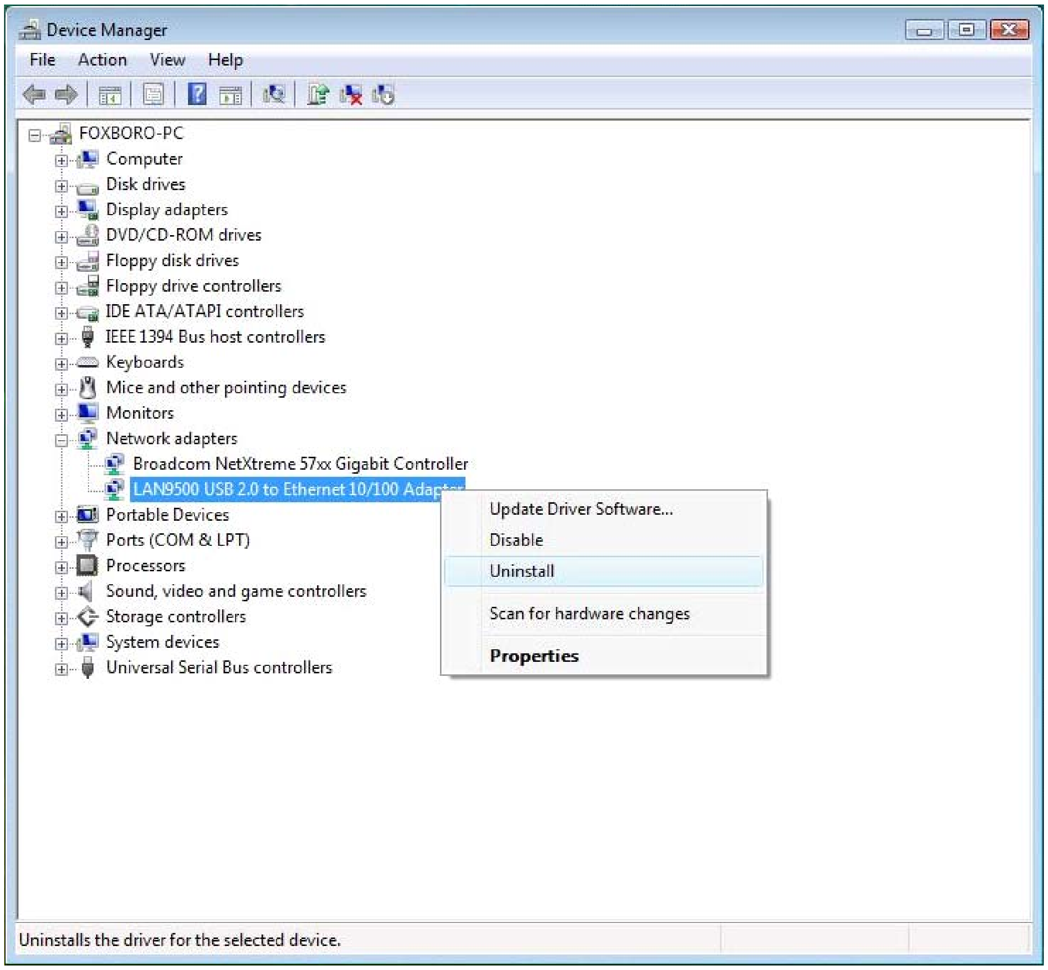
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: devmgmt.msc

This task will be created with administrative privileges.

Figure 3.18 Run Window

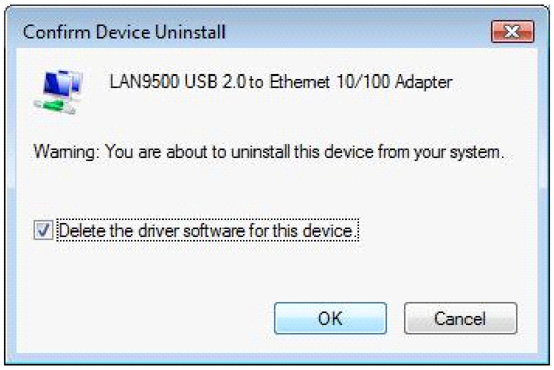
In the Device Manager window, browse to the “Network adapters” section and select the device. Right click on the device and select “Uninstall”, as shown in Figure 3.19.


Device Manager
File
Action
View
Help
FOXBORO-PC
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Floppy disk drives
Floppy drive controllers
IDE ATA/ATAPI controllers
IEEE 1394 Bus host controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Broadcom NetXtreme 57xx Gigabit Controller
LAN9500 USB 2.0 to Ethernet 10/100 Adapter
Portable Devices
Ports (COM & LPT)
Processors
Sound, video and game controllers
Storage controllers
System devices
Universal Serial Bus controllers
Update Driver Software...
Disable
Uninstall
Scan for hardware changes
Properties

Uninstalls the driver for the selected device.

Figure 3.19 Device Manager Window

In the “Confirm Device Uninstall” window, select the “Delete the driver software for this device” checkbox and click “OK”, as shown in Figure 3.20.



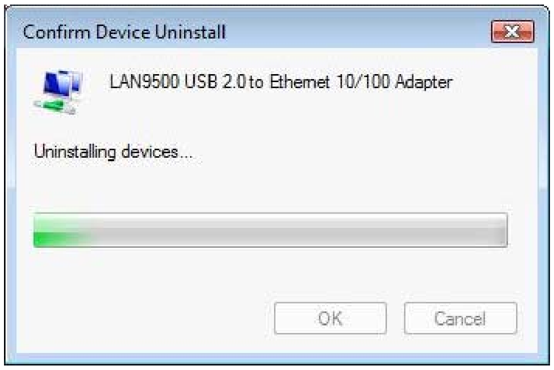
LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Warning: You are about to uninstall this device from your system.

☑ Delete the driver software for this device

Figure 3.20 Confirm Device Removal Window

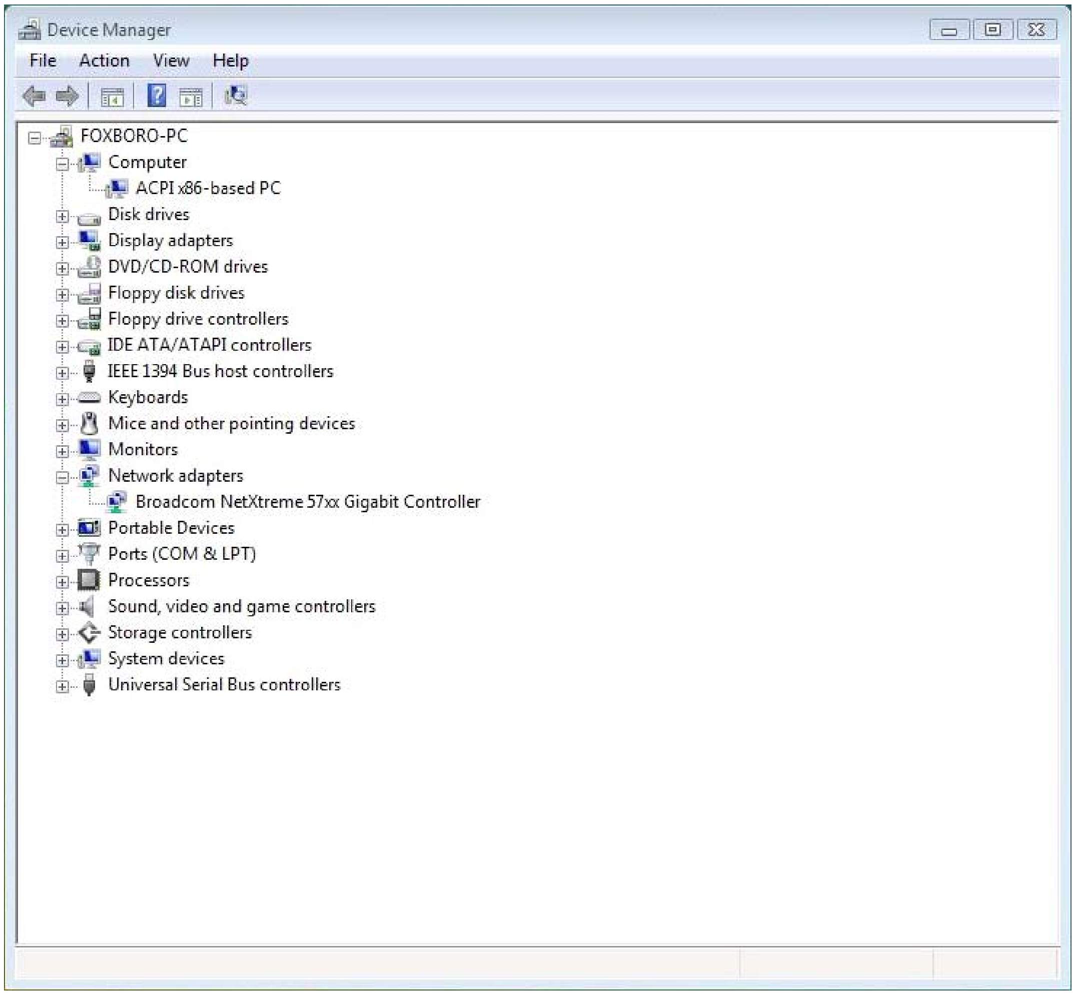
The Confirm Device Uninstall window will display a progress indicator while the device drivers are being removed, as shown in Figure 3.21.



Uninstalling devices...

Figure 3.21 Device Uninstall Progress Window

The uninstallation process is now complete. As illustrated in Figure 3.22, the device driver will no longer be listed in the Device Manager window. The Device Manager window may now be closed.



```
FOXBORO-PC
  Computer
    ACPI x86-based PC
  Disk drives
  Display adapters
  DVD/CD-ROM drives
  Floppy disk drives
  Floppy drive controllers
  IDE ATA/ATAPI controllers
  IEEE 1394 Bus host controllers
  Keyboards
  Mice and other pointing devices
  Monitors
  Network adapters
    Broadcom NetXtreme 57xx Gigabit Controller
  Portable Devices
  Ports (COM & LPT)
  Processors
  Sound, video and game controllers
  Storage controllers
  System devices
  Universal Serial Bus controllers
```

Figure 3.22 Device Removed from Device Manager

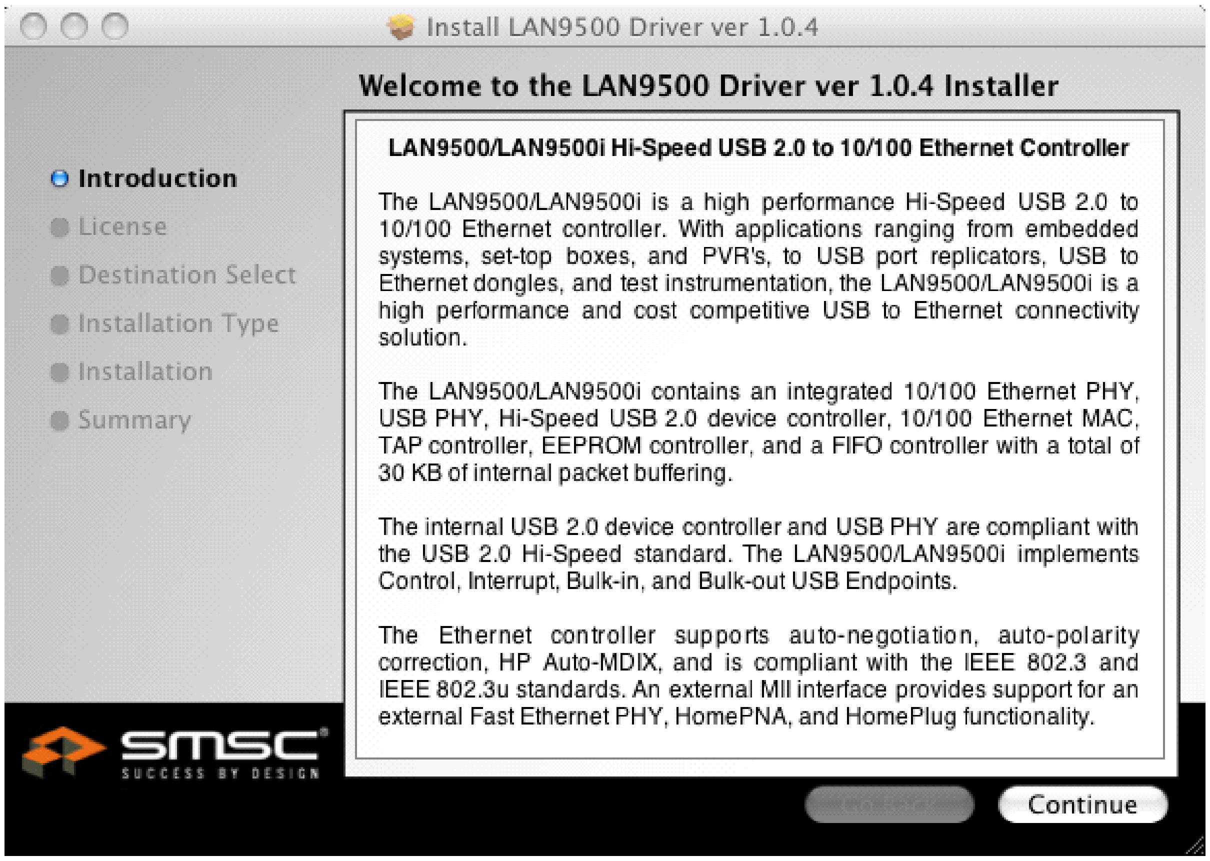
Chapter 4 MAC OSX Driver

4.1 MAC OSX Driver Installation

The folder containing the distribution files may be copied to the desktop or any other convenient, known place within the directory structure. Clicking the folder will result in the installer package file and the release notes file being displayed.

Note: The device should not be plugged into the computer prior to installing the driver software.

To begin installation, double click on the installer icon. The following introduction window will then appear:



Welcome to the LAN9500 Driver ver 1.0.4 Installer

LAN9500/LAN9500i Hi-Speed USB 2.0 to 10/100 Ethernet Controller

The LAN9500/LAN9500i is a high performance Hi-Speed USB 2.0 to 10/100 Ethernet controller. With applications ranging from embedded systems, set-top boxes, and PVR's, to USB port replicators, USB to Ethernet dongles, and test instrumentation, the LAN9500/LAN9500i is a high performance and cost competitive USB to Ethernet connectivity solution.

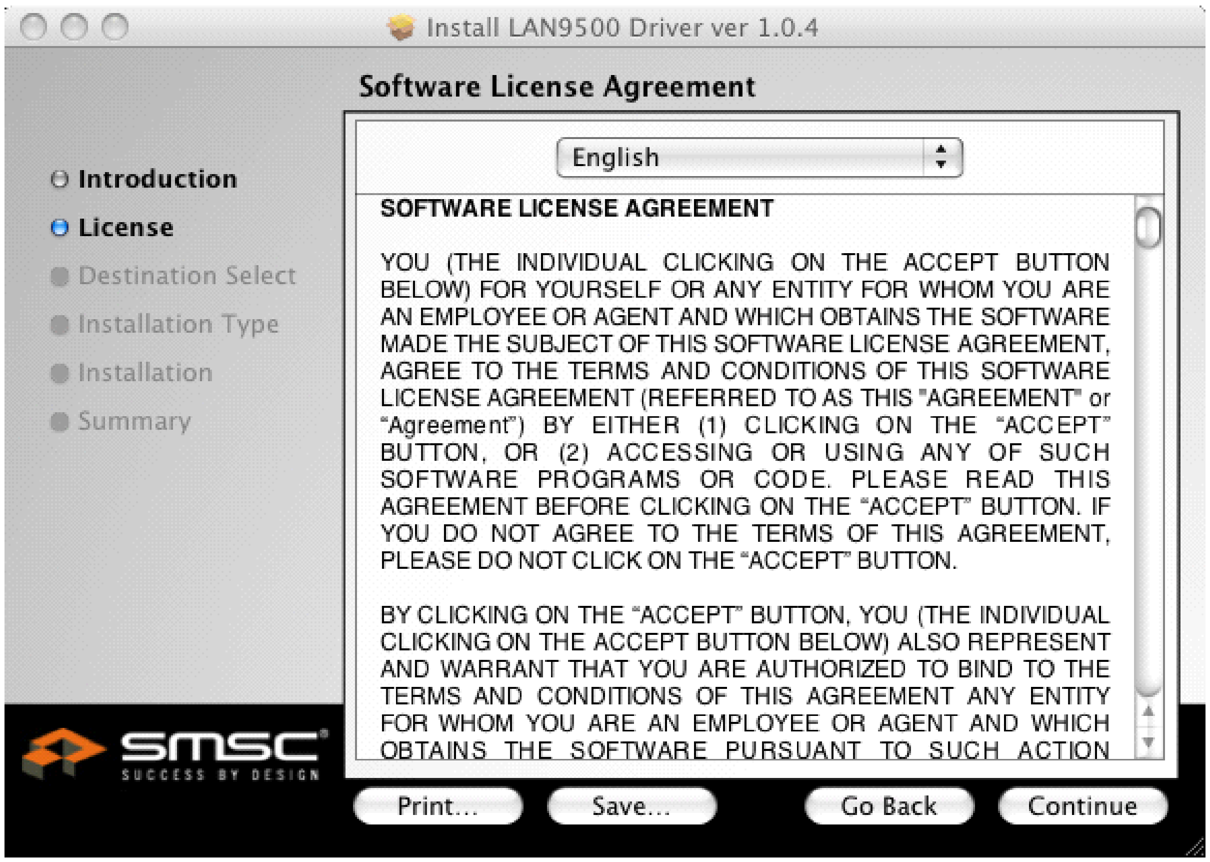
The LAN9500/LAN9500i contains an integrated 10/100 Ethernet PHY, USB PHY, Hi-Speed USB 2.0 device controller, 10/100 Ethernet MAC, TAP controller, EEPROM controller, and a FIFO controller with a total of 30 KB of internal packet buffering.

The internal USB 2.0 device controller and USB PHY are compliant with the USB 2.0 Hi-Speed standard. The LAN9500/LAN9500i implements Control, Interrupt, Bulk-in, and Bulk-out USB Endpoints.

The Ethernet controller supports auto-negotiation, auto-polarity correction, HP Auto-MDIX, and is compliant with the IEEE 802.3 and IEEE 802.3u standards. An external MII interface provides support for an external Fast Ethernet PHY, HomePNA, and HomePlug functionality.

Figure 4.1 Introduction Screen

Click Continue. The “License” window, illustrated in Figure 4.2, will then appear.



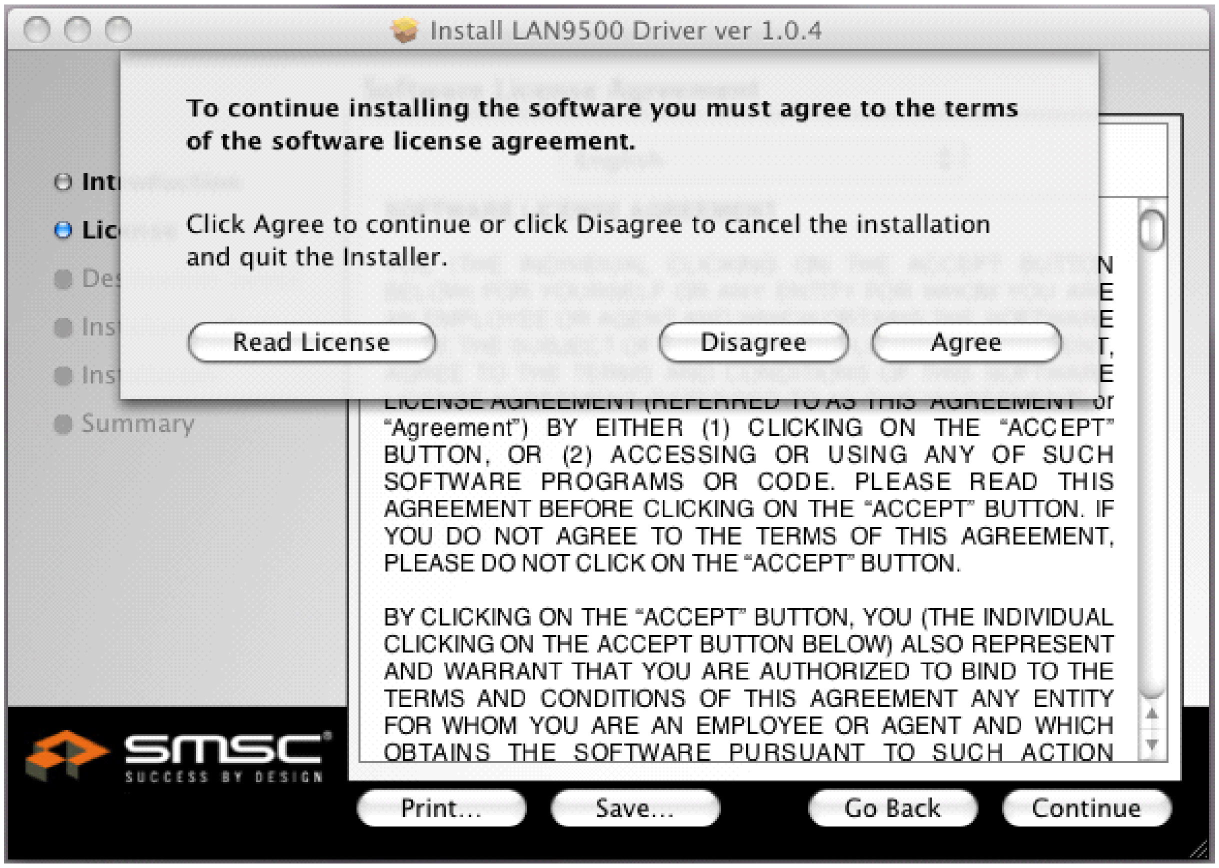
SOFTWARE LICENSE AGREEMENT

YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) FOR YOURSELF OR ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE MADE THE SUBJECT OF THIS SOFTWARE LICENSE AGREEMENT, AGREE TO THE TERMS AND CONDITIONS OF THIS SOFTWARE LICENSE AGREEMENT (REFERRED TO AS THIS "AGREEMENT" or "Agreement") BY EITHER (1) CLICKING ON THE "ACCEPT" BUTTON, OR (2) ACCESSING OR USING ANY OF SUCH SOFTWARE PROGRAMS OR CODE. PLEASE READ THIS AGREEMENT BEFORE CLICKING ON THE "ACCEPT" BUTTON. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, PLEASE DO NOT CLICK ON THE "ACCEPT" BUTTON.

BY CLICKING ON THE "ACCEPT" BUTTON, YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) ALSO REPRESENT AND WARRANT THAT YOU ARE AUTHORIZED TO BIND TO THE TERMS AND CONDITIONS OF THIS AGREEMENT ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE PURSUANT TO SUCH ACTION

Figure 4.2 License Window

Click Continue. The drop down menu, illustrated in Figure 4.3, will then appear.



To continue installing the software you must agree to the terms of the software license agreement.

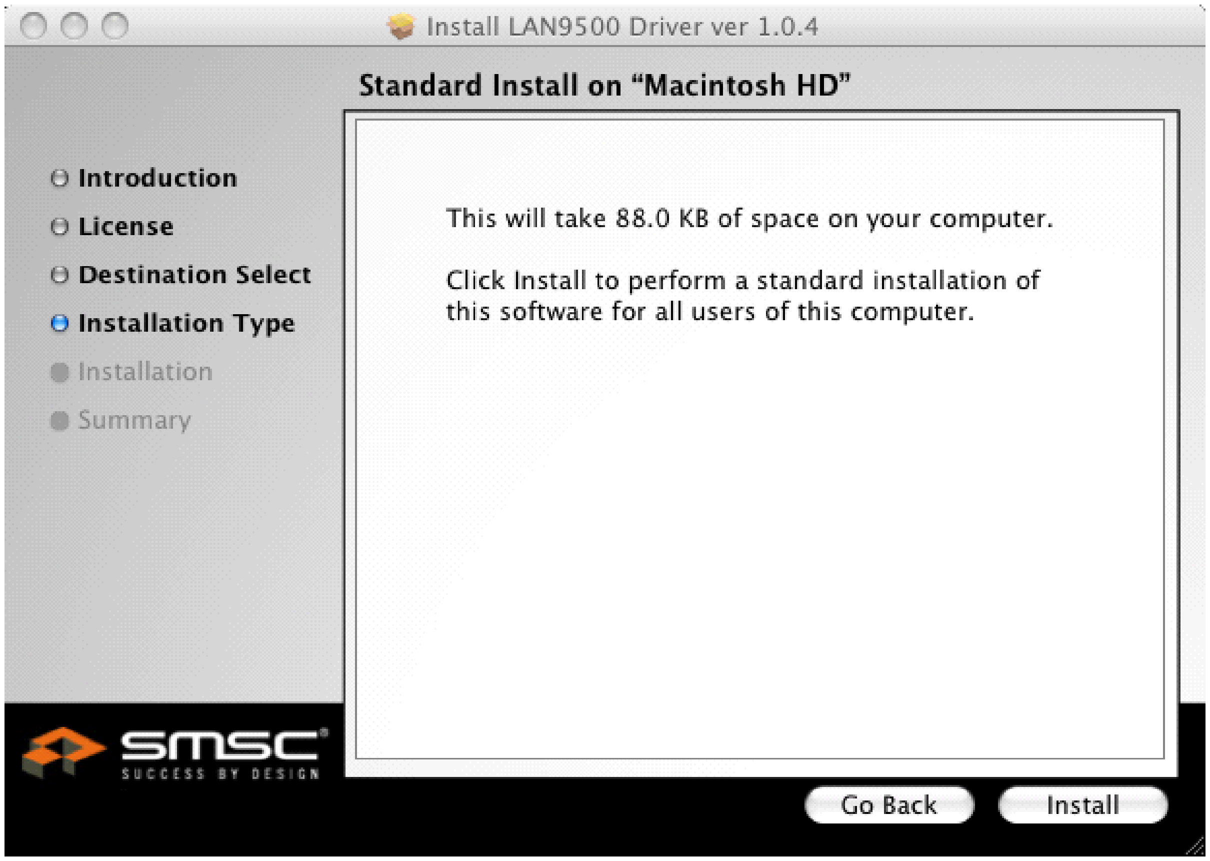
Click Agree to continue or click Disagree to cancel the installation and quit the Installer.

“Agreement”) BY EITHER (1) CLICKING ON THE “ACCEPT” BUTTON, OR (2) ACCESSING OR USING ANY OF SUCH SOFTWARE PROGRAMS OR CODE. PLEASE READ THIS AGREEMENT BEFORE CLICKING ON THE “ACCEPT” BUTTON. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, PLEASE DO NOT CLICK ON THE “ACCEPT” BUTTON.

BY CLICKING ON THE “ACCEPT” BUTTON, YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) ALSO REPRESENT AND WARRANT THAT YOU ARE AUTHORIZED TO BIND TO THE TERMS AND CONDITIONS OF THIS AGREEMENT ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE PURSUANT TO SUCH ACTION

Figure 4.3 Agree/Disagree Drop Down

Click the “Agree” button. The “Installation Type” window, illustrated in Figure 4.4, will then appear.



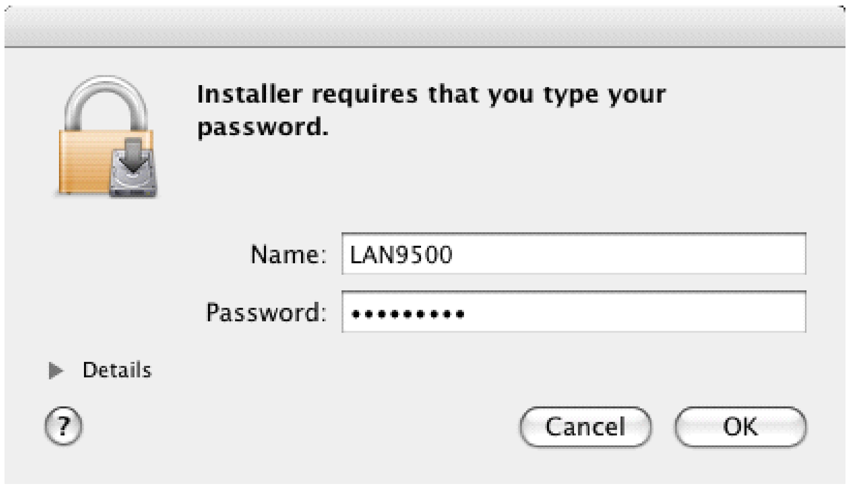
Standard Install on "Macintosh HD"

This will take 88.0 KB of space on your computer.

Click Install to perform a standard installation of this software for all users of this computer.

Figure 4.4 Installation Type Window

Click the "Install" button. A drop down requesting the Name and Password of a user with system administration rights will then appear, as illustrated in Figure 4.5.



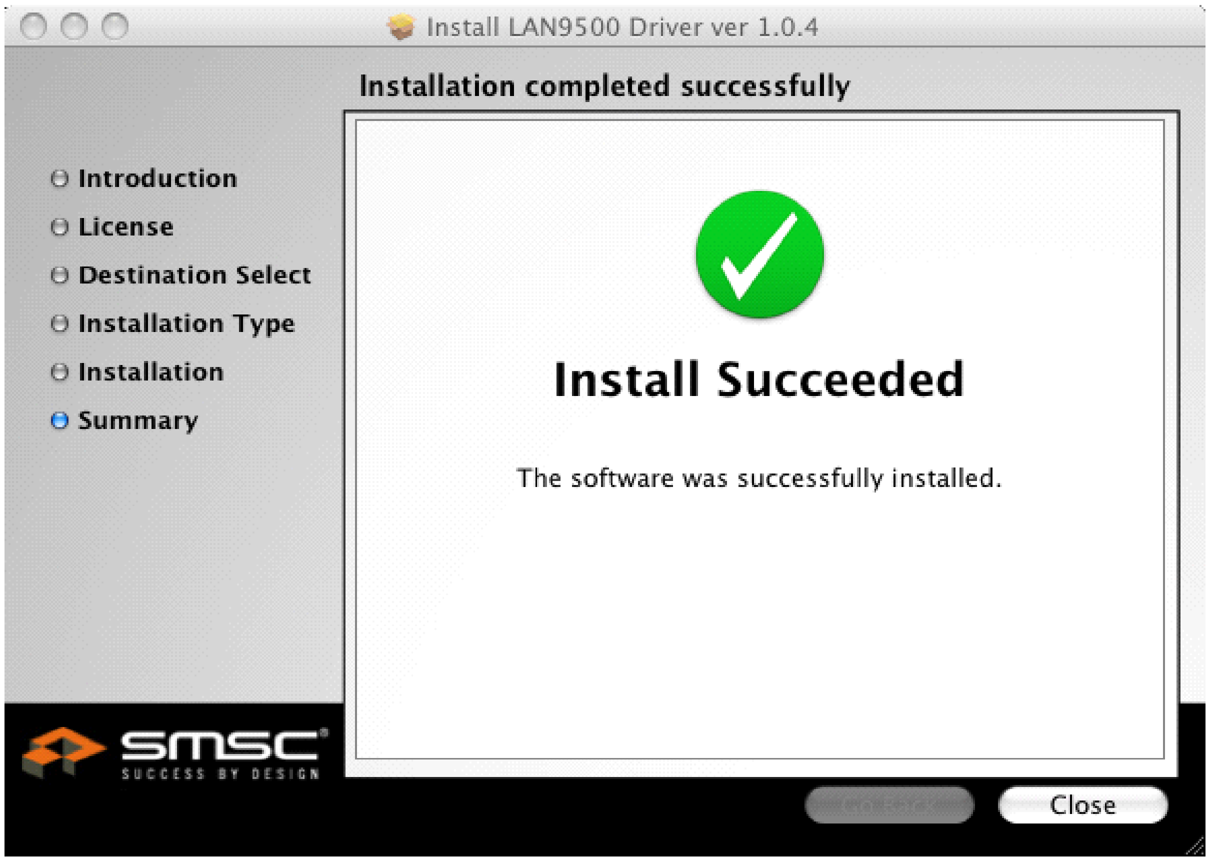
Installer requires that you type your password.

Name: LAN9500

Password: ••••••••••

Figure 4.5 Installer Name/Password Drop Down

Type in the appropriate Name and Password entries, then click “OK”. The Summary window, indicating successful software installation, illustrated in Figure 4.6, will then appear



Installation completed successfully

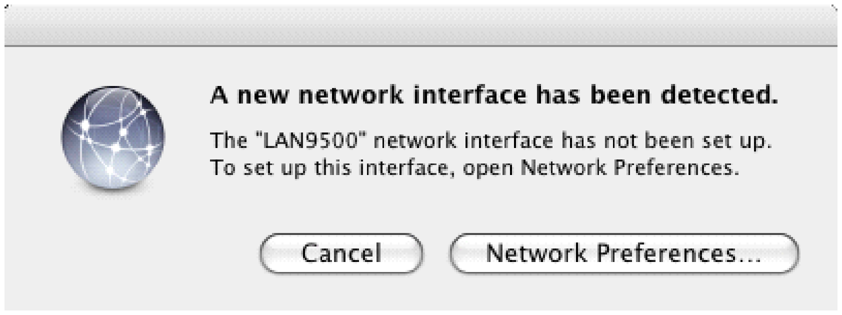
Install Succeeded

The software was successfully installed.

Figure 4.6 Summary Window Indicating Successful Installation

Click “Close” to complete the driver software installation.

The device must now be plugged into a free USB port on the computer. Upon device insertion, the pop up illustrated in Figure 4.7 may or may not be observed. In the case where it is observed, click “Cancel” and proceed to the next step.



A new network interface has been detected.

The "LAN9500" network interface has not been set up.
To set up this interface, open Network Preferences.

Figure 4.7 Cancel This Pop-Up If It Appears

Continue the configuration process by clicking the systray network icon (top right corner of the screen) and selecting "Open Network Preferences...", as illustrated in Figure 4.8.

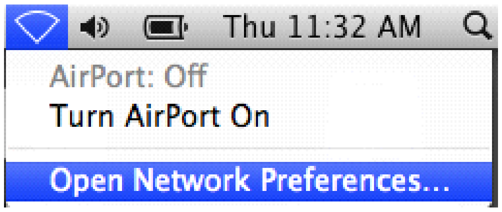
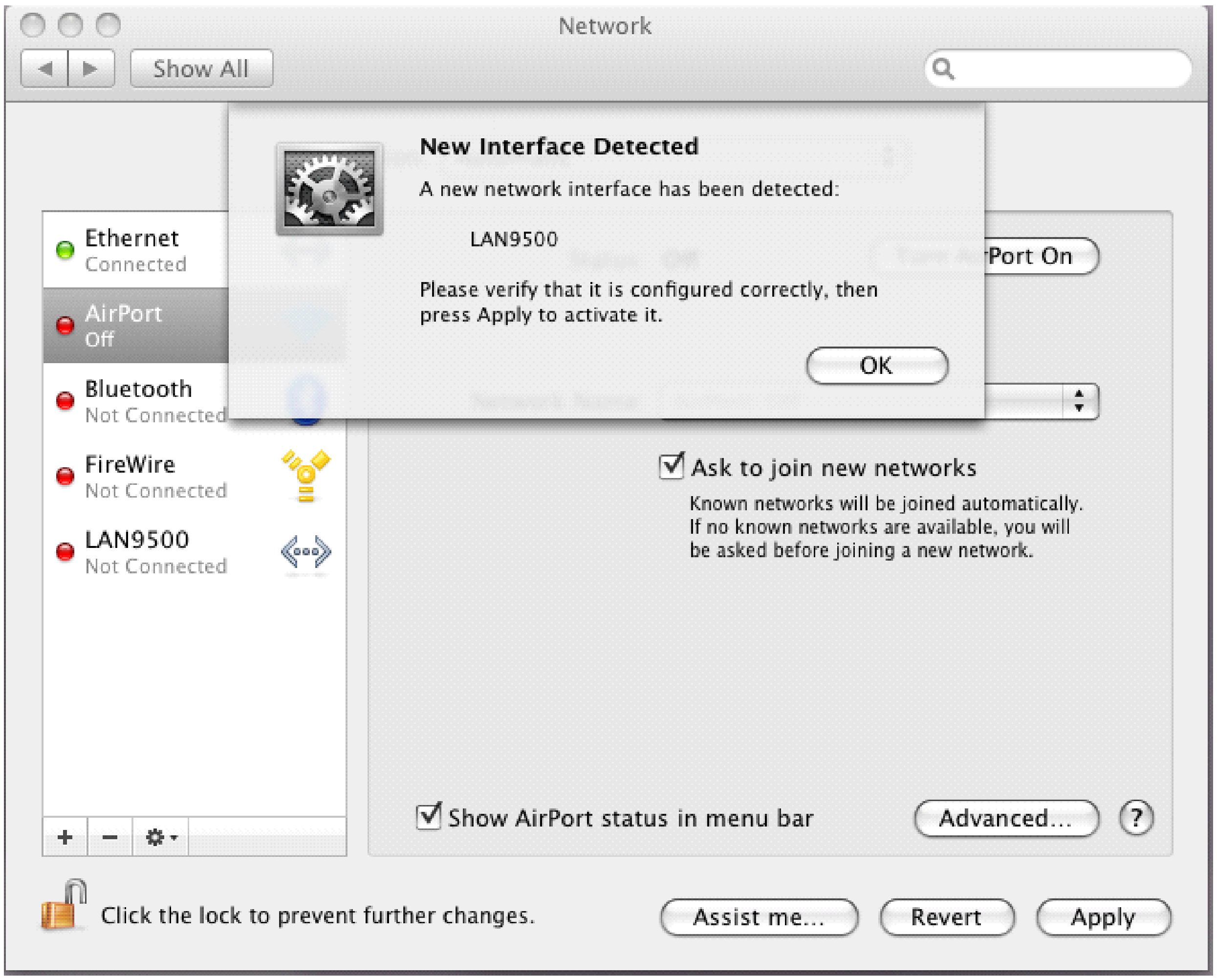


Figure 4.8 Open Network Preferences

The Network window will appear, as illustrated in Figure 4.9.



New Interface Detected

A new network interface has been detected:

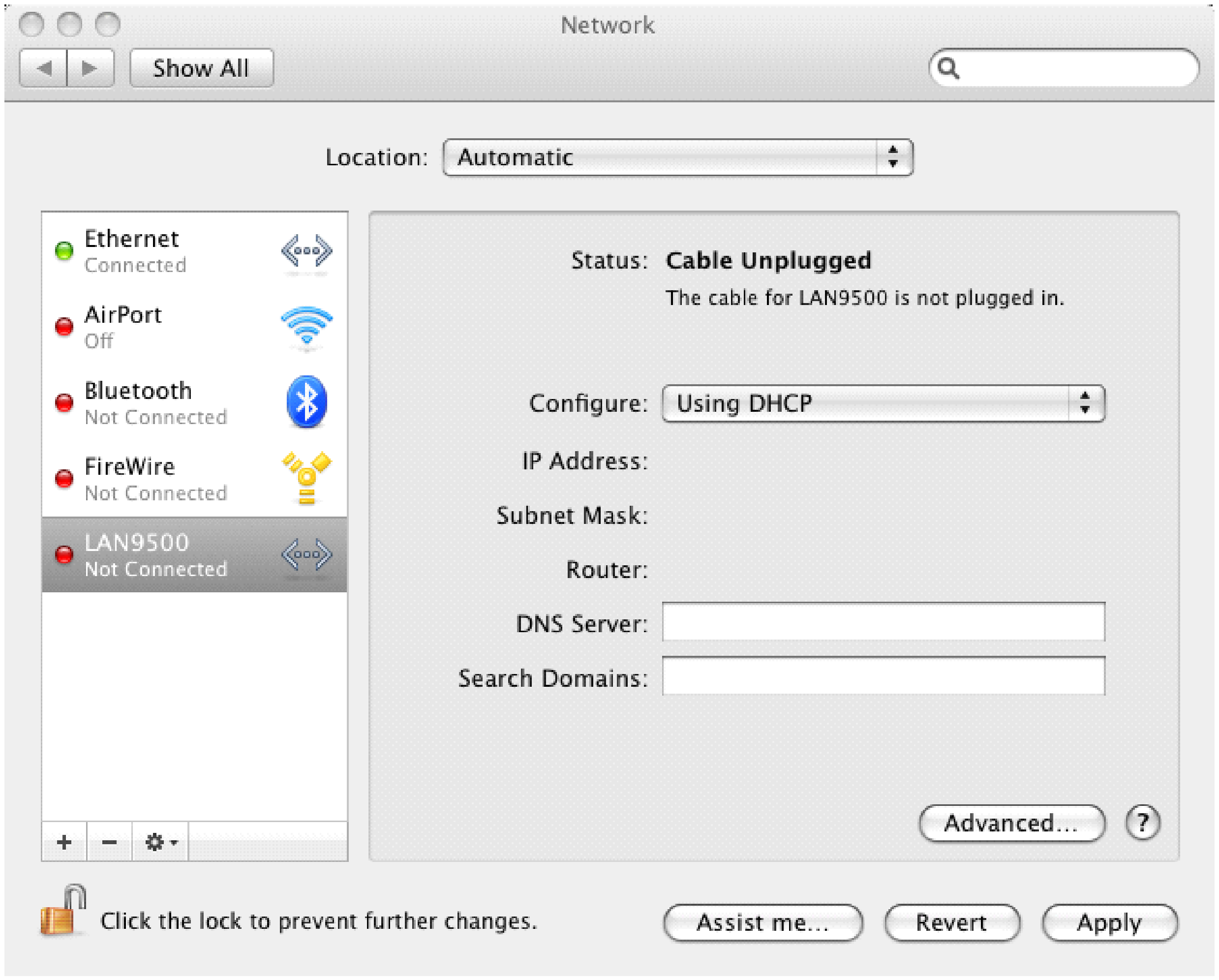
LAN9500

Please verify that it is configured correctly, then press Apply to activate it.

Network
Show All
OK
Ethernet
Connected
AirPort
Off
Bluetooth
Not Connected
FireWire
Not Connected
LAN9500
Not Connected
Port On
Ask to join new networks
Known networks will be joined automatically. If no known networks are available, you will be asked before joining a new network.
Show AirPort status in menu bar
Advanced...
?
Click the lock to prevent further changes.
Assist me...
Revert
Apply

Figure 4.9 Network Window with Pop-Up

Click "OK" to dismiss the pop-up window. An entry for the device will now be added to the Network window, as illustrated in Figure 4.10.



Status: **Cable Unplugged**

The cable for LAN9500 is not plugged in.

Configure: Using DHCP

IP Address:

Subnet Mask:

Router:

DNS Server:

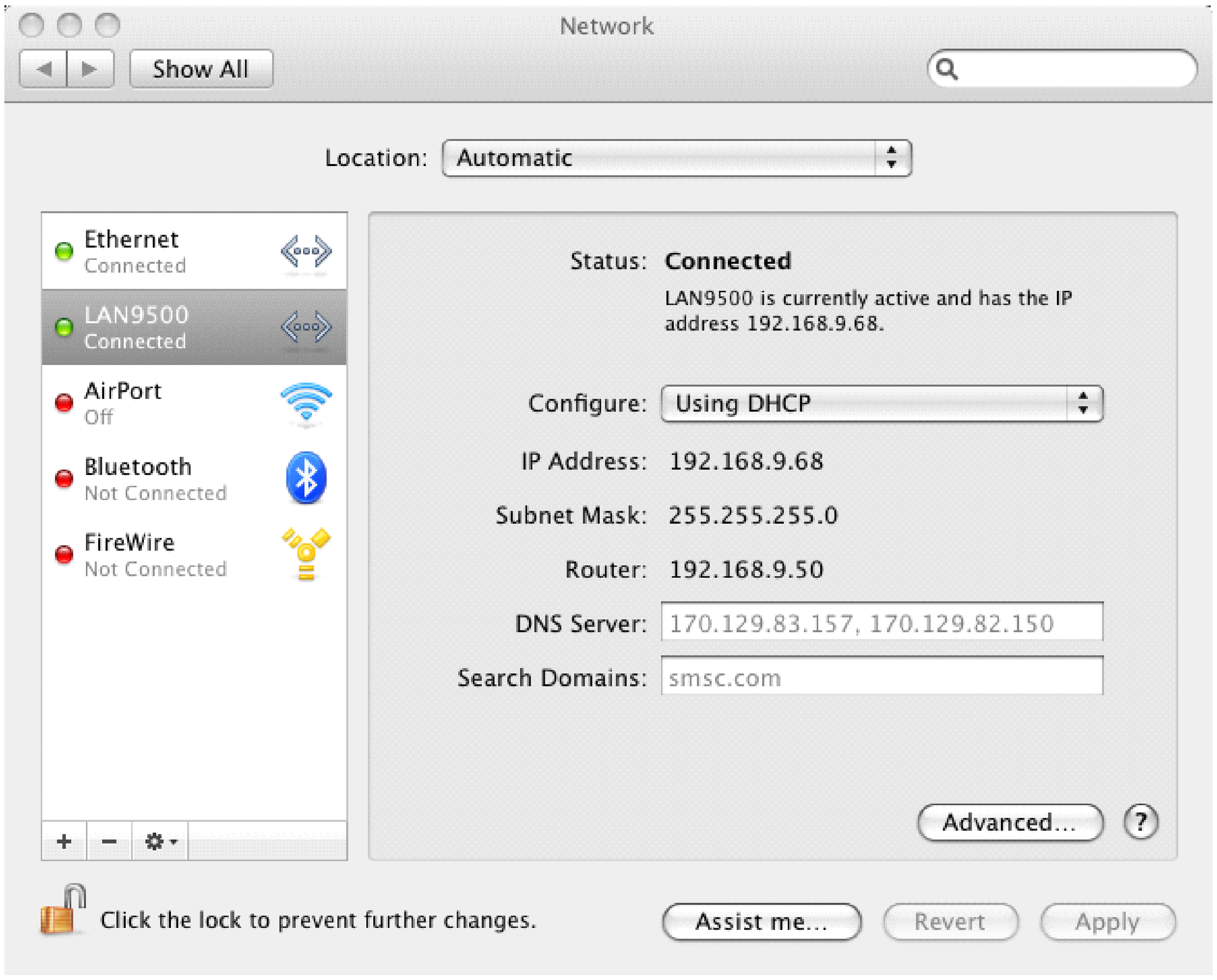
Search Domains:

Click the lock to prevent further changes.

Figure 4.10 New Service Insertion in Network Table

The new service must be configured to either use DHCP or a fixed IP address, depending on the network configuration. Specification of this portion of the configuration is outside the scope of this document. Upon completion of the configuration, click the “Apply” button to complete the installation.

After obtaining an IP address from the DHCP server, the Network window will appear similar to Figure 4.11.



Location: Automatic

Ethernet Connected
LAN9500 Connected
AirPort Off
Bluetooth Not Connected
FireWire Not Connected

Status: **Connected**
LAN9500 is currently active and has the IP address 192.168.9.68.

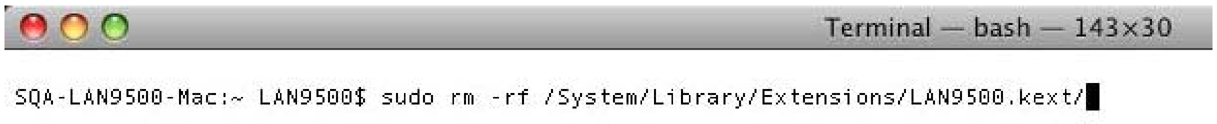
Configure: Using DHCP
IP Address: 192.168.9.68
Subnet Mask: 255.255.255.0
Router: 192.168.9.50
DNS Server: 170.129.83.157, 170.129.82.150
Search Domains: smsc.com

Figure 4.11 Device Connected with IP Address

4.2 MAC OSX Driver Uninstallation

Note: The device must be safely removed from the computer before beginning the uninstallation.

To begin the uninstallation process, open up a command terminal and enter the removal command “sudo rm -rf /System/Library/Extensions/LAN9500.kext/”, as indicated in Figure 4.12. This causes the device driver to be removed from the operating system.



```
SQA-LAN9500-Mac:~ LAN9500$ sudo rm -rf /System/Library/Extensions/LAN9500.kext/
```

Figure 4.12 Driver Removal

The final step is to remove the network entry that was created during the installation process. Click the systray network icon (top right corner of the screen) and select “Open Network Preferences...”, as illustrated in Figure 4.13.

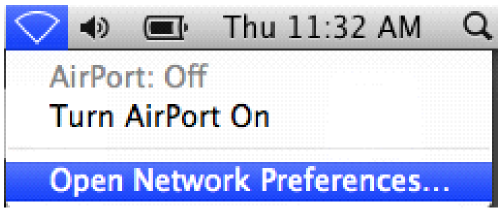
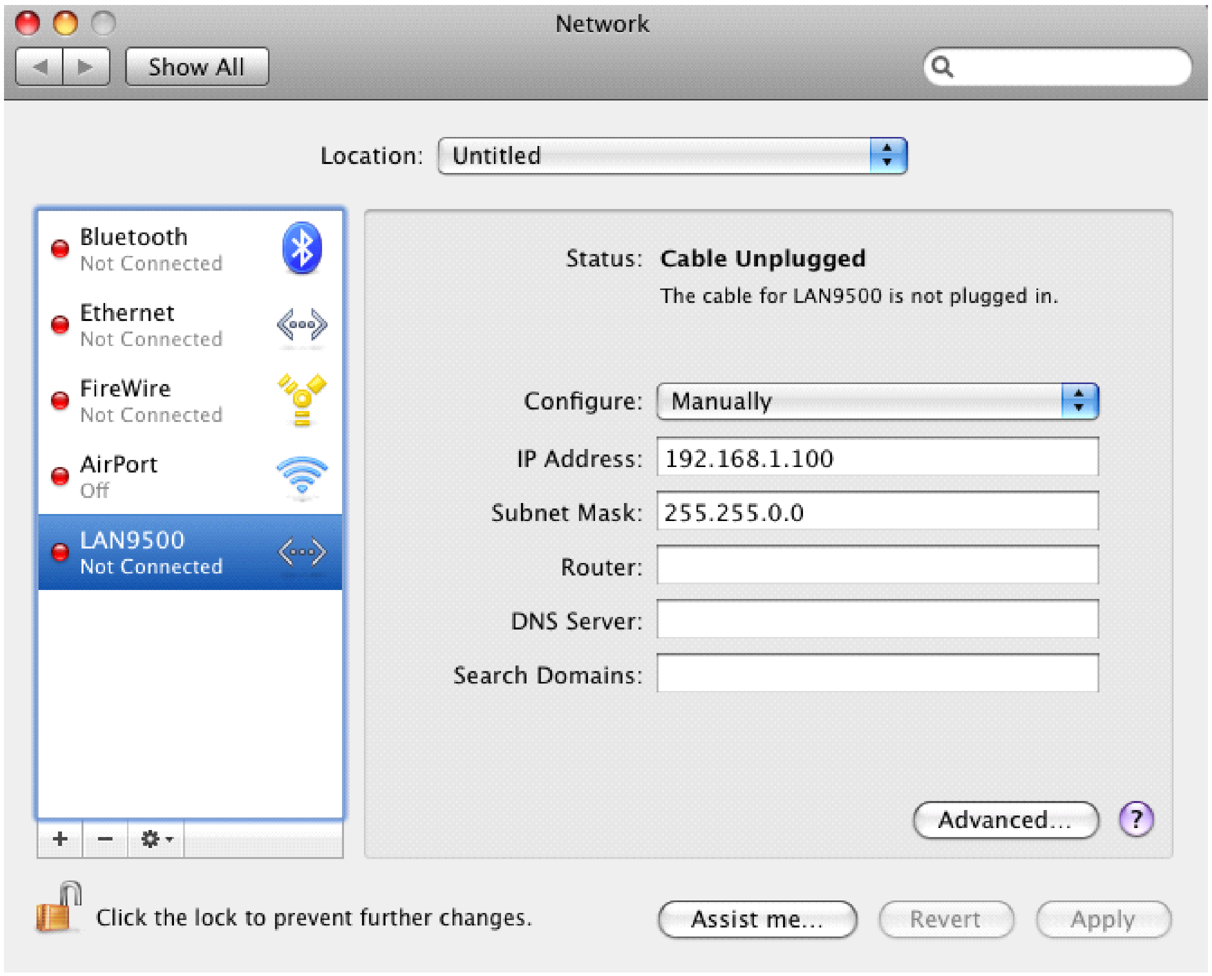


Figure 4.13 Open Network Preferences

The Network window will appear, as illustrated in Figure 4.14.



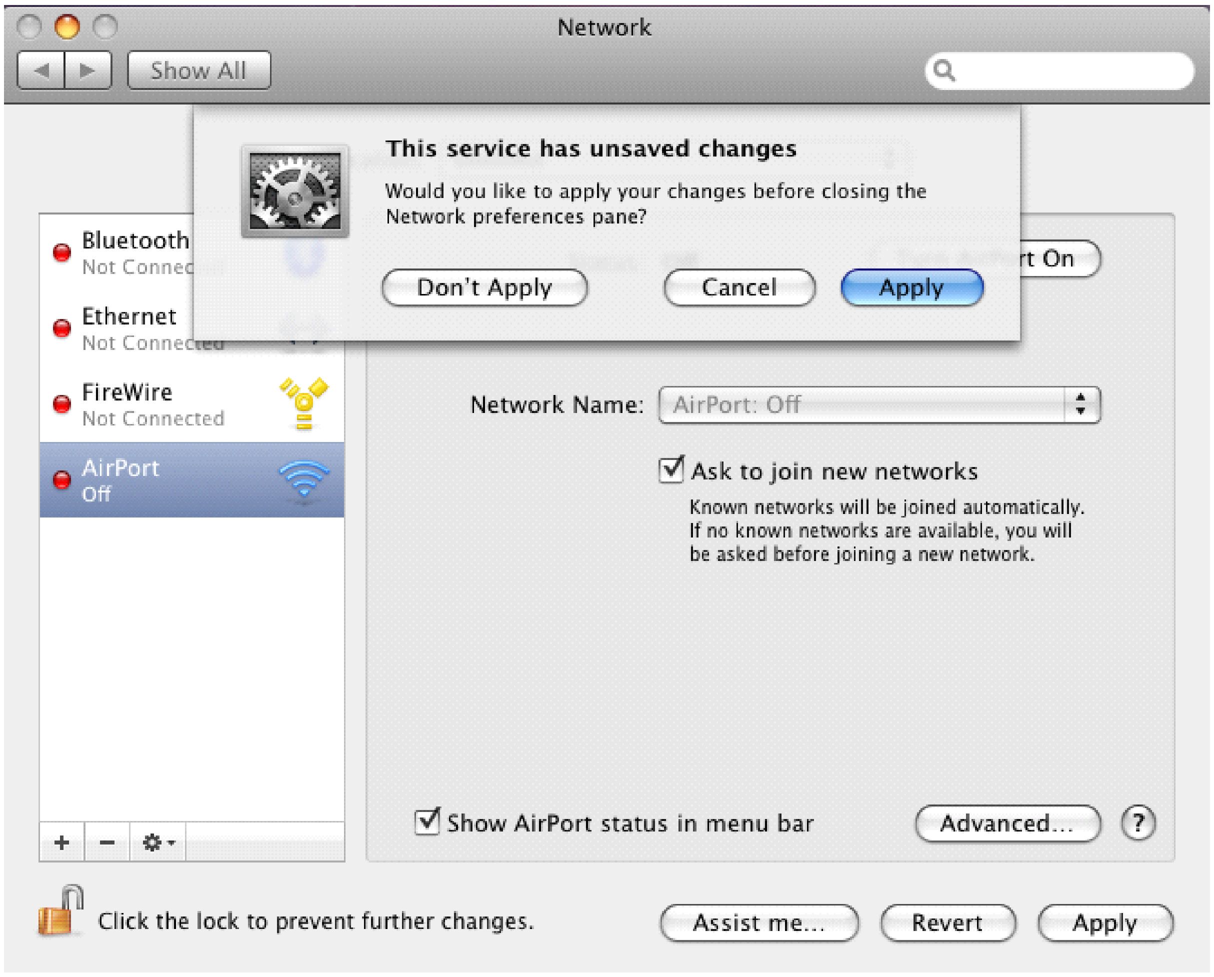
Status: **Cable Unplugged**
The cable for LAN9500 is not plugged in.

Configure: Manually
IP Address: 192.168.1.100
Subnet Mask: 255.255.0.0
Router:
DNS Server:
Search Domains:

Figure 4.14 Network Preferences

Click on the LAN9500 network entry to select and highlight it. Then click the “-” button to remove the LAN9500 network entry from the operating system.

When the window is exited, a prompt to confirm and apply the changes will appear, as in Figure 4.15.



This service has unsaved changes

Would you like to apply your changes before closing the Network preferences pane?

Don't Apply | Cancel | Apply

Network Name: AirPort: Off

☑ Ask to join new networks

Known networks will be joined automatically. If no known networks are available, you will be asked before joining a new network.

☑ Show AirPort status in menu bar

Click the lock to prevent further changes.

Figure 4.15 Confirm Changes

Click the “Apply” button to confirm and accept the changes.

The device uninstallation is now complete.

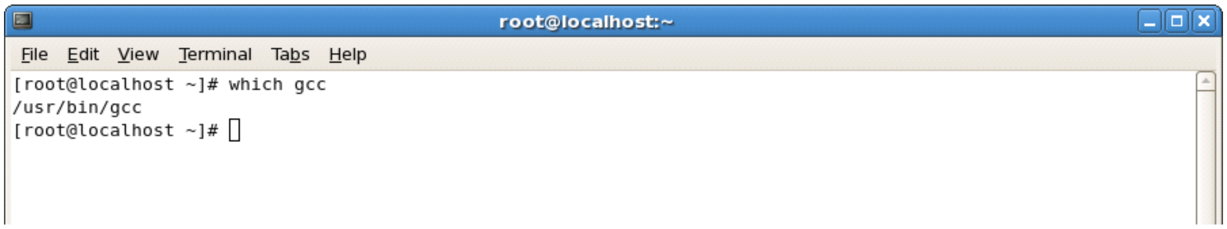
Chapter 5 Linux Driver

5.1 Linux Driver Installation

The software is distributed as a "tar" file containing all source files and release notes. The source files must be compiled and linked in order to generate a binary image for loading. The distribution file may be copied to the desktop or any other convenient, known, place within the directory structure.

Note: The device should not be plugged into the computer prior to installing the driver software.

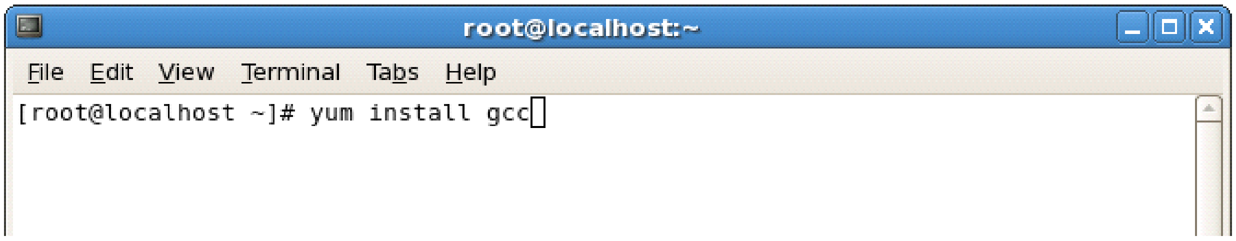
Since the files must be compiled as part of the software build process, it is necessary to determine whether or not the compiler (gcc) is installed. To determine this, type "which gcc" at the command line. If gcc is installed, the directory path of gcc will be displayed. If not, "no gcc" will be displayed and a list of searched paths will be displayed. Figure 5.1illustrates the case where gcc is installed and its path is returned.



```
[root@localhost ~]# which gcc
/usr/bin/gcc
[root@localhost ~]# 
```

Figure 5.1 Determining Presence of gcc

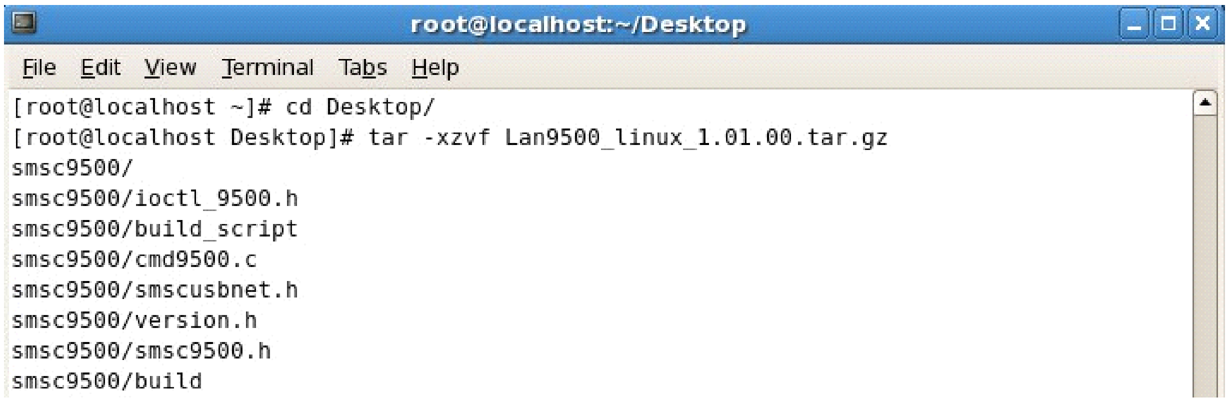
If gcc is not installed, it must be installed before the driver build process can continue. The computer must be connected to the internet and "yum install gcc" is entered on the command line to install gcc. Figure 5.2 illustrates this.



```
[root@localhost ~]# yum install gcc
```

Figure 5.2 Install gcc

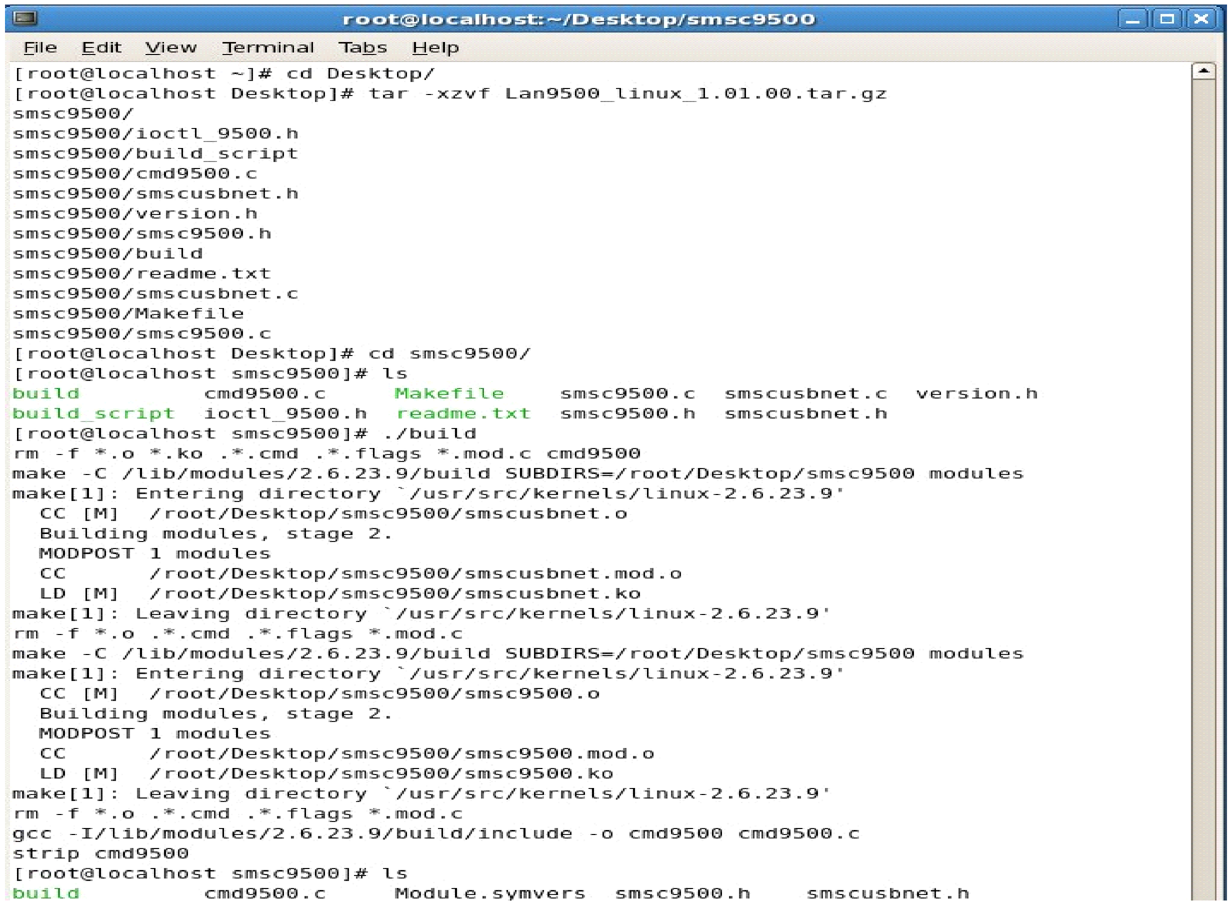
When the presence of gcc has been established, the build process can proceed. The first step is to extract the source files, build files, and release notes from the "tar" distribution file. This is accomplished by changing to the directory the "tar" distribution file resides in and by typing "tar -xzvf filename" on the command line, where filename is the name of the "tar" distribution file. As a result of executing the command, the directory SMSC9500 is created and 8 files are extracted from the "tar" file and inserted into it. Figure 5.3 illustrates this.



```
[root@localhost ~]# cd Desktop/
[root@localhost Desktop]# tar -xzvf Lan9500_linux_1.01.00.tar.gz
smsc9500/
smsc9500/ioctl_9500.h
smsc9500/build_script
smsc9500/cmd9500.c
smsc9500/smscusbnet.h
smsc9500/version.h
smsc9500/smsc9500.h
smsc9500/build
```

Figure 5.3 Tar of Distribution File

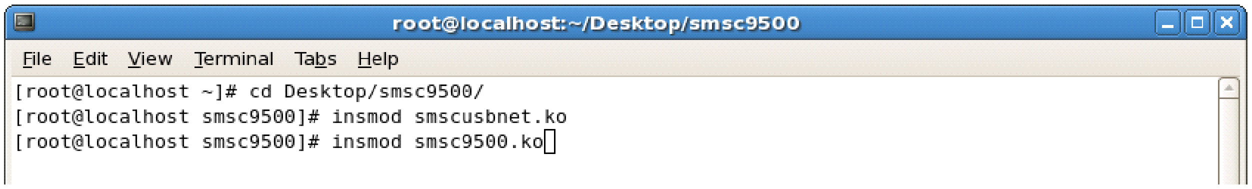
In order to continue the build process, change to the SMSC9500 directory by entering the cd command and type “./build” to invoke the build script. Figure 5.4 illustrates change of the directory and invocation of the build script. It also illustrates use of the “ls” command to list the contents of the SMSC9500 directory before and after invocation of the build script.


root@localhost:~/Desktop/smsc9500
File Edit View Terminal Tabs Help

```
[root@localhost ~]# cd Desktop/
[root@localhost Desktop]# tar -xzvf Lan9500_linux_1.01.00.tar.gz
smsc9500/
smsc9500/ioctl_9500.h
smsc9500/build_script
smsc9500/cmd9500.c
smsc9500/smscusbnet.h
smsc9500/version.h
smsc9500/smsc9500.h
smsc9500/build
smsc9500/readme.txt
smsc9500/smscusbnet.c
smsc9500/Makefile
smsc9500/smsc9500.c
[root@localhost Desktop]# cd smsc9500/
[root@localhost smsc9500]# ls
build          cmd9500.c     Makefile     smsc9500.c   smscusbnet.c   version.h
build_script   ioctl_9500.h  readme.txt   smsc9500.h   smscusbnet.h
[root@localhost smsc9500]# ./build
rm -f *.o *.ko .*.cmd .*.flags *.mod.c cmd9500
make -C /lib/modules/2.6.23.9/build SUBDIRS=/root/Desktop/smsc9500 modules
make[1]: Entering directory `/usr/src/kernels/linux-2.6.23.9'
  CC [M]  /root/Desktop/smsc9500/smscusbnet.o
  Building modules, stage 2.
  MODPOST 1 modules
  CC      /root/Desktop/smsc9500/smscusbnet.mod.o
  LD [M]  /root/Desktop/smsc9500/smscusbnet.ko
make[1]: Leaving directory `/usr/src/kernels/linux-2.6.23.9'
rm -f *.o .*.cmd .*.flags *.mod.c
make -C /lib/modules/2.6.23.9/build SUBDIRS=/root/Desktop/smsc9500 modules
make[1]: Entering directory `/usr/src/kernels/linux-2.6.23.9'
  CC [M]  /root/Desktop/smsc9500/smsc9500.o
  Building modules, stage 2.
  MODPOST 1 modules
  CC      /root/Desktop/smsc9500/smsc9500.mod.o
  LD [M]  /root/Desktop/smsc9500/smsc9500.ko
make[1]: Leaving directory `/usr/src/kernels/linux-2.6.23.9'
rm -f *.o .*.cmd .*.flags *.mod.c
gcc -I/lib/modules/2.6.23.9/build/include -o cmd9500 cmd9500.c
strip cmd9500
[root@localhost smsc9500]# ls
build          cmd9500.c     Module.symvers   smsc9500.h     smscusbnet.h
```

Figure 5.4 Execution of Build Script

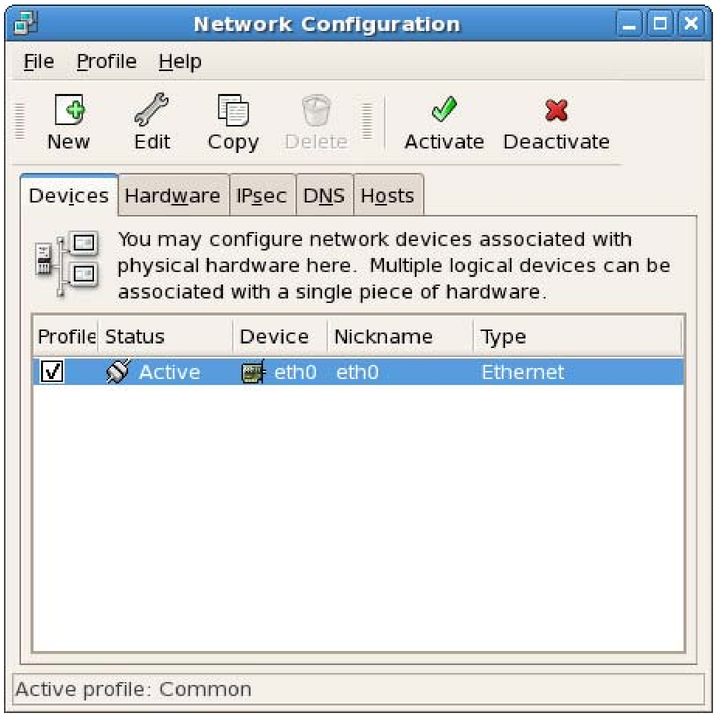
At the completion of the build script, two binary module, smscusbnet.ko and smsc9500.ko are generated, as indicated in Figure 5.4. These modules are installed via use of the “insmod” command, as illustrated inFigure 5.5.


root@localhost:~/Desktop/smsc9500
File Edit View Terminal Tabs Help

```
[root@localhost ~]# cd Desktop/smsc9500/
[root@localhost smsc9500]# insmod smscusbnet.ko
[root@localhost smsc9500]# insmod smsc9500.ko
```

Figure 5.5 Installing Driver Binaries

At this point, software installation is complete. The LAN9500/LAN9500i device must now be plugged into a free USB port on the computer, in order to be configured. After the device is plugged in, click on System->Administrator->Network on the task bar to bring up the Network Configuration window, as illustrated in Figure 5.6.



You may configure network devices associated with physical hardware here. Multiple logical devices can be associated with a single piece of hardware.

Profile	Status	Device	Nickname	Type
✓	Active	eth0	eth0	Ethernet

Active profile: Common

Figure 5.6 Network Configuration Window

Click “New”, to add a new device type. Figure 5.7 illustrates the resulting window.

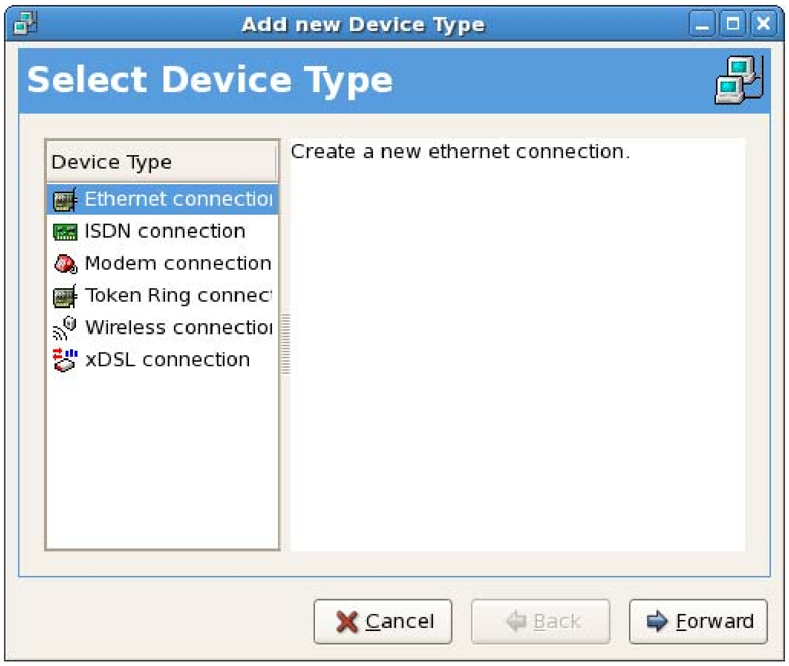


Figure 5.7 Add New Ethernet Device Type

Select “Ethernet connection” device type and click the “Forward” button. The window will now appear as illustrated in Figure 5.8.

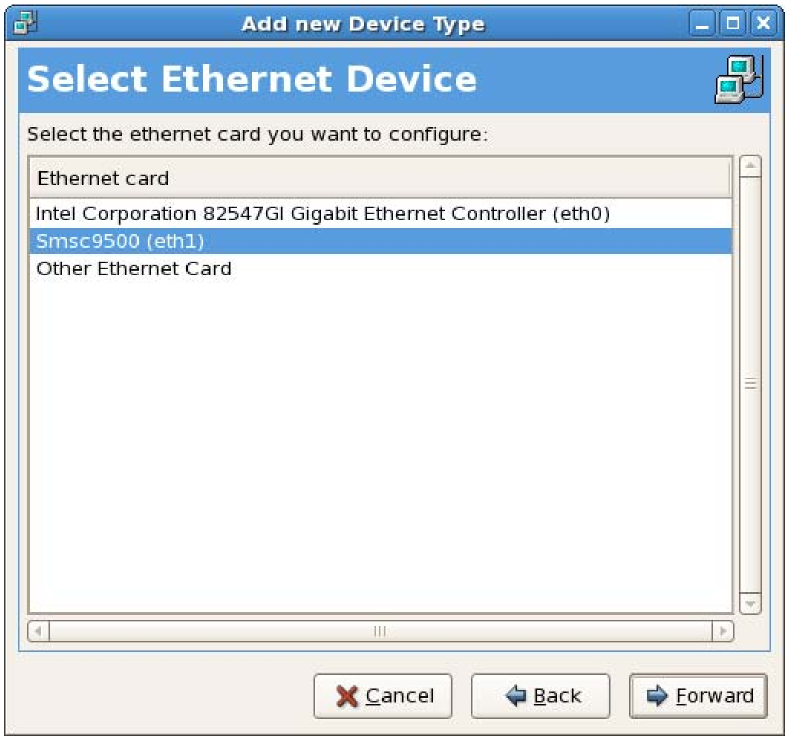
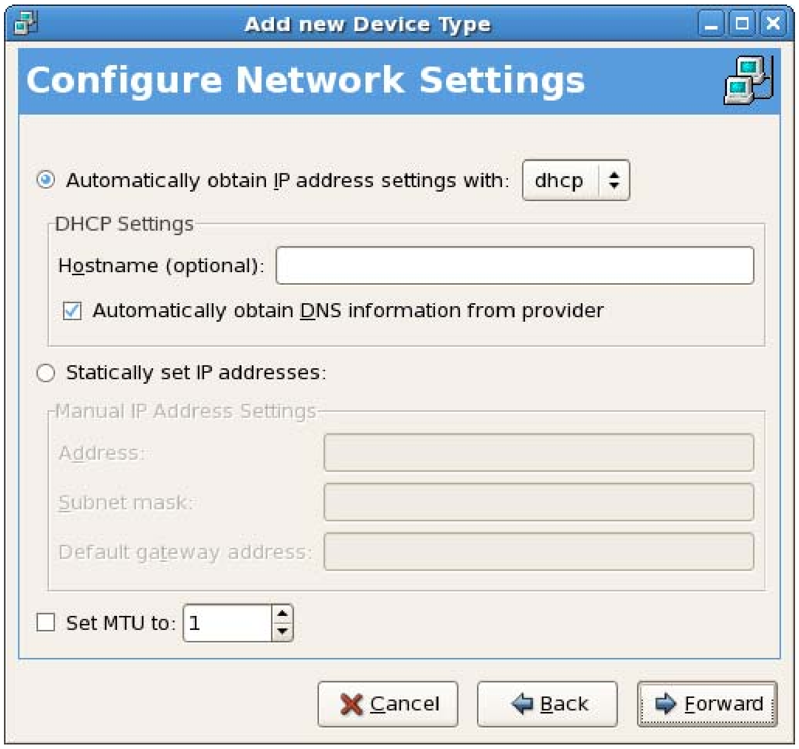

Add new Device Type
Select Ethernet Device
Select the ethernet card you want to configure:
Ethernet card
Intel Corporation 82547GI Gigabit Ethernet Controller (eth0)
Smsc9500 (eth1)
Other Ethernet Card
Cancel
Back
Forward

Figure 5.8 Device Selection

Select “Smsc9500” and click the “Forward” button. The window will now appear as illustrated in Figure 5.9.



(●) Automatically obtain IP address settings with: dhcp

DHCP Settings

Hostname (optional):

[✓] Automatically obtain DNS information from provider

( ) Statically set IP addresses:

Manual IP Address Settings

Address:

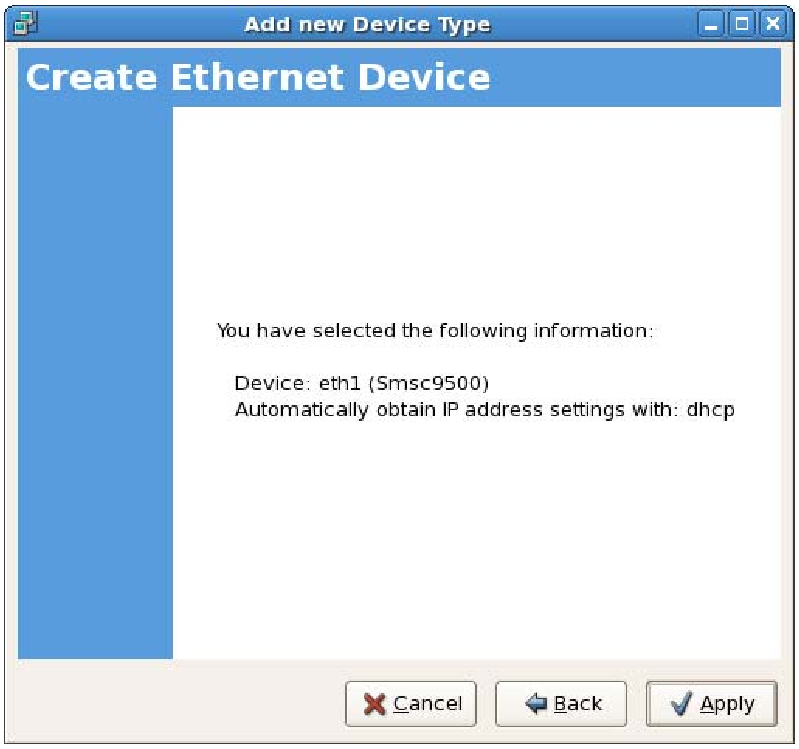
Subnet mask:

Default gateway address:

[ ] Set MTU to: 1

Figure 5.9 IP Address Generation

The new device must be configured to either use DHCP or a fixed IP address, depending on the network configuration. Specification of this portion of the configuration is outside the scope of this document. For illustration purposes, automatic IP address generation is selected in Figure 5.9. Upon completion of the configuration, click the “Forward” button. The window will now appear as illustrated in Figure 5.10.



You have selected the following information:

Device: eth1 (Smsc9500)
Automatically obtain IP address settings with: dhcp

Figure 5.10 Device Creation

Click the "Apply" button to create the device. The Network Configuration screen, illustrated in Figure 5.6 on page 46, will again appear. Select the newly created device (in this case eth1), and click the “Activate” button to activate the ethernet device. Click “File->Save” to retain the network configuration information and complete the installation.

5.2 Linux Driver Uninstallation

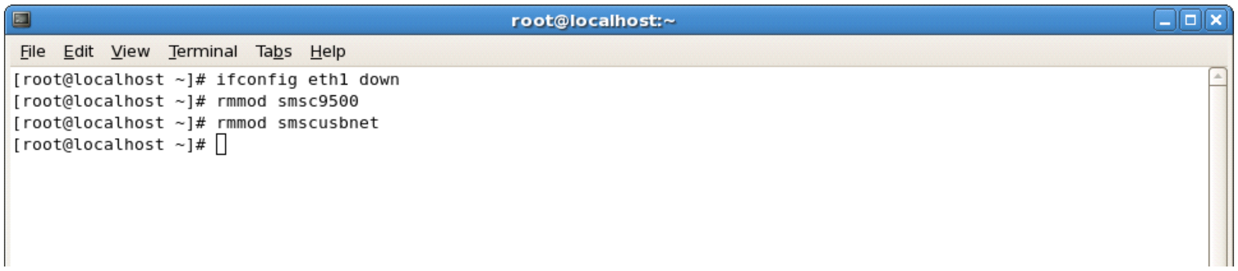
Note: The device must be safely removed from the computer before beginning the uninstallation.

Open a command terminal and bring the LAN9500 network interface down by typing “ifconfig <interface> down”, where <interface> is the interface associated with the LAN9500.

Remove the LAN9500 ethernet module by typing “rmmod smsc9500”

Remove the LAN9500 USB module by typing “rmmod smscusbnet”

These steps are illustrated in Figure 5.11.



```
[root@localhost ~]# ifconfig eth1 down
[root@localhost ~]# rmmod smsc9500
[root@localhost ~]# rmmod smscusbnet
[root@localhost ~]# 
```

Figure 5.11 Uninstallation Steps

The device uninstallation is now complete.

Chapter 6 Windows CE Driver

This chapter details the methods for building a LAN9500/LAN9500i driver into a Windows CE image. This may be accomplished in two ways:

- Building a CE Image with LAN9500/LAN9500i Source Files
- Building a CE Image with LAN9500/LAN9500i DLL & REG Files

Note: Please ensure all current Microsoft Quick Fix Engineering (QFE) patches for Platform Builder and Windows Embedded CE have been applied before working with the device driver. The latest QFE patches can be downloaded from:
http://msdn.microsoft.com/en-us/embedded/aa731256.aspx

6.1 Building a CE Image with LAN9500/LAN9500i Source Files

A Windows CE image containing the device driver may be built directly from the device driver source files. All device driver source files are compressed under the directory “SMSC9500”. A list of the device driver source files is provided in Table 6.1.

Table 6.1 Windows CE LAN9500/LAN9500i Device Driver Source Files

FILE NAME	DESCRIPTION
`init.c`	This module contains initialization helper routines called during miniport initialization
`interrupt.c`	This module contains miniport functions handling interrupt transactions and other helper routines called by these miniport functions.
`lan9500.h`	This module contains LAN9500/LAN9500i register and structure definitions.
`receive.c`	This module contains miniport functions for handling receive packets and other help routines called by these miniport functions.
`request.c`	This module contains miniport functions for handling Set & Query Information requests.
`send.c`	This module contains miniport functions for handling Send packets and other helper routines call by the miniport function.
`smsc9500.c`	USB ethernet adapter control/bulk/interrupt transport.
`smsc9500.h`	This module contains structure definitions and function prototypes.
`smsc9500.reg`	This module contains the LAN9500/LAN9500i registry keys.
`OS.c, os.h`	OS related files
`version.h`	This module contains version information.
`Ioctl.c`	This module contains all the Ioctl functions.
`Ioctl.h`	This module contains the `Ioctl.c` structure definitions and function prototypes.

Note: The latest source code may be downloaded from the E-Services portion of the SMSC website. Refer to https://www2.smsc.com/main.nsf for additional information.

To build the LAN9500/LAN9500i device driver from the source files into a CE image, the following procedure must be followed:

1. Most BSPs use the "`DRIVERS`" directory as the root folder for all device drivers. Unzip the LAN9500/LAN9500i driver to the "`DRIVERS`" folder, for example, `%_TARGETPLATROOT%\src\drivers`. The folder name "`smsc9500`" will then be listed under the "`DRIVERS`" directory.

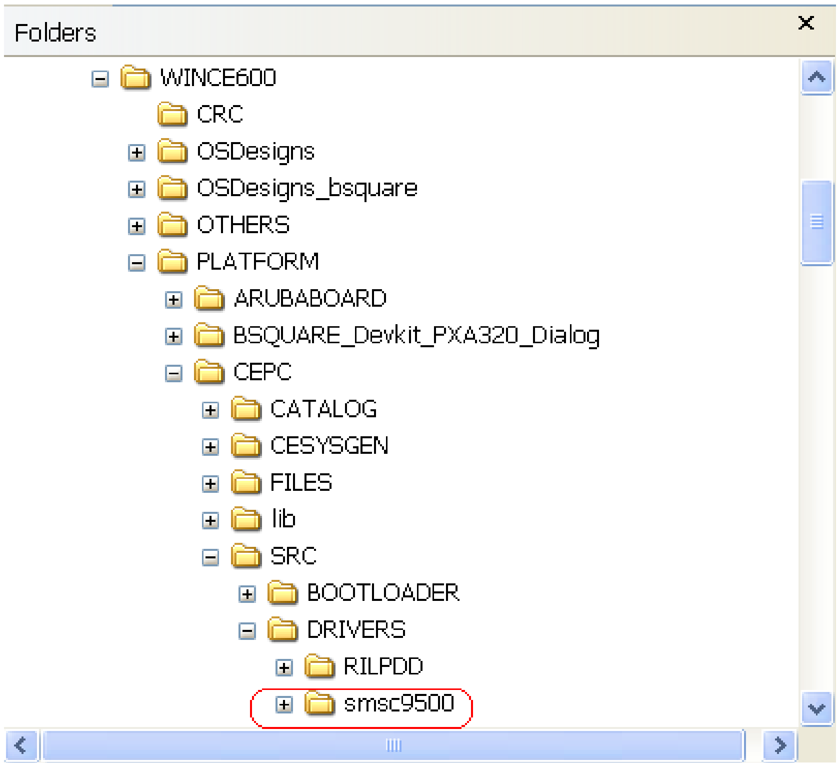
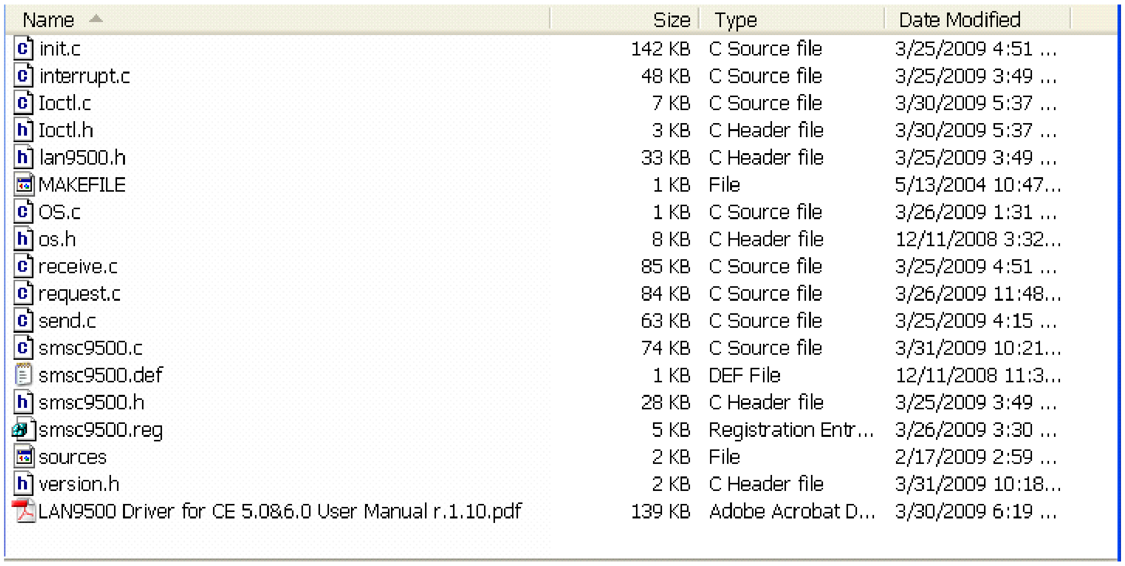


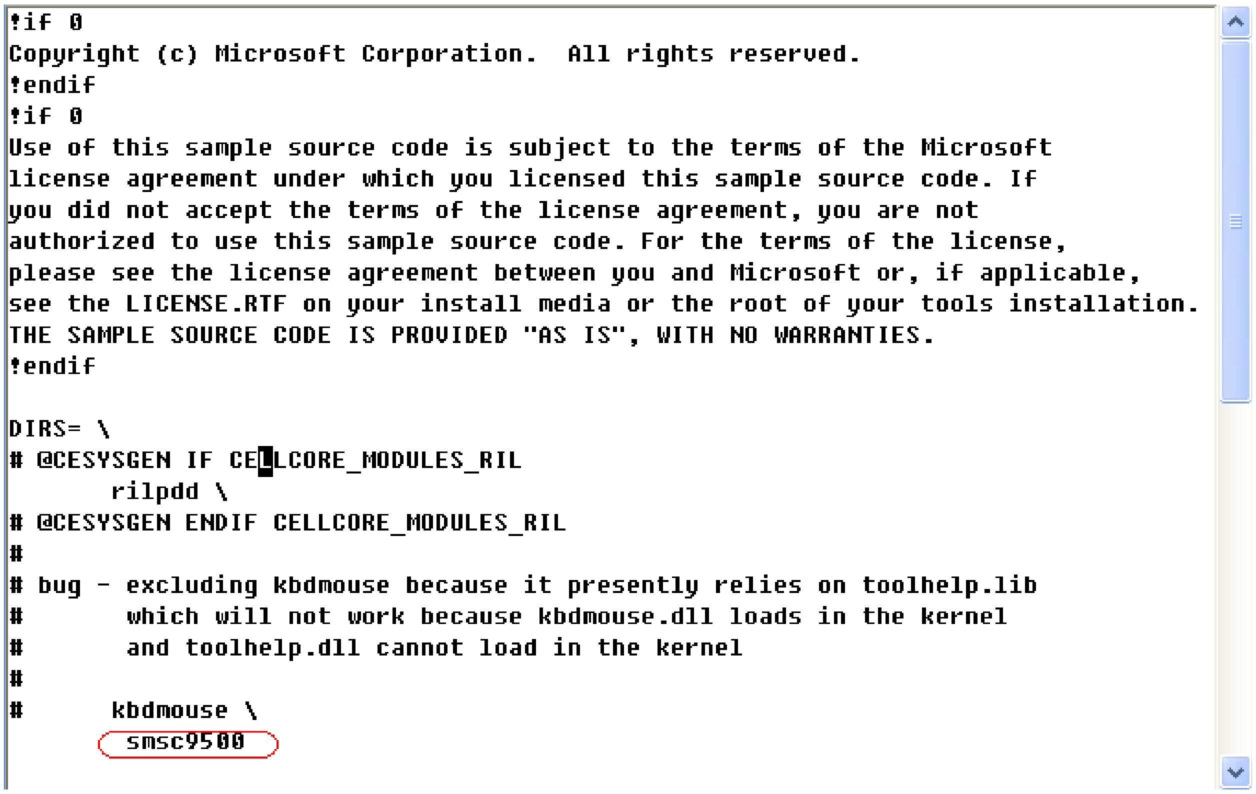
Figure 6.1 Example Unzip to DRIVERS Directory



Name	Size	Type	Date Modified
init.c	142 KB	C Source file	3/25/2009 4:51 ...
interrupt.c	48 KB	C Source file	3/25/2009 3:49 ...
Ioctl.c	7 KB	C Source file	3/30/2009 5:37 ...
Ioctl.h	3 KB	C Header file	3/30/2009 5:37 ...
lan9500.h	33 KB	C Header file	3/25/2009 3:49 ...
MAKEFILE	1 KB	File	5/13/2004 10:47...
OS.c	1 KB	C Source file	3/26/2009 1:31 ...
os.h	8 KB	C Header file	12/11/2008 3:32...
receive.c	85 KB	C Source file	3/25/2009 4:51 ...
request.c	84 KB	C Source file	3/26/2009 11:48...
send.c	63 KB	C Source file	3/25/2009 4:15 ...
smsc9500.c	74 KB	C Source file	3/31/2009 10:21...
smsc9500.def	1 KB	DEF File	12/11/2008 11:3...
smsc9500.h	28 KB	C Header file	3/25/2009 3:49 ...
smsc9500.reg	5 KB	Registration Entr...	3/26/2009 3:30 ...
sources	2 KB	File	2/17/2009 2:59 ...
version.h	2 KB	C Header file	3/31/2009 10:18...
LAN9500 Driver for CE 5.0&6.0 User Manual r.1.10.pdf	139 KB	Adobe Acrobat D...	3/30/2009 6:19 ...

Figure 6.2 smsc9500 Folder Contents

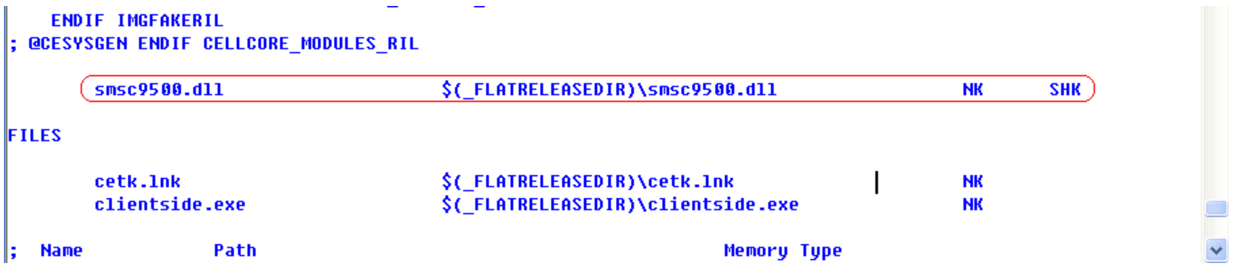
2. The `DIRS` file, under the `%_TARGETPLATROOT%\src\drivers` folder, has a list of drivers to be compiled during the image build procedure. The `smsc9500` directory must be added to this list to allow Platform Builder to build the driver automatically.



```
!if 0
Copyright (c) Microsoft Corporation.  All rights reserved.
!endif
!if 0
Use of this sample source code is subject to the terms of the Microsoft
license agreement under which you licensed this sample source code. If
you did not accept the terms of the license agreement, you are not
authorized to use this sample source code. For the terms of the license,
please see the license agreement between you and Microsoft or, if applicable,
see the LICENSE.RTF on your install media or the root of your tools installation.
THE SAMPLE SOURCE CODE IS PROVIDED "AS IS", WITH NO WARRANTIES.
!endif

DIRS= \
# @CESYSGEN IF CELLCORE_MODULES_RIL
       rilpdd \
# @CESYSGEN ENDIF CELLCORE_MODULES_RIL
#
# bug - excluding kbdmouse because it presently relies on toolhelp.lib
#       which will not work because kbdmouse.dll loads in the kernel
#       and toolhelp.dll cannot load in the kernel
#
#      kbdmouse \
        smsc9500
```

Figure 6.3 DIRS List of Drivers to be Built

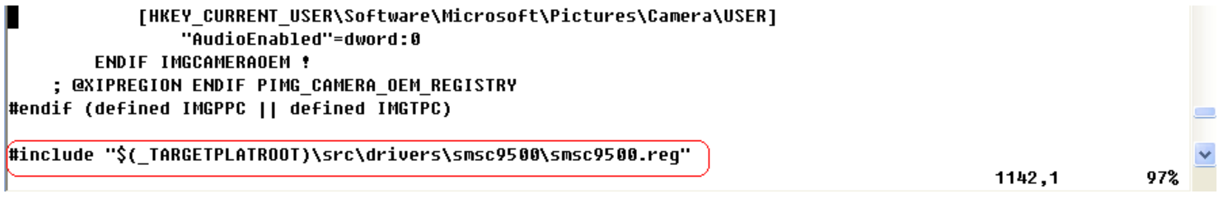
3. The driver file must then be included into the target image. The `smsc9500.dll` file must be added to `Platform.bib` under the `%_TARGETPLATROOT%\FILES` folder. This file lists the platform-related files to be included in the final CE image.



```
   ENDIF IMGFAKERIL
; @CESYSGEN ENDIF CELLCORE_MODULES_RIL

      smsc9500.dll                $(_FLATRELEASEDIR)\smsc9500.dll              NK       SHK

FILES

      cetk.lnk                    $(_FLATRELEASEDIR)\cetk.lnk                  NK
      clientside.exe              $(_FLATRELEASEDIR)\clientside.exe            NK

;  Name            Path                                       Memory Type
```

Figure 6.4 Adding smsc9500.dll into platform.bib

4. The `smsc9500` folder contains the LAN9500/LAN9500i registry keys file `smsc9500.reg`. This file must be included into `%_TARGETPLATROOT%\FILES\Platform.reg` or alternatively, the contents of the `smsc9500.reg` file copied into `%_TARGETPLATROOT%\FILES\Platform.reg`.



```
            [HKEY_CURRENT_USER\Software\Microsoft\Pictures\Camera\USER]
                "AudioEnabled"=dword:0
        ENDIF IMGCAMERAOEM !
    ; @XIPREGION ENDIF PIMG_CAMERA_OEM_REGISTRY
#endif (defined IMGPPC || defined IMGTPC)

#include "$(_TARGETPLATROOT)\src\drivers\smsc9500\smsc9500.reg"
                                                                    1142,1        97%
```

Figure 6.5 Including smsc9500.reg in platform.reg

5. The CE image may now be built. This procedure varies, dependant on the CE version being used.

   For CE 5.0, Select "Build OS" -> "Sysgen" from Platform Builder 5.0. This will generate the CE Image, `NK.BIN`, which will include the device driver.

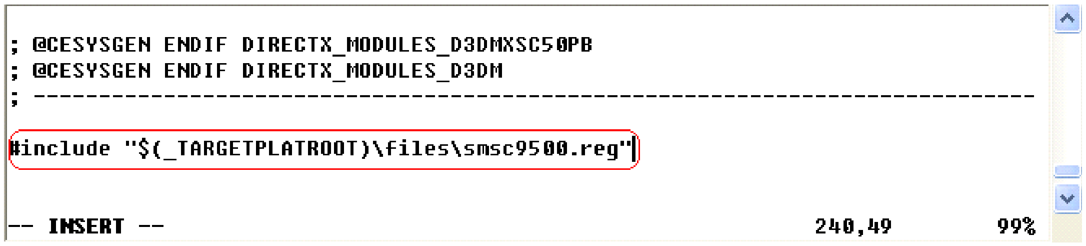
   For CE 6.0, Platform Builder is a plug-in under Visual Studio 2005. Select "Build" -> "Build Solution". This will generate the CE Image, `NK.BIN`, which will include the LAN9500/LAN9500i driver.

6.2 Building a CE Image with LAN9500/LAN9500i DLL & REG Files

To build the LAN9500/LAN9500i device driver from the `smsc9500.dll` and `smsc9500.reg` files into a CE image, the following procedure must be followed:

1. Copy the `smsc9500.dll` and `smsc9500.reg` files into the `%_TARGETPLATROOT%\FILES` folder.

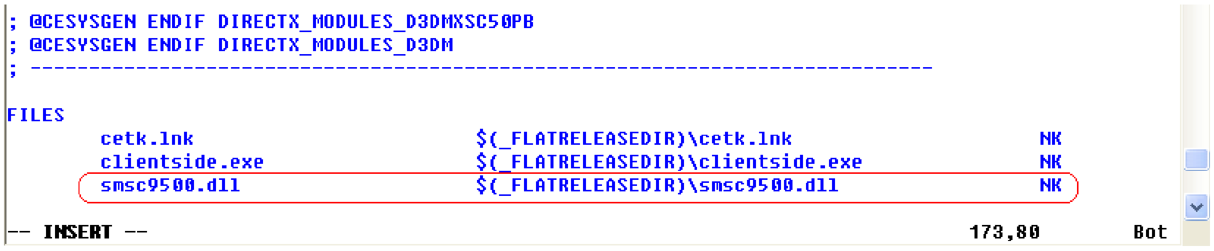
2. Include `smsc9500.reg` into `%_TARGETPLATROOT%\FILES\Platform.reg` or alternatively, the contents of the `smsc9500.reg` file can be copied into `%_TARGETPLATROOT%\FILES\Platform.reg`.



```
; @CESYSGEN ENDIF DIRECTX_MODULES_D3DMXSC50PB
; @CESYSGEN ENDIF DIRECTX_MODULES_D3DM
; ---------------------------------------------------------------------------

#include "$(_TARGETPLATROOT)\files\smsc9500.reg"

-- INSERT --                                                  240,49       99%
```

Figure 6.6 Including smsc9500.reg in platform.reg

3. Add `smsc9500.dll` to the `%_TARGETPLATROOT%\files\platform.bib` file



```
; @CESYSGEN ENDIF DIRECTX_MODULES_D3DMXSC50PB
; @CESYSGEN ENDIF DIRECTX_MODULES_D3DM
; ---------------------------------------------------------------------------

FILES
        cetk.lnk                $(_FLATRELEASEDIR)\cetk.lnk               NK
        clientside.exe          $(_FLATRELEASEDIR)\clientside.exe         NK
        smsc9500.dll            $(_FLATRELEASEDIR)\smsc9500.dll           NK

-- INSERT --                                                  173,80       Bot
```

Figure 6.7 Adding smsc9500.dll into platform.bib

4. The CE image may now be built. This procedure varies, dependant on the CE version being used.

   For CE 5.0, Select "Build OS" -> "Sysgen" from Platform Builder 5.0. This will generate the CE Image, `NK.BIN`, which will include the LAN9500/LAN9500i driver.

   For CE 6.0, Platform Builder is a plug-in under Visual Studio 2005. Select "Build" -> "Build Solution". This will generate the CE Image, `NK.BIN`, which will include the LAN9500/LAN9500i driver.

6.3 USBD Driver Update for WinCE 5.0 & 6.0

As confirmed by Microsoft, the default USB HCD driver contains a bug. It returns `ERROR_SUCCESS` instead of an `ERROR` code when the `IssueBulkTransfer()` fails. This bug needs to be fixed from Microsoft. Since the device utilizes the USBD interface, a USBD driver patch has been devised to provide a work around.

To bypass this bug, modify the `IssueBulkTransfer()` function in the `usbclient.c` file located in the `$(_WINCEROOT)\PUBLIC\COMMON\OAK\DRIVERS\USB\CLASS\COMMON` subdirectory to add the following three bold red lines. Once added, rebuild the image (perform a "Build and Sysgen").

```
} else {
          //
          // Synch call completed.
          // Get transfer status & number of bytes transferred
          //
          // ASSERT( pUsbFuncs->lpIsTransferComplete(hTransfer) );

          GetTransferStatus(pUsbFuncs, hTransfer, pBytesTransferred,
          pUsbRc);
      }

      CloseTransferHandle(pUsbFuncs, hTransfer);

   } else {
      dwErr = GetLastError();
      if (ERROR_SUCCESS == dwErr) {
          dwErr = ERROR_GEN_FAILURE;
      }

DEBUGMSG( ZONE_USBCLIENT, (TEXT("*** IssueBulkTransfer ERROR(3, %d) ***\n"),
dwErr ));
   }

     } else {
         dwErr = ERROR_INVALID_PARAMETER;
     }
```

6.4 EHCI/OHCI Driver Physical Memory

By default, the device driver can submit 4 Bulk Out transfers, 4 Bulk In transfers (16k for each high speed USB and 8k for each full speed USB) and 4 interrupt transfers pending. The customer can increase the value of physical memory for the EHCI/OHCI by adding the registry key (PhysicalPageSize) and setting it to another value, allowing support for multiple USB devices, each with several transfers pending. The default value is 128k.

Chapter 7 Driver Customization

The GUI based Windows (XP/Vista) and Mac OS X automated driver installation packages include SMSC product names and artwork that SMSC customers may desire to replace with their own. To facilitate this, these installation packages provide various customization options which are detailed in this chapter.

7.1 Windows Driver Customization and Localization

The Windows driver package is a self extracting executable created with Winzip Self Extractor. When decompressed, the file/folder structure shown in Table 7.1 will be created.

Table 7.1 Automated Installer Package Contents

FILE NAME	DESCRIPTION
`\Readme.txt`	Contains the latest release information
`\install.exe`	Executable that checks the platform and launches the appropriate DPInst executable for the architecture (see below)
`\x86\DpInstx86.exe`	Microsoft redistributable driver package installer utility for the x86 architecture
`\x86\DpInst.xml`	DPInst configuration/customization file
`\x86\AppData\Eula409.txt`	End User License Agreement (EULA) text
`\x86\AppData\watermark.bmp`	Left margin watermark bitmap
`\x86\AppData\logo.bmp`	Company or device logo bitmap
`\x86\Driver\net9500-x86-n51f.inf`	NDIS 5.1 driver installation file for x86
`\x86\Driver\lan9500-x86-n51f.cat`	NDIS 5.1 driver WHQL-signed catalog file for x86
`\x86\Driver\lan9500-x86-n51f.sys`	NDIS 5.1 driver file for x86
`\x86\Driver\WdfCoInstaller01007.dll`	Microsoft Wdf Coinstaller v1.7 for x86
`\x64\DpInstx64.exe`	Microsoft redistributable driver package installer utility for the x64 architecture
`\x64\DpInst.xml`	DPInst configuration/customization file
`\x64\AppData\Eula409.txt`	End User License Agreement (EULA) text
`\64\AppData\watermark.bmp`	Left margin watermark bitmap
`\x64\AppData\logo.bmp`	Company or device logo bitmap
`\x64\Driver\net9500-x64-n51f.inf`	NDIS 5.1 driver installation file for x64
`\x64\Driver\lan9500-x64-n51f.cat`	NDIS 5.1 driver WHQL-signed catalog file for x64
`\x64\Driver\lan9500-x64-n51f.sys`	NDIS 5.1 driver file for x64
`\x64\Driver\WdfCoInstaller01007.dll`	Microsoft Wdf Coinstaller v1.7 for x64

Once the package is customized, as detailed in the following sections, it should be recompressed into an EXE using the Winzip Self Extractor or similar tool.

7.1.1 GUI Visual Elements and Strings Customization

Visual elements used by the installer (logo, watermark and EULA) are located in the `AppData` folder. Other custom textual elements used by the installer wizard are located in the `DpInst.xml` file. These files can be replaced or edited to customize the Installer application's look and feel as desired.

Note: The aforementioned files appear twice in the package, one for each architecture. However, the two sets should be identical.

7.1.2 Localization

The installer package is released with the EULA and custom strings in english only. It can be easily modified to support alternative or additional languages by performing the following:

- replace or add a "language code" section in the `DPInst.xml` file for the desired language
- replace or add EULA files for the desired language

7.1.3 Additional Information

SMSC's automated installer is based on Microsoft DPInst technology. Please refer to the following links to obtain additional information regarding DPInst customization and localization.

Customizing DPInst Wizard Pages:

http://msdn.microsoft.com/en-us/library/ms790314.aspx

DPInst Multi-language Customization Instructions:

http://msdn.microsoft.com/en-us/library/ms791054.aspx

DPInst Supported Languages:

http://msdn.microsoft.com/en-us/library/ms790447.aspx

7.2 Mac OS X Driver Customization

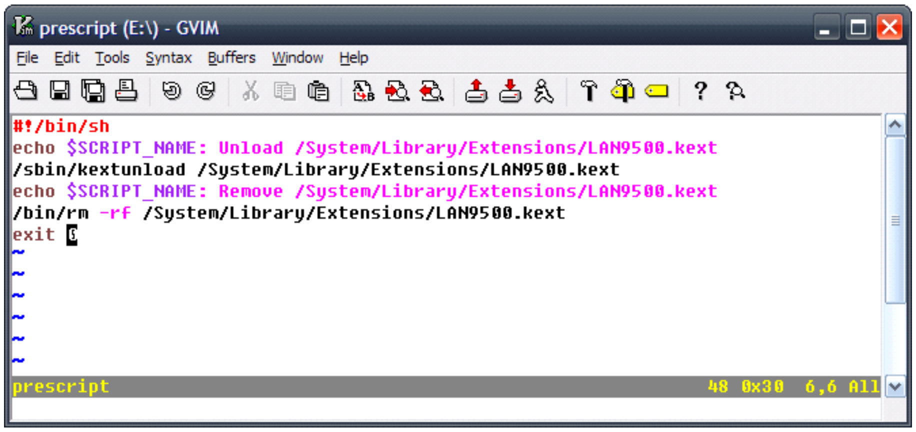
Upon request, SMSC may provide the `LAN9500.kext` kernel extension file to assist the customer in building a customized installation package. This section provides a brief overview of how to create a driver installation package using Apple PackageMaker. For detailed instructions on using Apple PackageMaker, refer to the following links:

http://developer.apple.com/documentation/DeveloperTools/Conceptual/SoftwareDistribution/Introduction/Introduction.html

http://s.sudre.free.fr/Stuff/PackageMaker_Howto.html

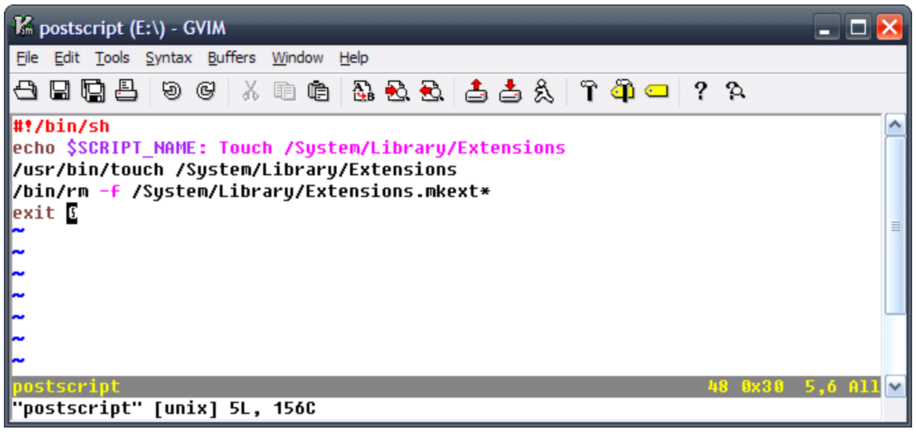
7.2.1 Building a Driver Installation Package

1. Create three rich text format files (optional) for use in the installer
   - `Welcome.rtf` - Welcome message
   - `Readme.rtf` - Readme message
   - `License.rtf` - Software license agreement
2. Create a background image for the installer (optional)
3. Create a prescript and postscript text file as illustrated in Figure 7.1 and Figure 7.2, respectively.



```
#!/bin/sh
echo $SCRIPT_NAME: Unload /System/Library/Extensions/LAN9500.kext
/sbin/kextunload /System/Library/Extensions/LAN9500.kext
echo $SCRIPT_NAME: Remove /System/Library/Extensions/LAN9500.kext
/bin/rm -rf /System/Library/Extensions/LAN9500.kext
exit 0
~
~
~
~
~
~
prescript                                          48 0x30  6,6 All
```

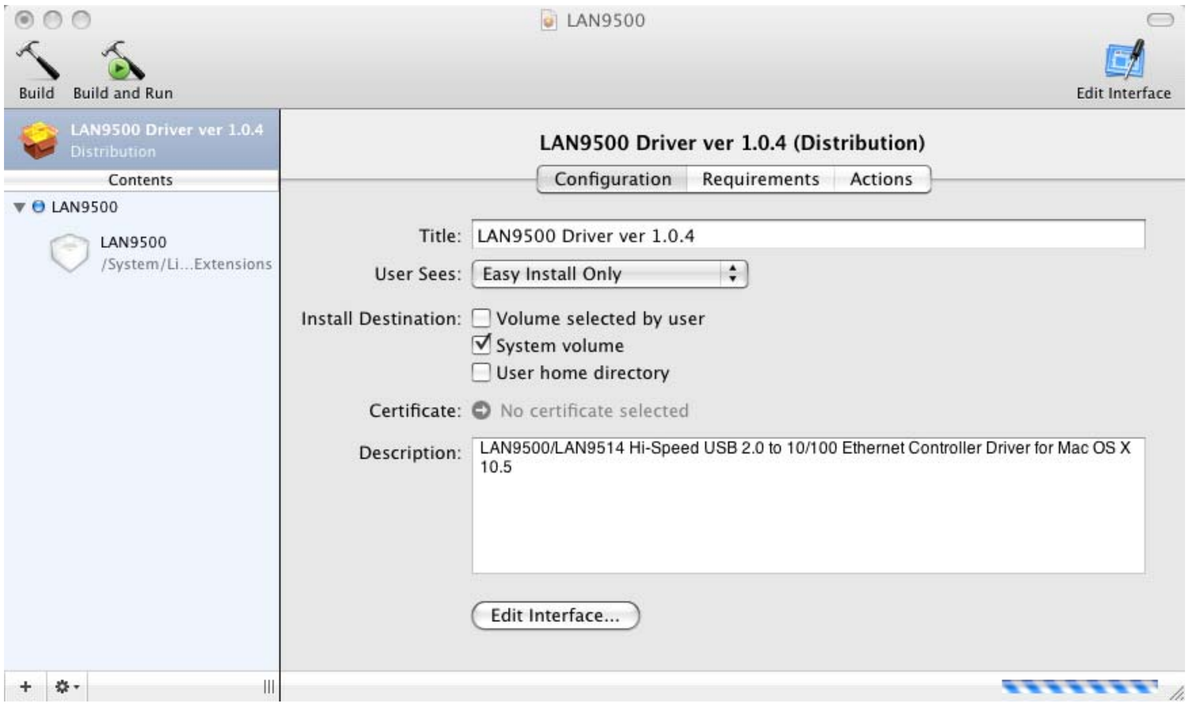
Figure 7.1 Prescript Creation



```
#!/bin/sh
echo $SCRIPT_NAME: Touch /System/Library/Extensions
/usr/bin/touch /System/Library/Extensions
/bin/rm -f /System/Library/Extensions.mkext*
exit 0
~
~
~
~
~
~
~
postscript                                         48 0x30  5,6 All
"postscript" [unix] 5L, 156C
```

Figure 7.2 Postscript Creation

4. Execute PackageMaker and add the `LAN9500.kext` file by selecting the "+" and browsing to its location, as shown in Figure 7.3. Fill in the "Title" and "Description" fields as desired.



LAN9500 Driver ver 1.0.4 (Distribution)

Title: LAN9500 Driver ver 1.0.4

User Sees: Easy Install Only

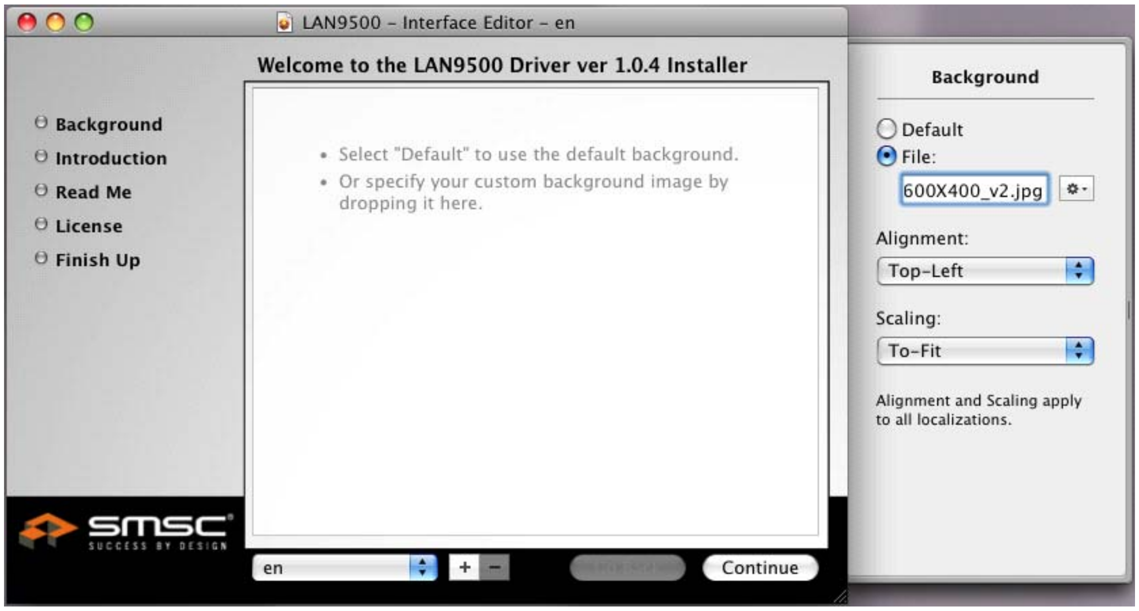
Install Destination: ☐ Volume selected by user ✓ System volume ☐ User home directory

Certificate: No certificate selected

Description: LAN9500/LAN9514 Hi-Speed USB 2.0 to 10/100 Ethernet Controller Driver for Mac OS X 10.5

Figure 7.3 Adding LAN9500.kext

5. Open Interface Editor by clicking "Edit Interface"
6. Follow the on-screen prompts to configure the background image, introduction (welcome message), read me, license, and conclusion, as shown in Figure 7.4 through Figure 7.8.



Welcome to the LAN9500 Driver ver 1.0.4 Installer

- Select "Default" to use the default background.
- Or specify your custom background image by dropping it here.

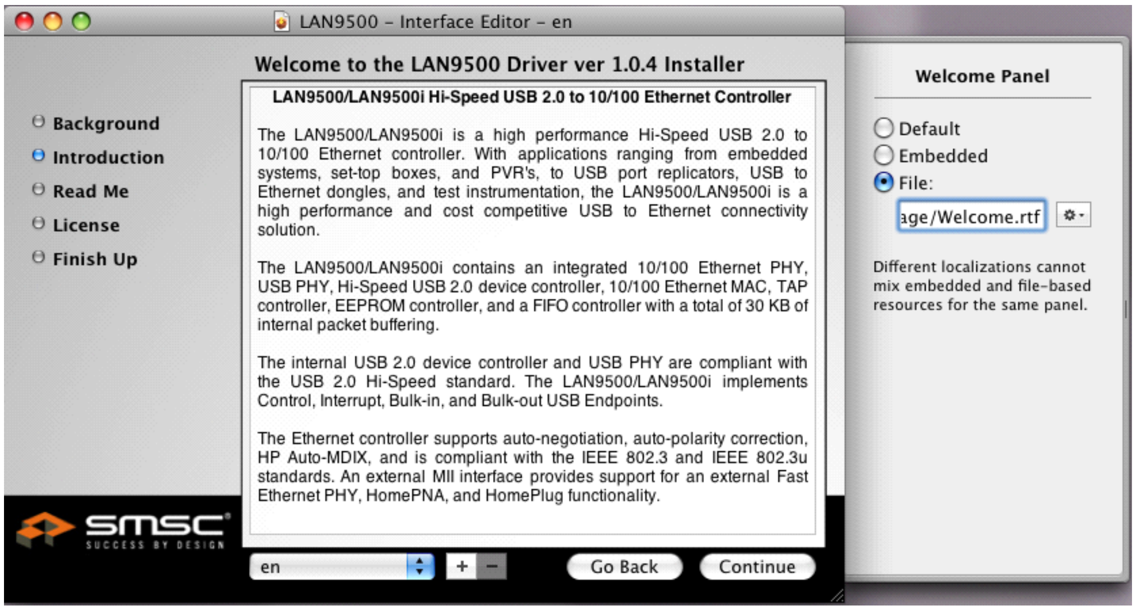
○ Default
● File: 600X400_v2.jpg

Alignment: Top-Left

Scaling: To-Fit

Alignment and Scaling apply to all localizations.

Figure 7.4 Selecting Background Image



Welcome to the LAN9500 Driver ver 1.0.4 Installer

LAN9500/LAN9500i Hi-Speed USB 2.0 to 10/100 Ethernet Controller

The LAN9500/LAN9500i is a high performance Hi-Speed USB 2.0 to 10/100 Ethernet controller. With applications ranging from embedded systems, set-top boxes, and PVR's, to USB port replicators, USB to Ethernet dongles, and test instrumentation, the LAN9500/LAN9500i is a high performance and cost competitive USB to Ethernet connectivity solution.

The LAN9500/LAN9500i contains an integrated 10/100 Ethernet PHY, USB PHY, Hi-Speed USB 2.0 device controller, 10/100 Ethernet MAC, TAP controller, EEPROM controller, and a FIFO controller with a total of 30 KB of internal packet buffering.

The internal USB 2.0 device controller and USB PHY are compliant with the USB 2.0 Hi-Speed standard. The LAN9500/LAN9500i implements Control, Interrupt, Bulk-in, and Bulk-out USB Endpoints.

The Ethernet controller supports auto-negotiation, auto-polarity correction, HP Auto-MDIX, and is compliant with the IEEE 802.3 and IEEE 802.3u standards. An external MII interface provides support for an external Fast Ethernet PHY, HomePNA, and HomePlug functionality.

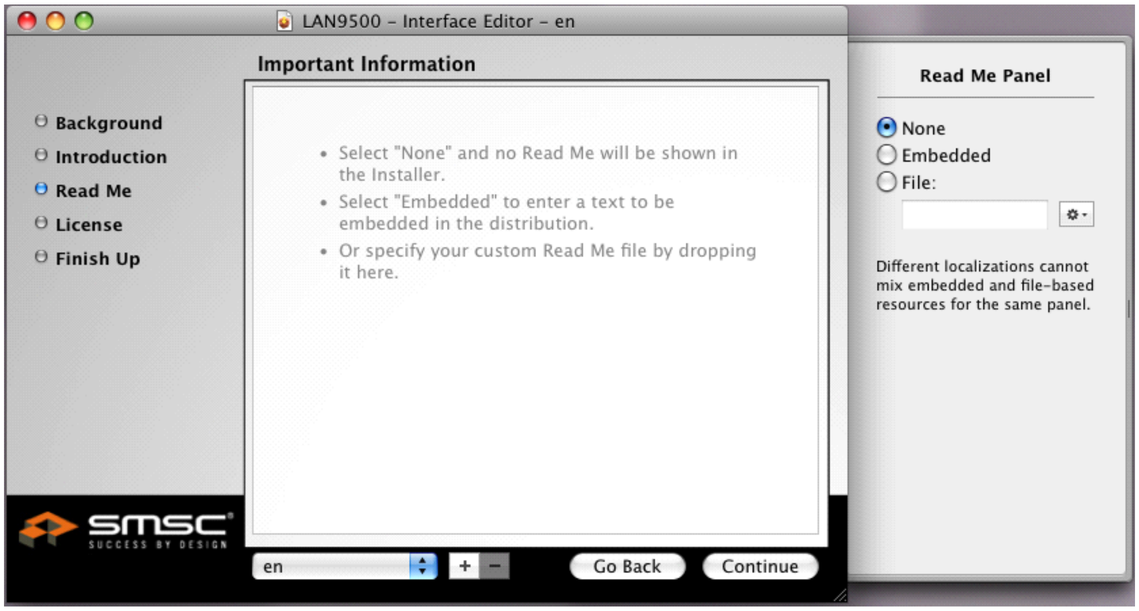
Welcome Panel

Default [✓ File:] Embedded

age/Welcome.rtf

Different localizations cannot mix embedded and file-based resources for the same panel.

Figure 7.5 Selecting Introduction File



Important Information

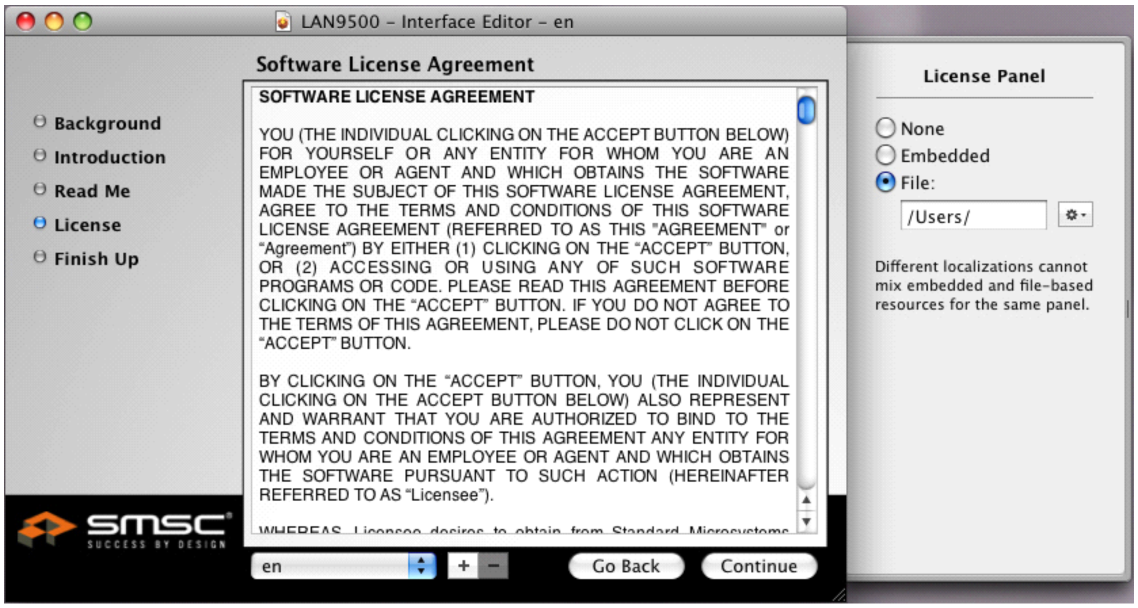
- Select "None" and no Read Me will be shown in the Installer.
- Select "Embedded" to enter a text to be embedded in the distribution.
- Or specify your custom Read Me file by dropping it here.

Read Me Panel

[✓ None] Embedded File:

Different localizations cannot mix embedded and file-based resources for the same panel.

Figure 7.6 Selecting Read Me File



LAN9500 – Interface Editor – en

Software License Agreement

SOFTWARE LICENSE AGREEMENT

YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) FOR YOURSELF OR ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE MADE THE SUBJECT OF THIS SOFTWARE LICENSE AGREEMENT, AGREE TO THE TERMS AND CONDITIONS OF THIS SOFTWARE LICENSE AGREEMENT (REFERRED TO AS THIS "AGREEMENT" or "Agreement") BY EITHER (1) CLICKING ON THE "ACCEPT" BUTTON, OR (2) ACCESSING OR USING ANY OF SUCH SOFTWARE PROGRAMS OR CODE. PLEASE READ THIS AGREEMENT BEFORE CLICKING ON THE "ACCEPT" BUTTON. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, PLEASE DO NOT CLICK ON THE "ACCEPT" BUTTON.

BY CLICKING ON THE "ACCEPT" BUTTON, YOU (THE INDIVIDUAL CLICKING ON THE ACCEPT BUTTON BELOW) ALSO REPRESENT AND WARRANT THAT YOU ARE AUTHORIZED TO BIND TO THE TERMS AND CONDITIONS OF THIS AGREEMENT ANY ENTITY FOR WHOM YOU ARE AN EMPLOYEE OR AGENT AND WHICH OBTAINS THE SOFTWARE PURSUANT TO SUCH ACTION (HEREINAFTER REFERRED TO AS "Licensee").

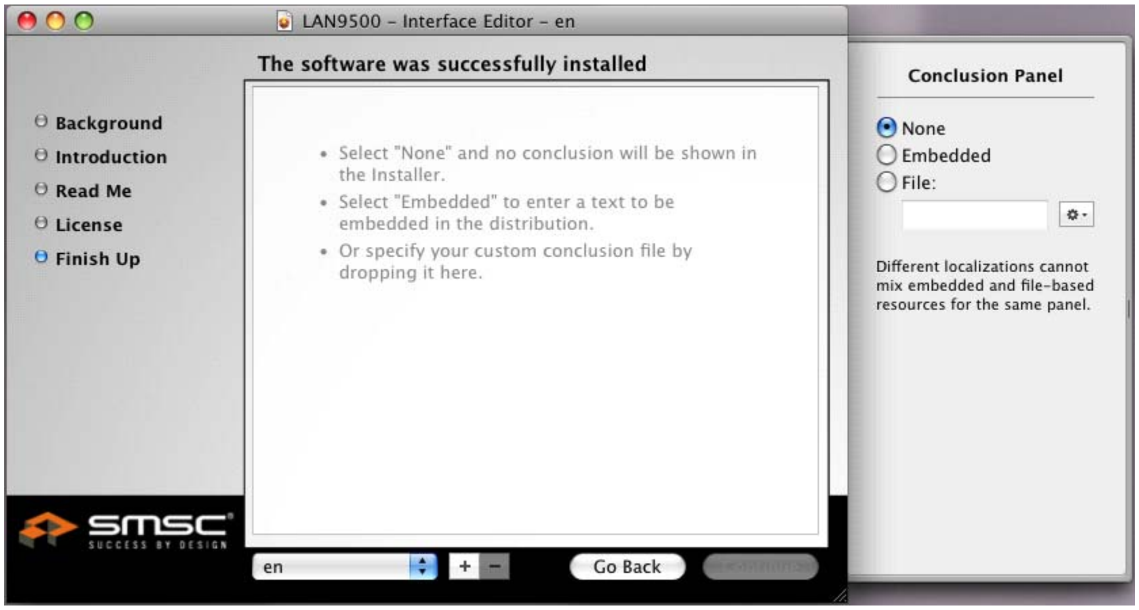
WHEREAS Licensee desires to obtain from Standard Microsystems

License Panel

None
Embedded
[✓ File:]
/Users/

Different localizations cannot mix embedded and file-based resources for the same panel.

Figure 7.7 Selecting License File



LAN9500 – Interface Editor – en

The software was successfully installed

- Select "None" and no conclusion will be shown in the Installer.
- Select "Embedded" to enter a text to be embedded in the installer.
- Or specify your custom conclusion file by dropping it here.

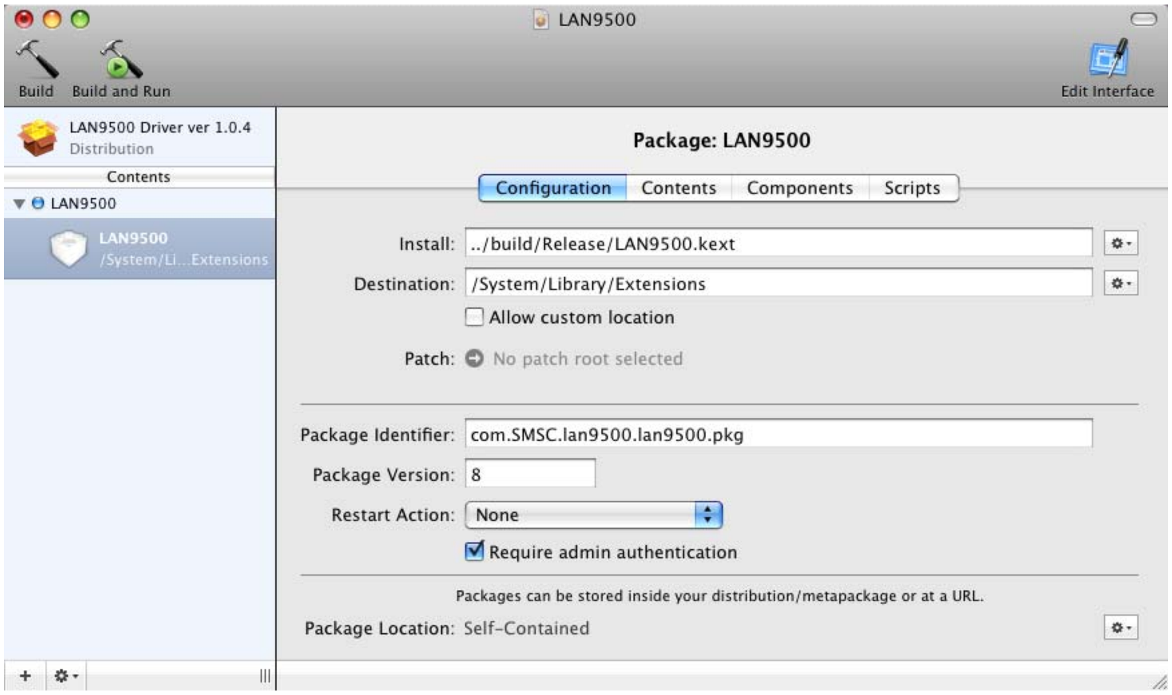
Conclusion Panel

[✓ None]
Embedded
File:

Different localizations cannot mix embedded and file-based resources for the same panel.

Figure 7.8 Selecting Conclusion File

7. Complete the information under the “Configuration” heading as suggested in Figure 7.9, modifying as necessary for the user’s application.



Package: LAN9500

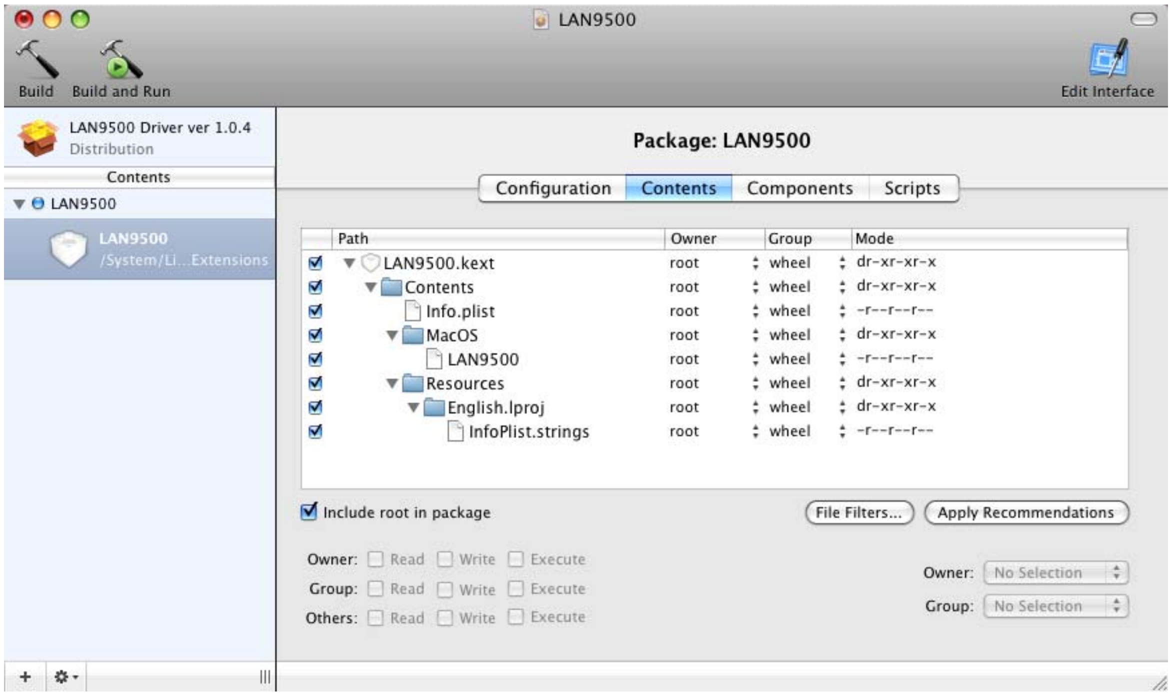
Install: ../build/Release/LAN9500.kext
Destination: /System/Library/Extensions
Allow custom location
Patch: No patch root selected

Package Identifier: com.SMSC.lan9500.lan9500.pkg
Package Version: 8
Restart Action: None
[✓] Require admin authentication

Packages can be stored inside your distribution/metapackage or at a URL.
Package Location: Self-Contained

Figure 7.9 Configuration Information

8. Modify the file attributes under “Contents” heading as shown in Figure 7.10.



Package: LAN9500

	Path	Owner	Group	Mode
✓	LAN9500.kext	root	wheel	dr-xr-xr-x
✓	Contents	root	wheel	dr-xr-xr-x
✓	Info.plist	root	wheel	-r--r--r--
✓	MacOS	root	wheel	dr-xr-xr-x
✓	LAN9500	root	wheel	-r--r--r--
✓	Resources	root	wheel	dr-xr-xr-x
✓	English.lproj	root	wheel	dr-xr-xr-x
✓	InfoPlist.strings	root	wheel	-r--r--r--

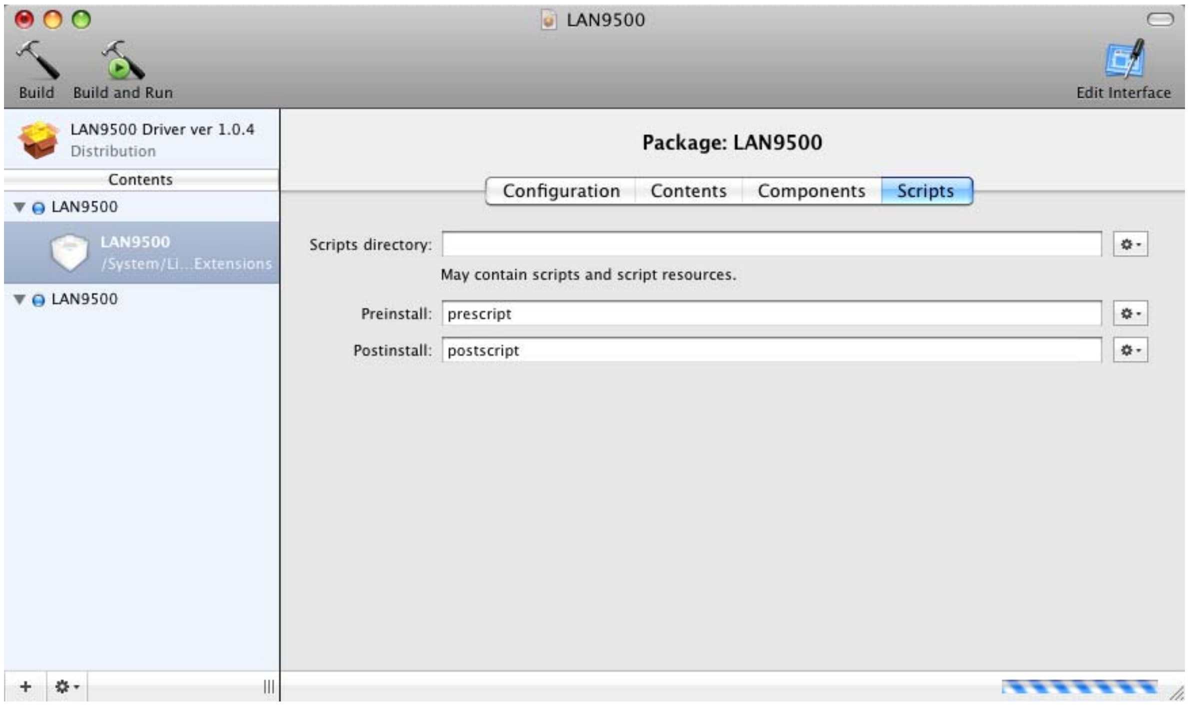
[✓] Include root in package

Owner: Read Write Execute
Group: Read Write Execute
Others: Read Write Execute

Owner: No Selection
Group: No Selection

Figure 7.10 Content Information

9. Under the “Scripts” heading, add the prescript and postscript files created earlier to the Preinstall and Postinstall fields as shown in Figure 7.11.



Scripts directory:

May contain scripts and script resources.

Preinstall: prescript

Postinstall: postscript

Figure 7.11 Scripts Information

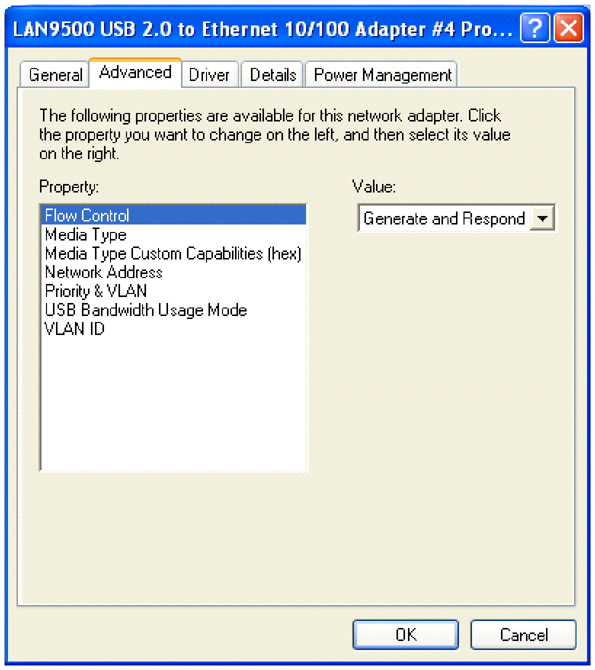
10. Click on the “Build” button to complete the installer package creation.

Chapter 8 Advanced Driver Parameters

The device drivers provide a set of advanced parameters that allow operation of the device to be tailored to a specific application. The methods and parameters vary dependant on the operating system. This chapter provides an overview of how to access these parameters under various operating systems.

8.1 Windows Parameters

Windows parameters are accessible through the “Advanced” tab of the “Device Properties” window. An example of these parameters in Windows XP and Vista can be seen in Figure 8.1 and Figure 8.2, respectively. These parameters may change between driver releases. For additional details, please refer to the release notes (readme.txt) of the particular release being used.

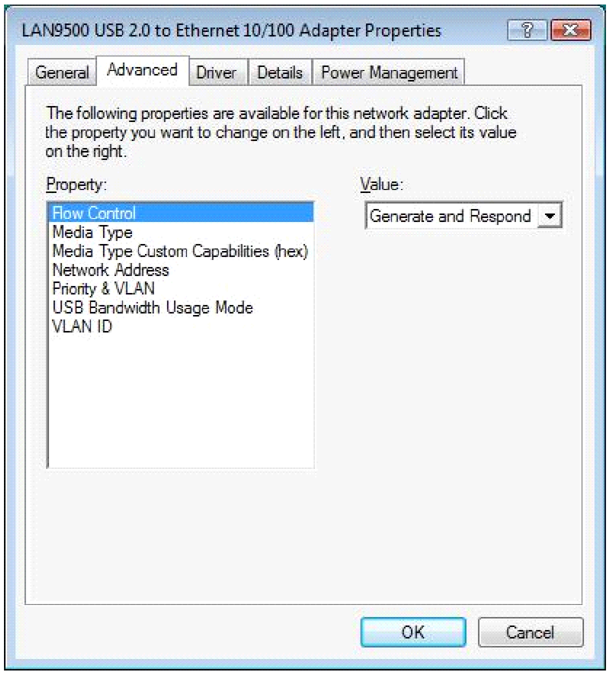


The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

Property:
- Flow Control
- Media Type
- Media Type Custom Capabilities (hex)
- Network Address
- Priority & VLAN
- USB Bandwidth Usage Mode
- VLAN ID

Value: Generate and Respond

Figure 8.1 Windows XP Advanced Parameters


LAN9500 USB 2.0 to Ethernet 10/100 Adapter Properties

General | Advanced | Driver | Details | Power Management

The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

Property:
- Flow Control
- Media Type
- Media Type Custom Capabilities (hex)
- Network Address
- Priority & VLAN
- USB Bandwidth Usage Mode
- VLAN ID

Value: Generate and Respond

Figure 8.2 Windows Vista Advanced Parameters

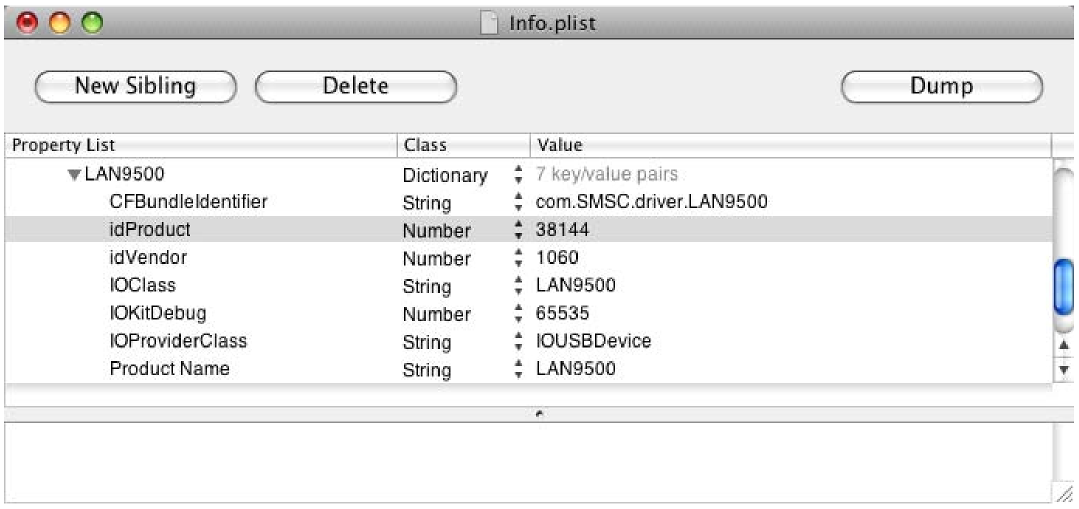
8.2 Mac OS X Parameters

Mac OS X device driver parameters are accessible by customizing the `info.plist` file. After installation of the LAN9500/LAN9500i device driver, the following kernal extension (kext) will be created: `/System/Library/Extensions/LAN9500.kext`. The `info.plist` file, which resides within the kext package, contains the device driver parameters. Open the `info.plist` file using the PropertyListEditor application to show the parameters and their default values. Figure 8.3 shows an example `info.plist` file open in the PropertyListEditor.

Note: Changing the `info.plist` contents to invalid values may prevent the loading and execution of the device driver. The keys in the `info.plist` file may be changed between revisions without notice. For detailed key information, refer to the release notes (readme.txt) of the particular release being used.

For details regarding kernal extensions (kext) files, refer to the following link:

http://developer.apple.com/DOCUMENTATION/Darwin/Conceptual/KEXTConcept/KEXTConceptPackaging/packaging_kext.html.



Property List	Class	Value
▼LAN9500	Dictionary	7 key/value pairs
CFBundleIdentifier	String	com.SMSC.driver.LAN9500
idProduct	Number	38144
idVendor	Number	1060
IOClass	String	LAN9500
IOKitDebug	Number	65535
IOProviderClass	String	IOUSBDevice
Product Name	String	LAN9500

Figure 8.3 Mac OS X info.plist Advanced Parameters

8.3 Linux Parameters

Linux parameters may be modified via the following methods:

- Load Time (insmod)
- Runtime Proprietary (cmd9500)
- Runtime Standard (ethtool)

8.3.1 insmod

The device driver can be loaded with parameters as follows:

```
insmod smscusbnet.ko [parameter1 = value1 parameter2 = value2 … parameterN = valueN]
insmod smsc9500.ko [parameter1 = value1 parameter2 = value2 … parameterN = valueN]
```

For example, to enable the operational mode, type the following commands:

```
insmod smscusbnet.ko operational_mode = 1
insmod smsc9500.ko
```

Note: The supported device driver parameters may change between driver releases. For additional details, please refer to the release notes (readme.txt) of the particular release being used.

8.3.2 cmd9500

Using the SMSC utility "cmd9500", the device parameters can be read or written. The cmd9500 utility is used as follows:

```
./cmd9500 [-h] [-e adaptername] [-c command] [-a address] [-d data] [-f filename]
```

The following example details the cmd9500 method for reading the device configuration:

```
./cmd9500 -e eth0 -c GET_CONFIG
```

Note: The supported device driver parameters may change between driver releases. For additional details, please refer to the release notes (readme.txt) of the particular release being used.

Note: Refer to Section A.2.3.2, "cmd9500," on page 104 for additional information regarding the cmd9500 utility.

8.3.3 ethtool

The device driver supports the standard Linux “ethtool” API. Refer to the Linux documentation for additional information on ethtool.

Note: The supported device driver parameters may change between driver releases. For additional details, please refer to the release notes (readme.txt) of the particular release being used.

Note: Refer to Section A.2.3.1, "ethtool," on page 104 for information on EEPROM programming using ethtool.

8.4 Windows CE Parameters

Windows CE device driver parameters are accessible via the smsc9500.reg file. A sample of a typical smsc9500.reg file is shown below:

```
[HKEY_LOCAL_MACHINE\Comm\SMSC95001\Parms]

   "MediaType"=dword:0

       ;MEDIA_TYPE_AUTO_FULL  0x00

       ;MEDIA_TYPE_10HD_AUTO  0x01

       ;MEDIA_TYPE_10FD_AUTO  0x02

       ;MEDIA_TYPE_100HD_AUTO  0x03

       ;MEDIA_TYPE_100FD_AUTO  0x04

       ;MEDIA_TYPE_10HD_FORCED  0x06

       ;MEDIA_TYPE_10FD_FORCED  0x07

       ;MEDIA_TYPE_100HD_FORCED  0x08

       ;MEDIA_TYPE_100FD_FORCED  0x09

   ........
```

Note: The supported device driver parameters may change between driver releases. For additional details, please refer to the release notes (readme.txt) of the particular release being used.

Chapter 9 Pre-Execution Environment (PXE) Support

SMSC provides LAN9500/LAN9500i customized PXE-compliant firmware which can be embedded into a PC BIOS to boot pre-OS. This solution is advantageous when utilizing pre-OS environments such as Windows PE over Ethernet.

For additional information on LAN9500/LAN9500i PXE-compliant firmware, contact your SMSC representative, or visit www.SMSC.com.

9.1 PXE Overview*

The Pre-Execution Environment (PXE) is an environment to boot computers using a network interface independently of available data storage devices or installed operating systems. PXE was introduced as part of the Wired for Management framework by Intel and is described in the specification (v2.1) published by Intel and Systemsoft. PXE makes use of several network protocols like IP, UDP, DHCP and TFTP and of concepts like GUID/UUID and Universal Network Device Interface and extends the firmware of the PXE client (the computer to be bootstrapped via PXE) with a set of predefined APIs.

The term PXE client only refers to the role that the machine takes in the PXE boot process. A PXE client can be a server, desktop, laptop or any other machine that is equipped with PXE boot code. The firmware on the client tries to locate a PXE redirection service on the network (Proxy DHCP) in order to receive information about available PXE boot servers. After parsing the answer, the firmware will ask an appropriate boot server for the file path of a network bootstrap program (NBP), download it into the computer's RAM using TFTP, possibly verify it, and finally execute it. If only one NBP is used among all PXE clients it could be specified using BOOTP without any need of a proxy DHCP, but a TFTP boot server is still required.

**Source: http://en.wikipedia.org/wiki/Preboot_Execution_Environment*

Chapter 10 Windows Manufacturing Utility

The Windows Manufacturing Utility application provides a graphical user interface for programming the device EEPROM and performing device tests. This chapter details the installation and operation of the Windows Manufacturing Utility.

Note: The Windows Manufacturing Utility currently supports only the LAN9500/LAN9500i and LAN9500A/LAN9500Ai. A future LAN9512/LAN9514 version of the Windows Manufacturing Utility will be available at a later date.

Note: For the latest release information, please refer to the readme file located at the root of the Windows Manufacturing Utility installation.

10.1 Installation

This section details the installation of the Windows Manufacturing Utility, the Utility Device Driver, and includes setup and system requirements.

10.1.1 Setup and System Requirements

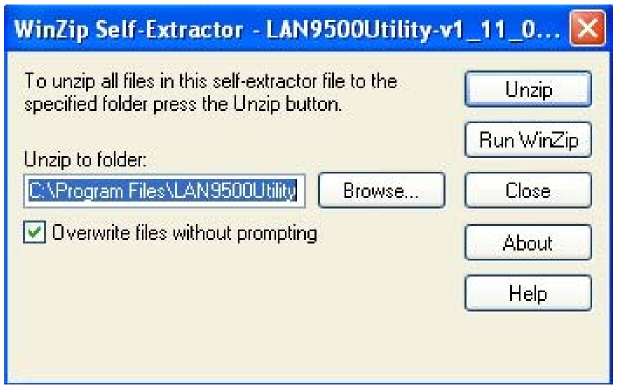
Table 10.1 details the Windows Manufacturing Utility setup and system requirements.

Table 10.1 Setup and System Requirements

CATEGORY	REQUIREMENTS
PCs	■ A 2GHz Pentium 4 or higher PC is recommended for both the EEPROM programmer host system and the test partner system. ■ The test partner should support an IP/ICMP stack capable of replying to 65000 byte ICMP echo requests ("pings of 65000"). ■ Firewalls and any other existing security software must be set to enable "pings of 65000" in both EEPROM programmer host and test partner systems (if unsure on how to do the latter, simply turn firewalls off).
Supported OSs	■ Windows XP x86 (32-bit) MUST be the OS running in the EEPROM programmer host system.
Environment	■ The utility is designed to be used standalone with NO additional applications running on either the EEPROM programmer host or test partner.
Network	■ End-to-end link between the device and the test partner should be on a closed network with no other connected hosts (An exception is granted for sharing a test partner among several assembly lines. See Section 10.4.2, "Sharing the Ping Partner Across Several Assembly Lines," on page 88). ■ The test partner system (or switch) must be capable of (and configured to) autonegotiate advertising of all four 10/100 half/full duplex combinations. ■ For ping tests, it is recommended to place an Ethernet Switch between the device and the test partner for the most consistent results. ■ Also, the device's interface must be set to a static IP address that is on the same subnet as the test partner.
Data	■ Manual editing of the LAN9500Utility.ini file is not supported, and may lead to utility malfunction and/or corrupted EEPROM.
Device Instances	■ Only one device may be plugged into the PC at a time.

10.1.2 Decompressing the Windows Manufacturing Utility Contents

The Windows Manufacturing Utility is distributed in a self extracting EXE file. To begin the installation, double-click the provided LAN9500Utility_vx.x.x.x.exe file, where “x.x.x.x” indicates the release version. This will open the self-extractor window as shown in Figure 10.1.


WinZip Self-Extractor - LAN9500Utility-v1_11_0...

To unzip all files in this self-extractor file to the specified folder press the Unzip button.

Unzip to folder: C:\Program Files\LAN9500Utility

[✓] Overwrite files without prompting

Figure 10.1 Self-Extraction Window

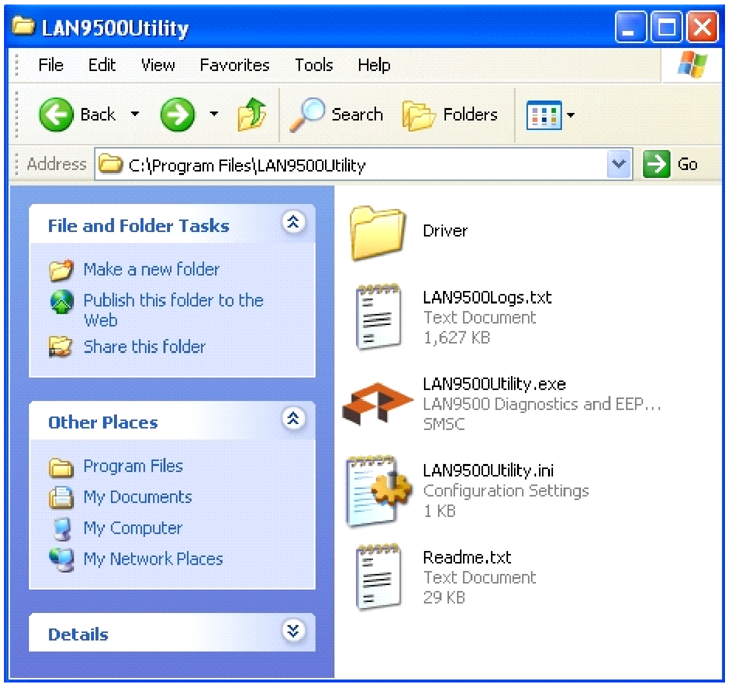
Indicate the preferred directory for decompression in the “Unzip to folder” field and click “Unzip”.

Note: The default location is: `C:\Program Files\LAN9500Utility`

Click “OK” and the “Close” to complete the decompression. After the decompression is complete, the following five files should be located in the chosen directory.

Table 10.2 Decompressed File Descriptions

FILE	DESCRIPTION
`LAN9500Utility_vx_x_x_x_Readme.txt`	A readme file detailing release notes and important information. (the “x_x_x_x” indicates the version number.)
`LAN9500Utility.exe`	The utility executable
`LAN9500Utility.ini`	The INI file where settings for the utility are saved
`Driver\LAN9500Utility_x86_n51m.inf`	Special driver installation script used with the LAN9500Utility only.
`Driver\lan9500-x86-n51m.sys`	LAN9500 32-bit windows device driver



C:\Program Files\LAN9500Utility

Driver	
LAN9500Logs.txt	Text Document, 1,627 KB
LAN9500Utility.exe	LAN9500 Diagnostics and EEP..., SMSC
LAN9500Utility.ini	Configuration Settings, 1 KB
Readme.txt	Text Document, 29 KB

Figure 10.2 Decompressed Contents

10.1.3 Installing the Manufacturing Utility Device Driver

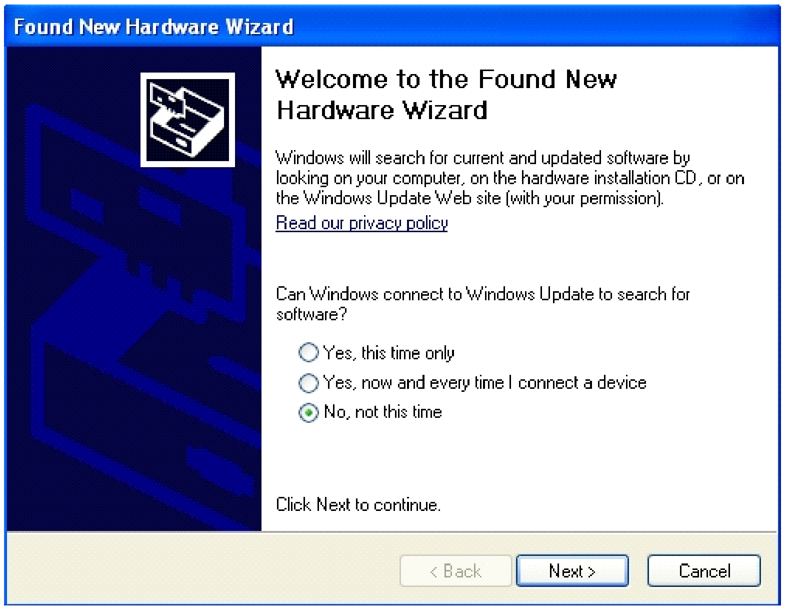
In order to use the Windows Manufacturing Utility, the installation of a special manufacturing utility device driver is required. This special driver is designed exclusively for use with the Windows Manufacturing Utility. Before installing this special manufacturing utility device driver, please note the following:

Note: The Windows Manufacturing Utility will NOT be able to write to the EEPROM with the standard retail device driver package. The special driver package provided with the Windows Manufacturing Utility MUST be used instead. If the standard retail driver has been previously installed on the host system, it MUST be uninstalled before performing any of the instructions provided in this section. Please ensure that NO remnants of a previous installation, such as `oem<n>.inf` copies or `net9500*.inf` files, remain in the `c:\windows\inf` directory.

Note: This special driver enables writing to the EEPROM. If not performed properly, EEPROM write operations can render the device inaccessible. This driver and tool are meant for a production environment only and therefore, MUST NEVER be released to end users.

Note: If the EEPROM programming host machine has internet connectivity, it is recommended to disable automatic updates. This will ensure the special manufacturing version of the device driver included with the utility is NOT automatically updated to the retail version via Windows update (which, as previously stated, does not support EEPROM writing).

To begin the manufacturing utility device driver installation, plug in a device that has a NON programmed EEPROM. This will trigger a "Found New Hardware Wizard" window. Select the "No, not this time" option to indicate you do not want to search for drivers in via Windows Update and click "Next".


Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).

Read our privacy policy

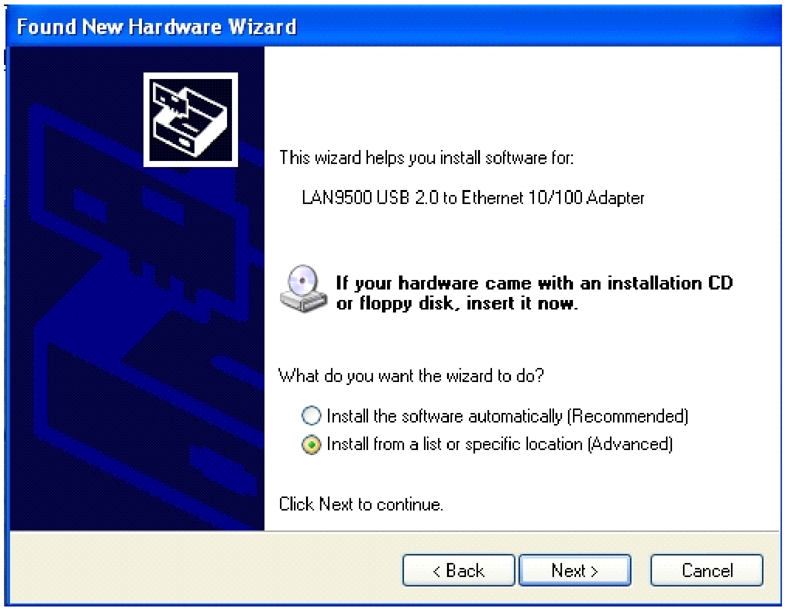
Can Windows connect to Windows Update to search for software?

Yes, this time only
Yes, now and every time I connect a device
[✓ No, not this time]

Click Next to continue.

Figure 10.3 Found New Hardware Wizard Welcome Window

Select "Install from a list or specific location (Advanced)" option and click "Next".


Found New Hardware Wizard

This wizard helps you install software for:

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

If your hardware came with an installation CD or floppy disk, insert it now.

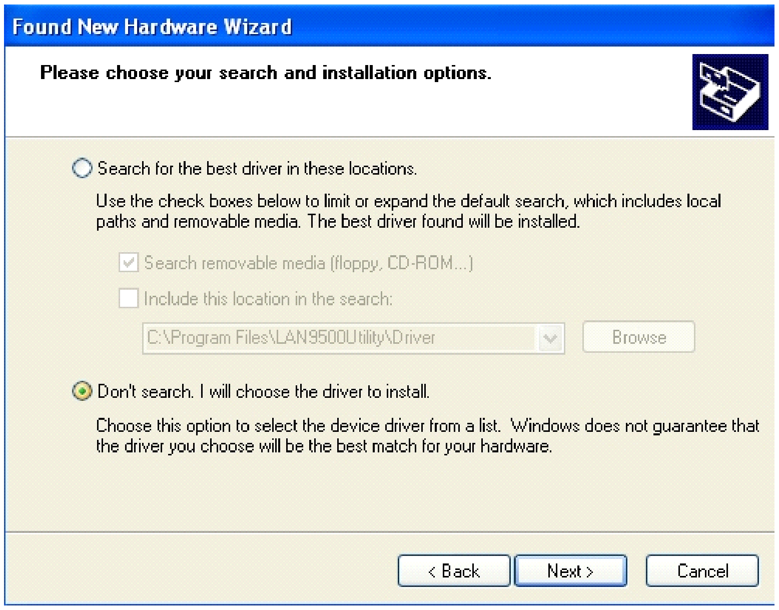
What do you want the wizard to do?

Install the software automatically (Recommended)
[✓ Install from a list or specific location (Advanced)]

Click Next to continue.

Figure 10.4 Install from a List or Specific Location Option

Select "Don't search. I will choose the driver to install." option and click "Next".


Found New Hardware Wizard

Please choose your search and installation options.

( ) Search for the best driver in these locations.

Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.

[✓] Search removable media (floppy, CD-ROM...)

[ ] Include this location in the search:

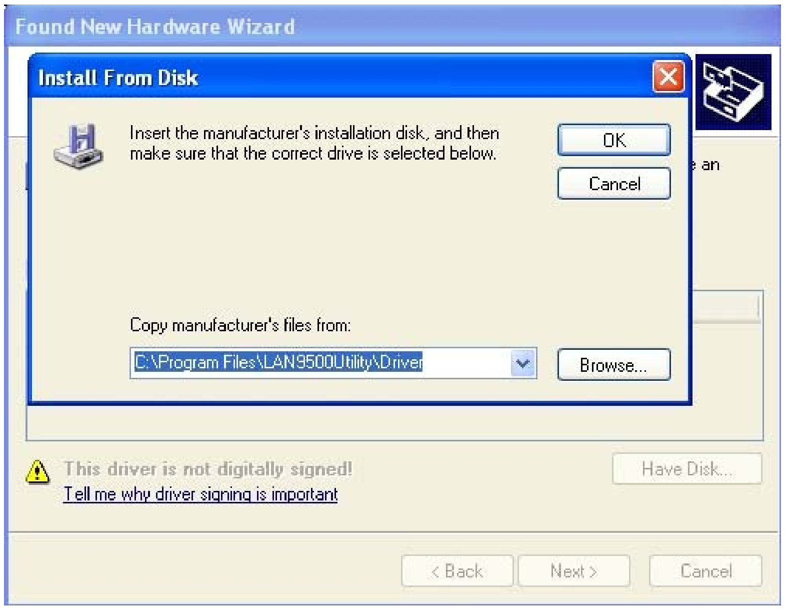
C:\Program Files\LAN9500Utility\Driver

[✓ Don't search. I will choose the driver to install.]

Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.

Figure 10.5 Don’t Search Option

Select the "Have Disk..." option in the Select Network Adapter window. Browse to the location where the driver has been extracted (i.e., `C:\Program Files\LAN9500Utility\Driver`) and select "OK".


Found New Hardware Wizard

Install From Disk

Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.

Copy manufacturer's files from:

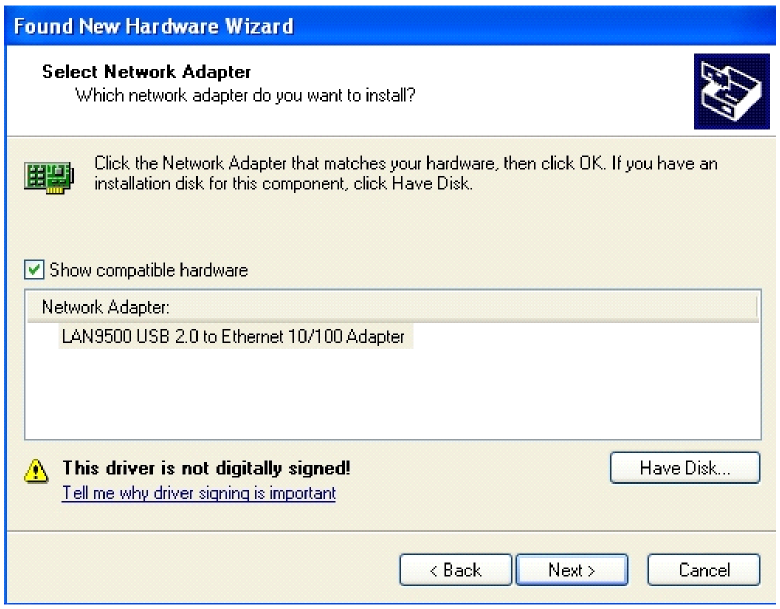
C:\Program Files\LAN9500Utility\Driver

This driver is not digitally signed!

Tell me why driver signing is important

Figure 10.6 Install From Disk Option

Click "Next" in Select Network Adapter window. This will begin the driver installation.



Found New Hardware Wizard

Select Network Adapter

Which network adapter do you want to install?

Click the Network Adapter that matches your hardware, then click OK. If you have an installation disk for this component, click Have Disk.

[✓] Show compatible hardware

Network Adapter:

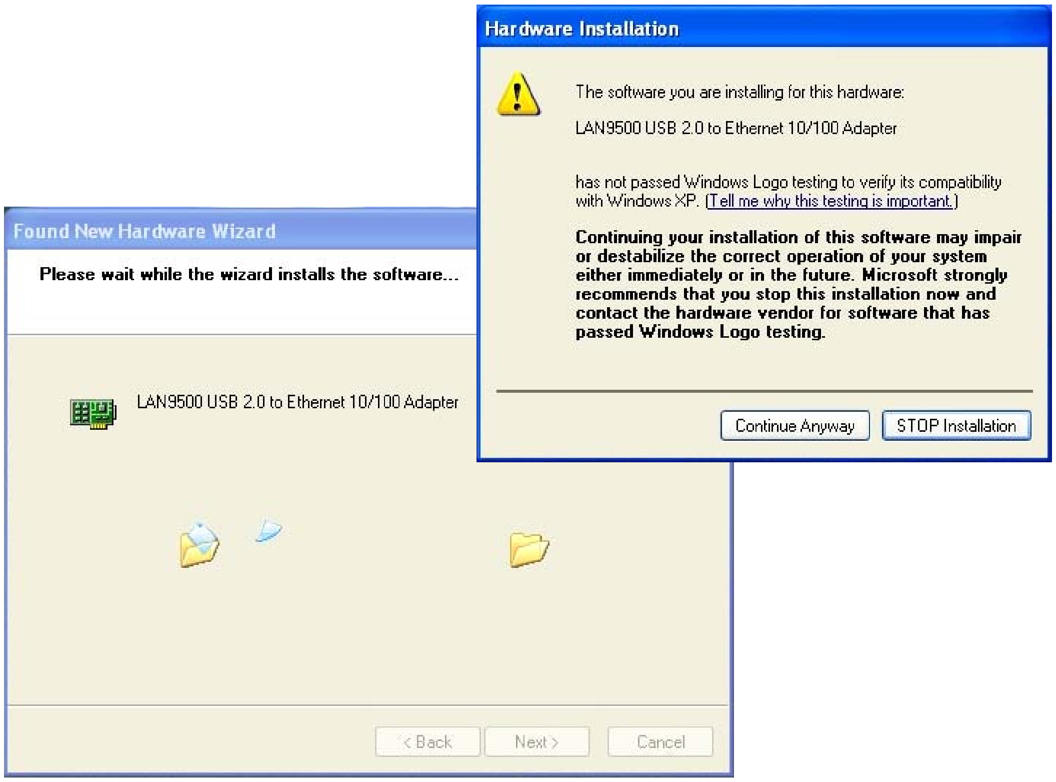
LAN9500 USB 2.0 to Ethernet 10/100 Adapter

This driver is not digitally signed!

Tell me why driver signing is important

Figure 10.7 Select Network Adapter Window

A Hardware Installation window will appear, notifying the user that the driver is not WHQL certified. Press "Continue anyway" to continue the installation.



Hardware Installation

The software you are installing for this hardware:

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)

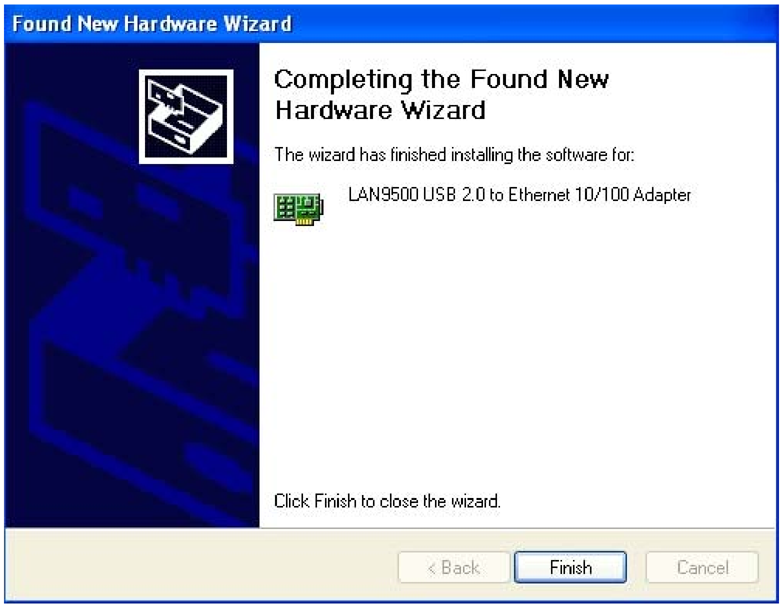
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.

Found New Hardware Wizard

Please wait while the wizard installs the software...

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Figure 10.8 Hardware Installation Warning Window



Found New Hardware Wizard

Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

LAN9500 USB 2.0 to Ethernet 10/100 Adapter

Click Finish to close the wizard.

Figure 10.9 Hardware Installation Complete Window

After the driver initialization is completed, it is recommend to setup the device with a manually assigned IP address (NOT DHCP). As mentioned previously, this IP address and the test partner system's network interface should be in the same IP subnet.

10.2 Operation

This section details the operation of the Windows Manufacturing Utility, including the following:

- Starting the Utility
- Using the Utility
- Exiting the Utility

10.2.1 Starting the Utility

After Decompressing the Windows Manufacturing Utility Contents and Installing the Manufacturing Utility Device Driver, the Windows Manufacturing Utility can be launched by double-clicking the LAN9500Utility.exe file.

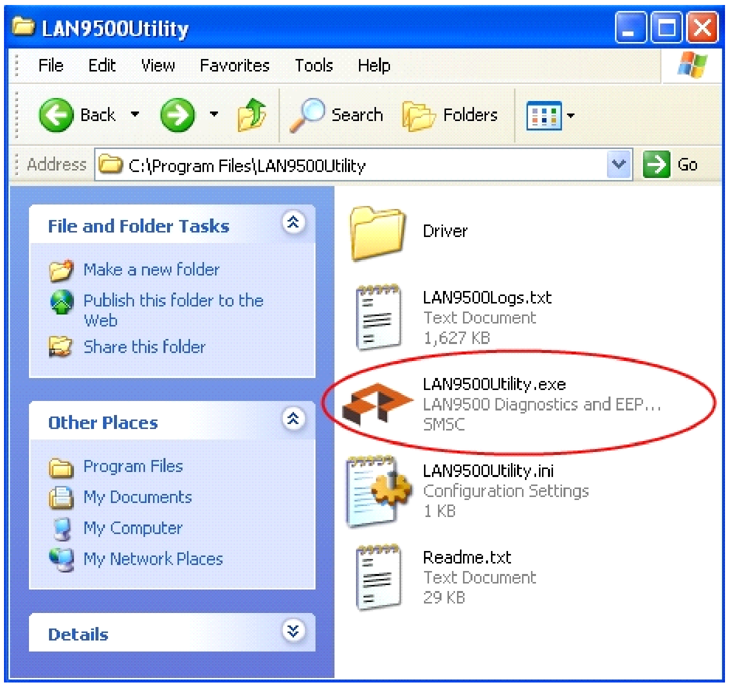


Figure 10.10 Launching the Windows Manufacturing Utility

Note: A desktop shortcut to the LAN9500Utility.exe can be created on the desktop if desired.

10.2.2 Using the Utility

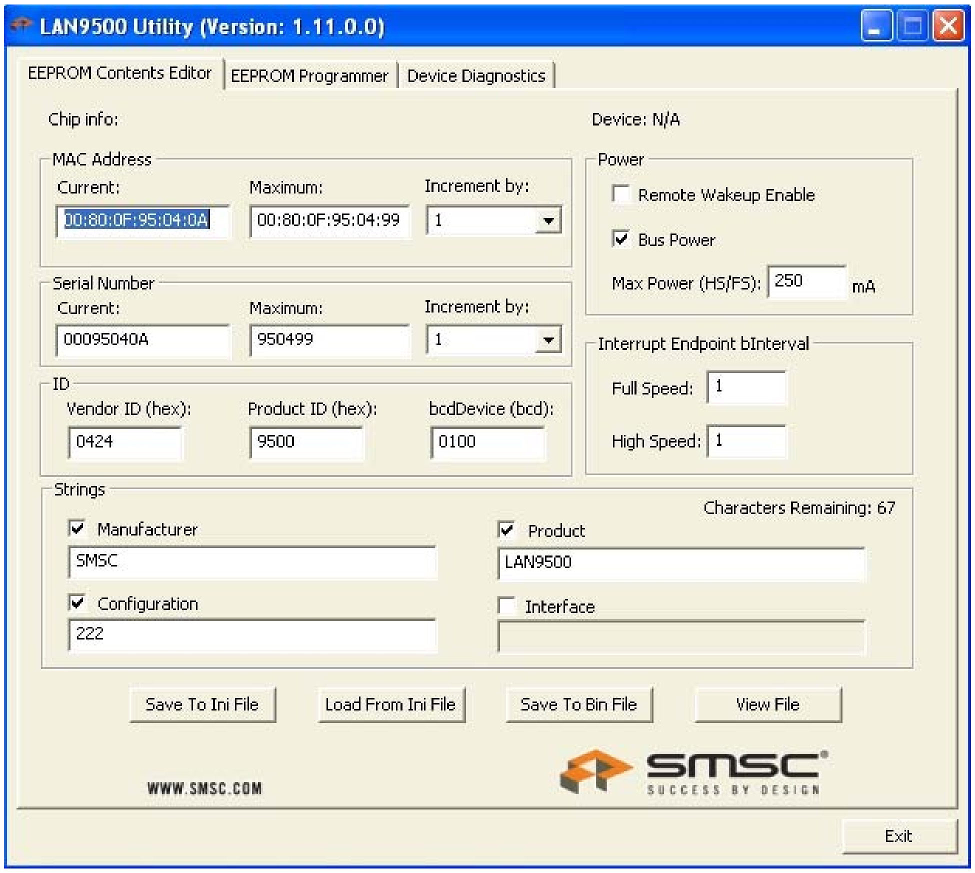
The Windows Manufacturing Utility consists of three main screens which are accessible through the following tabs:

- EEPROM Contents Editor Tab
- EEPROM Programmer Tab
- Device Diagnostics Tab

10.2.2.1 EEPROM Contents Editor Tab

The EEPROM Contents Editor tab allows the user to set the device EEPROM parameters off-line and save them to the `LAN9500Utility.ini` file. This file will be used to provide the initial parameters to program the device's EEPROM from the EEPROM Programmer Tab. The EEPROM Contents Editor tab can be seen in Figure 10.11.

Note: The EEPROM Contents Editor tab is the default tab shown when the utility is initially started.


LAN9500 Utility (Version: 1.11.0.0)

EEPROM Contents Editor | EEPROM Programmer | Device Diagnostics

Chip info:

Device: N/A

MAC Address
Current: 00:80:0F:95:04:0A
Maximum: 00:80:0F:95:04:99
Increment by: 1

Power
☐ Remote Wakeup Enable
☑ Bus Power
Max Power (HS/FS): 250 mA

Serial Number
Current: 00095040A
Maximum: 950499
Increment by: 1

Interrupt Endpoint bInterval
Full Speed: 1
High Speed: 1

ID
Vendor ID (hex): 0424
Product ID (hex): 9500
bcdDevice (bcd): 0100

Strings
Characters Remaining: 67
☑ Manufacturer: SMSC
☑ Product: LAN9500
☑ Configuration: 222
☐ Interface:

Figure 10.11 EEPROM Contents Editor Tab

10.2.2.1.1 EEPROM CONTENTS EDITOR FIELDS

The following fields are available for editing in this tab:

Table 10.3 EEPROM Contents Editor Tab - Fields

CATEGORY	FIELD DESCRIPTIONS
MAC Address	These fields define the 6-byte universally unique MAC address parameters. Bytes are separated by a colon.
	Current: Defines the first MAC address (will be incremented after Manual/Auto burn for the next device)
	Maximum: Defines the last MAC address to be used before rolling over to 0
	Increment By: Will be added to Current MAC Address after successful EEPROM burn cycle (max is 255)
Serial Number	These fields define the unique USB serial number (up to 16-digit hexadecimal number).
	Current: Defines the first serial number (will be incremented after Manual/Auto burn for the next device)
	Maximum: Defines the last serial number to be used before rolling over
	Increment By: Will be added to Current serial number after successful EEPROM burn cycle (max is 255)
ID	These fields define the various USB IDs.
	Vendor ID: This is the company USB Vendor ID. It is a 4-digit hexadecimal number.
	Product ID: This is the device USB Product ID. It is a 4-digit hexadecimal number.
	bcdDevice: This is the release number assigned to the device. It is a 4-digit binary-coded decimal (BCD) number. BCD is a decimal number format (only digits 0-9 allowed). Each digit is allocated four bits in the data field's binary representation.
Power/ Remote Wake	These parameters affect values of the USB configuration descriptor. Improper setups which violate the USB 2.0 specification will not be allowed. An error message will be displayed if an illegal value has been entered.
	Remote Wakeup Enable: Enables/disables remote USB wakeup capability (Enabled when checked)
	Bus Power: Selects device configuration between Bus Power and Self Power (Bus-Power when checked)
	Max Power: Maximum Power Consumption in mA (between 2mA and 500mA for BusPower; between 0mA and 100mA for SelfPower) **Note:** This value must always be an even number.
Interrupt Endpoint bInterval	These fields define the interval for polling the interrupt endpoint as defined in the bInterval field of the endpoint descriptor by the USB 2.0 specification. Illegal values will not be allowed; an error message will be displayed if one has been entered.
	Full Speed: Interrupt endpoint bInterval for full speed operation (Valid range of 1-255)
	High Speed: Interrupt endpoint bInterval for high speed operation (Valid range of 1-16)

Table 10.3 EEPROM Contents Editor Tab - Fields (continued)

CATEGORY	FIELD DESCRIPTIONS
Strings	These fields define the user customizable device strings. Each string can be individually enabled/disabled via a check box. The "Characters remaining" counter helps the user adjust the strings' lengths so that all content fits within the EEPROM size.
	Manufacturer: A user definable string used for manufacturer information
	Product: A user definable string used for product information
	Configuration: A user definable string used for configuration information
	Interface: A user definable string used for interface information

Note: It is strongly recommended that a device with the same size EEPROM as the final target be plugged into the system and recognized by the utility. This will allow the utility to identify the size of the EEPROM being edited and properly indicate the "characters remaining count". If no device is plugged in, the EEPROM contents editor will use a default EEPROM size of 256 bytes to calculate the "characters remaining count".

10.2.2.1.2 EEPROM CONTENTS EDITOR ACTIONS

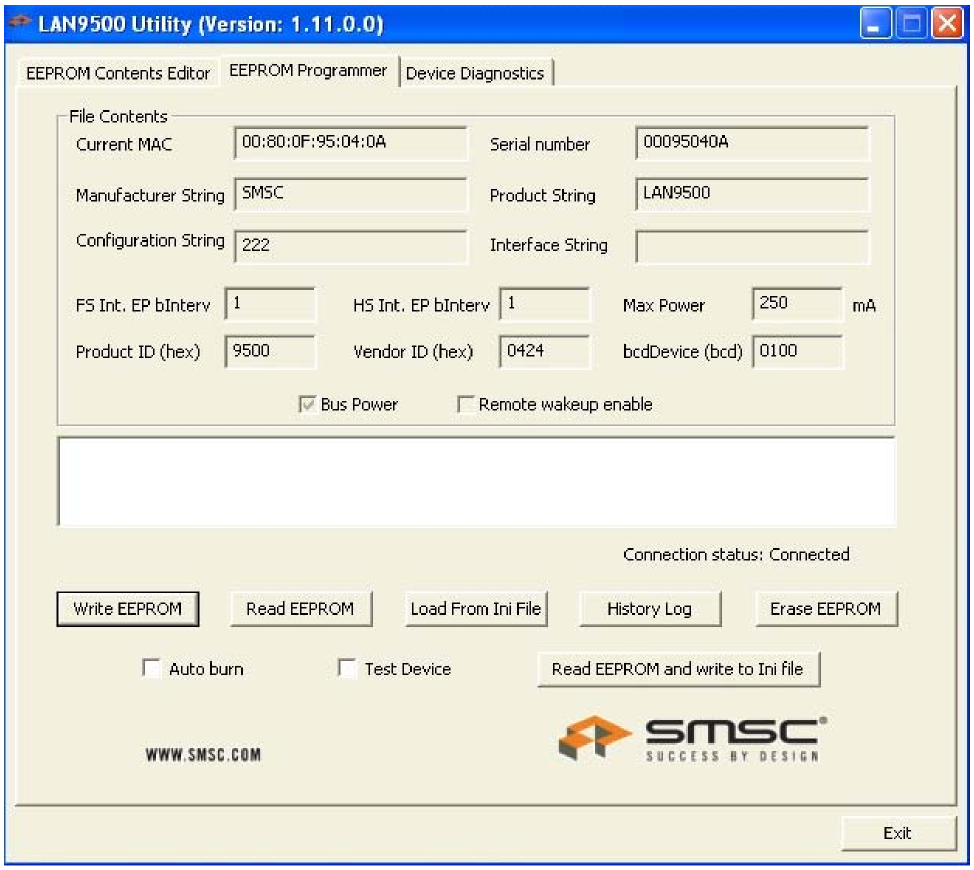
The following action buttons are available in this tab:

Table 10.4 EEPROM Contents Editor Tab - Actions

BUTTON	ACTION DESCRIPTION
Save To Ini File	Saves the information currently displayed in the fields detailed in Section 10.2.2.1.1, "EEPROM Contents Editor Fields" to the `LAN9500Utility.ini` file.
Load From Ini File	Reads the contents of `LAN9500Utility.ini` file and refreshes the fields detailed in Section 10.2.2.1.1, "EEPROM Contents Editor Fields" with the file contents.
Save To Bin File	Saves the information currently displayed in the fields detailed in Section 10.2.2.1.1, "EEPROM Contents Editor Fields" to a binary data file to be burned to the EEPROM outside of the Windows Manufacturing Utility
View File	Opens and displays the `LAN9500Utility.ini` file

10.2.2.2 EEPROM Programmer Tab

The EEPROM Programmer tab allows the user to perform operations such as programming and verifying contents directly on the EEPROM. The EEPROM Programmer tab can be seen in Figure 10.12.



File Contents

Current MAC	00:80:0F:95:04:0A		Serial number	00095040A	
Manufacturer String	SMSC		Product String	LAN9500	
Configuration String	222		Interface String		
FS Int. EP bInterv	1	HS Int. EP bInterv	1	Max Power	250 mA
Product ID (hex)	9500	Vendor ID (hex)	0424	bcdDevice (bcd)	0100

[✓] Bus Power ☐ Remote wakeup enable

Connection status: Connected

☐ Auto burn ☐ Test Device

Figure 10.12 EEPROM Programmer Tab

Note: If a device is plugged in a USB port and the driver is properly loaded, the indicator in lower right corner of the tab will read "Connected". Otherwise the indicator will read "Not Connected" and an unprogrammed device should be plugged in.

10.2.2.2.1 EEPROM/FILE CONTENTS FIELDS

These fields show the non-editable information that the utility has read from either the EEPROM or the ini file. For definitions of these fields, refer to Table 10.3, “EEPROM Contents Editor Tab - Fields,” on page 79.

10.2.2.2.2 EEPROM PROGRAMMER TAB ACTIONS & STATUS

The following action buttons are available in this tab:

Table 10.5 EEPROM Programmer Tab - Actions

BUTTON	ACTION DESCRIPTION
Read EEPROM and Write to Ini File	This button reads the attached device's EEPROM and saves it to the `LAN9500Utility.ini` file.
Write EEPROM	This button burns the information from the `LAN9500Utility.ini` file into the EEPROM of the attached device. The status is reported in the list box and also saved in the `LAN9500Logs.txt` file.
Read EEPROM	This button reads the attached device's EEPROM and displays it in the EEPROM/File Contents Fields. The status is reported in the list box and also saved in the `LAN9500Logs.txt` file.
Load From Ini File	This button reads the `LAN9500Utility.ini` file and displays it's contents in the EEPROM/File Contents Fields.
History Log	This button opens `LAN9500Logs.txt` file in text format.
Erase EEPROM	This button erases the EEPROM of the attached device.

The following checkboxes are available in this tab:

Table 10.6 EEPROM Programmer Tab - Checkboxes

CHECKBOX	DESCRIPTION
Auto Burn	When this checkbox is selected, the user will be prompted for confirmation. Clicking on “Yes” will start the autoburn procedure. This operating mode allows for automatic programming of boards in a serial manner with a minimal amount of user intervention. The utility will instruct the operator when to unplug a device that has already been programmed and when to plug in a new unprogrammed device, but will perform everything else automatically.
Test Device	When this checkbox is selected, the tests chosen in the Device Diagnostics Tab will be executed before the EEPROM programming begins (except for the EEPROM contents verification which is performed after programming). An error message will prompt the user if any of the selected tests fail. Unchecking the checkbox will disable these tests.

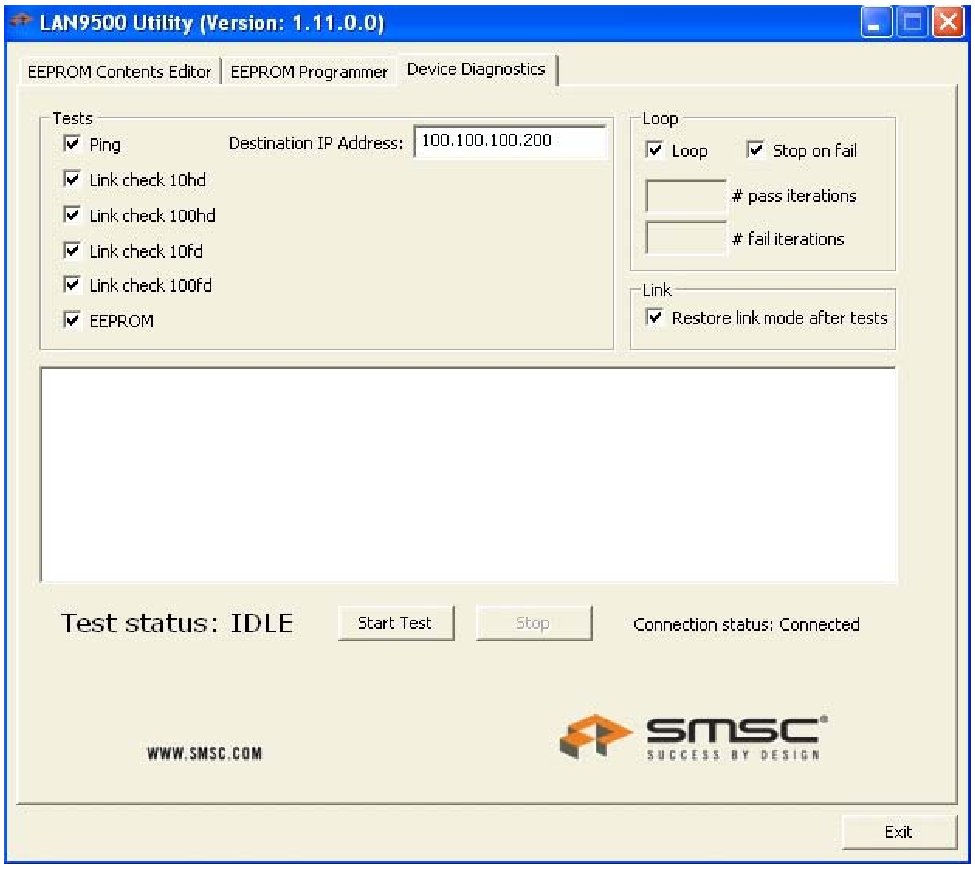
The following status fields are available in this tab:

Table 10.7 EEPROM Programmer Tab - Status

STATUS FIELD	DESCRIPTION
Detailed Status	A scrollable area which records all of the activity initiated from this tab in the current session. **Note:** This information is also written to the `LAN9500Logs.txt` file for later review.
Status Overview	A text line showing the current/last state of diagnostic activity. When the tab is first entered the status is not shown. The status will be updated as the programming and tests progress with the last entry in the Detailed Status field.

10.2.2.3 Device Diagnostics Tab

The Device Diagnostics tab allows diagnostic tests to be performed on the device. Tests to be performed are selected using the provided checkboxes. Status information is shown while tests are running and when they are completed. The Device Diagnostics tab can be seen in Figure 10.13.



✓ Ping   Destination IP Address: 100.100.100.200
✓ Link check 10hd
✓ Link check 100hd
✓ Link check 10fd
✓ Link check 100fd
✓ EEPROM
✓ Loop   ✓ Stop on fail
# pass iterations
# fail iterations
✓ Restore link mode after tests
Test status: IDLE
Connection status: Connected

Figure 10.13 Device Diagnostics Tab

10.2.2.3.1 TESTS SECTION

The Tests section of the Device Diagnostics tab is used to enable and configure the tests to be run. The following test options are available in this tab:

Table 10.8 Device Diagnostics Tab - Tests

TESTS	DESCRIPTION
Ping	When checked, the application will transmit a 65KB ICMP echo request datagram (a.k.a. ping) to the connected partner PC through the device. The test passes if the entire datagram is echoed back. The test fails if 5 consecutive ping attempts do not receive a response.
Destination IP Address	In this box, enter the IP address of the test partner PC used for the ping test. This box is greyed out if the "Ping" box is unchecked. **Note:** THE DESTINATION IP MUST BE ON THE SAME SUBNET AS THE DEVICE. This must be verified prior to testing. Otherwise, the stated results may be invalid.

Table 10.8 Device Diagnostics Tab - Tests (continued)

TESTS	DESCRIPTION
Link Check 10hd	When checked, the utility will attempt to establish a 10Mbps/Half-Duplex link through the device with the partner PC. If the Ping test is enabled, it will be performed immediately after the link is established. If a link is established and the ping is successful, the test passes. Otherwise, the test fails.
Link Check 100hd	When checked, the utility will attempt to establish a 100Mbps/Half-Duplex link through the device with the partner PC. If the Ping test is enabled, it will be performed immediately after the link is established. If a link is established and the ping is successful, the test passes. Otherwise, the test fails.
Link Check 10fd	When checked, the utility will attempt to establish a 10Mbps/Full-Duplex link through the device with the partner PC. If the Ping test is enabled, it will be performed immediately after the link is established. If a link is established and the ping is successful, the test passes. Otherwise, the test fails.
Link Check 100fd	When checked, the utility will attempt to establish a 100Mbps/Full-Duplex link through the device with the partner PC. If the Ping test is enabled, it will be performed immediately after the link is established. If a link is established and the ping is successful, the test passes. Otherwise, the test fails.
EEPROM	When checked, this test verifies that the device EEPROM has been programmed correctly. When this test is run standalone from the Device Diagnostics tab, the MAC address and Serial Number in the EEPROM are checked for consistency with the ranges specified by the `LAN9500Utility.ini` file. When this test is run from the EEPROM Programmer Tab, the MAC address and Serial Number in the EEPROM are checked to exactly match the Current MAC Address and Current Serial number specified by the `LAN9500Utility.ini` file.

10.2.2.3.2 LOOP SECTION

The Loop section of the Device Diagnostics tab allows the selected tests in the Tests Section to run continuously. The following loop options are available in this tab:

Table 10.9 Device Diagnostics Tab - Loops

OPTION	DESCRIPTION
Loop	When checked, the selected tests will run continuously until manually stopped. When unchecked, each selected test will run only once. This setting is only effective when tests are running standalone from the Device Diagnostics Tab.
Stop on fail	If this checkbox is selected in conjunction with the Loop checkbox, test execution will stop when an error is encountered. This option is useful for providing access to the device at the point an error occurred. This option is valid only if the Loop checkbox is selected.
# pass iterations	This non-editable field displays the number of successfully executed test runs since the start of the current loop.
# fail iterations	This non-editable field displays the number of test runs that have produced at least one error since the start of the current loop. **Note:** If the "Stop on fail" checkbox is selected, this number will never be greater than 1.

10.2.2.3.3 LINK SECTION

The Link section of the Device Diagnostics tab provides the following option:

Table 10.10 Device Diagnostics Tab - Links

OPTION	DESCRIPTION
Restore link mode after tests	When this checkbox is selected, the link mode will be restored to it's previous state before the test started. This option is not valid during autoburn.

10.2.2.3.4 STATUS INFORMATION

The following status information is provided on the Device Diagnostics tab:

Table 10.11 Device Diagnostics Tab - Status Information

OPTION	DESCRIPTION
Detailed Status	A scrollable area which records all of the activity initiated from the Device Diagnostics tab in the current session. **Note:** This information is also written to the `LAN9500Logs.txt` file for later review.
Status Overview	A large, boldfaced text line showing the current/last state of diagnostic activity. When the Device Diagnostics tab is first entered, the status is shown as "IDLE". If a test is executing, the status is shown as "TESTING". If a test cycle has finished executing, the status will be shown as "PASSED" or "FAILED", depending on the most recent result.
Connection Status	As in the EEPROM Programmer Tab, this line will read "Connected" if the device is connected and the device driver is properly loaded. Otherwise, it will read "Not connected." In the "Not Connected" state, the device will not function and testing should not be attempted.

10.2.2.3.5 DEVICE DIAGNOSTICS TAB ACTIONS

The following action buttons are available in this tab:

Table 10.12 Device Diagnostics Tab - Actions

BUTTON	ACTION DESCRIPTION
Start Test	Begins execution of a test run with the tests that have been selected. These tests will loop if the "Loop" checkbox is selected, and will run continuously until the "Stop" button is pressed. If "Stop on fail" is checked, then testing will also stop if any failure is encountered. If the "Loop" box is not checked, then each selected test will run once and the loop will end.
Stop	Stops test execution

10.2.3 Exiting the Utility

The Windows Manufacturing Utility can be exited in any of the following way:

- Clicking the "Exit" button
- Clicking the window's close box
- Pressing the ESC key from any tab

10.3 Production Testing Methodology and Coverage

10.3.1 Test Methodology

A Windows driver identifies a device by it's serial number. When a device is connected with a different serial number than the previous devices Windows has seen before, Windows installs a new "adapter instance" for the driver. If the driver is WHQL certified, this installation is generally performed silently in the background. If a DHCP server is also available for IP address assignment, the device will be ready to run immediately after. However, if the driver is not certified (and the special driver used by the Windows Manufacturing Utility is purposely not certified), the user is prompted for driver installation. This behavior of Windows recognizing each new programmed serial number and loading a new driver instance causes two problems in a production environment:

1. Installation of a driver takes time. Even if the device driver was WHQL certified and installed automatically/silently, this process would require approximately 15 additional seconds of unproductive time for each autoburn cycle.

2. A machine used for production will generally program thousands of NIC cards, which would lead to thousands of entries in the registry. This leads to a slow performing production machine at risk of exceeding the maximum allowed registry size. This could potentially be prevented by uninstalling the driver for each instance after test completion. However this solution would again increase the critical "assembly time per NIC".

In order to avoid the problems explained above, the Windows Manufacturing Utility tests and programs as much of the device as possible WITHOUT the new EEPROM contents (i.e., serial number) actually taking effect (and requiring Windows to install a new adapter instance). The downside to this method is that the utility is NOT testing the device with it's final EEPROM contents being utilized. The production workflow assumption is that all devices are plugged into to the host system with unprogrammed EEPROMs and they are all recognized as the same device by Windows. As soon as an unprogrammed device is connected, the utility performs the selected tests (out of ping, link tests). If these programs pass, the EEPROM is programmed (and verified if selected). If there is no failure detected during the testing or EEPROM verification, the utility instructs the operator to disconnect the device (which has completed it's cycle) and connect the next one.

To address the concern of the production line not testing each device using it's final EEPROM contents, it is suggested to take random control samples from each lot (i.e., 1 out of 100 or 1 out of 1000). This sample can be tested by connecting it to a PC, installing the production device driver and performing typical end user network activity. Alternatively, the manufacturing device driver may be installed and the device tested using the Device Diagnostics tab of the Windows Manufacturing Utility.

10.3.2 Test Time

Performing all available tests takes approximately 9 seconds. This majority of the time is due to the autonegotiation cycles, which take approximately 2 seconds each with 4 link modes in the default settings (all tests enabled). There is always a balance between test time and coverage. If the manufacturer is comfortable with lowering the test coverage, test options can be disabled from the Device Diagnostics tab to reduce the test time.

In particular, some manufacturers may desire to utilize one of the following reduced sets of test options:

- EEPROM verify + Ping test: approximately 1 second per device
- EEPROM verify + Ping test + 100FD Link test: approximately 3 seconds per device.

10.4 Examples

This section details examples of typical Windows Manufacturing Utility operations.

10.4.1 Setting Up an Autoburn Session

This section details how to set up a typical autoburn session.

<u>One Time Setup:</u>

1. In the EEPROM Contents Editor Tab, edit the EEPROM contents per the application requirements. At a minimum, the current (i.e.: first) and max serial number and MAC addresses must be selected specifically for this session.
2. In the Device Diagnostics Tab, select the tests to run for each programming cycle.
3. In the EEPROM Programmer Tab, select the Test Device box.

<u>Starting the Autoburn Operation:</u>

1. In the EEPROM Programmer Tab, select the autoburn checkbox and click "Yes" in the pop-up window.

<u>Running Loop (fully automatic, except for user plugging and unplugging devices)</u>

1. The utility performs the previously selected tests (except EEPROM verify). If the tests fail, the autoburn loop is stopped.
2. The utility programs the EEPROM of the current device.
3. If previously selected, the utility performs an EEPROM verification. If the test fails, the autoburn loop is stopped.
4. The utility prompts the user to remove the device (this device program / test cycle is completed)
5. The utility prompts the user to connect a new "empty EEPROM" device
6. The running loop starts again from step 1.

<u>Stopping the autoburn operation</u>

1. Press cancel at the device plug or unplug prompts.

10.4.2 Sharing the Ping Partner Across Several Assembly Lines

1. Using an unprogrammed device, install the driver on each of the programming PCs as per Section 10.1.3, "Installing the Manufacturing Utility Device Driver," on page 72.
2. Ensure each PC's connected device has a different IP address from all the other network devices in the same subnet.
3. Assign each PC's unprogrammed device a different MAC address:
   a. Open Device Manager
   b. Double click on the device to open it's properties
   c. Click the “Advanced” tab
   d. Select "Network Address" and assign a different address to each PC. Please note, the lower two bits of the lower nibble of the first byte must be 10b (address is locally assigned, address is not multicast). Refer to Table 10.13 for an example.

Table 10.13 Network Address Assignment Example

PC	IP ADDRESS	MAC ADDRESS
1st	192.168.1.1	02-00-00-00-00-01
2nd	192.168.1.2	02-00-00-00-00-02
3rd	192.168.1.3	02-00-00-00-00-03
...	...	...
nth	192.168.1.n	02-00-00-00-00-0n
Single Ping Partner: 192.168.1.100		

Chapter 11 DOS Utility Suite

The DOS Utility Suite is a set of EXEs that run from DOS and provide support for programming the EEPROM and testing basic functionality in a production/manufacturing environment. The DOS Utility Suite is comprised of the following executables:

- 9500EEP.EXE - EEPROM programming and contents verification utility
- 9500TEST.EXE - Basic functionality test utility

Note: The DOS utility runs under DOS only (Windows 98 version 4.10.2222 and MS-DOS version 6.22). It cannot run in a Windows command prompt.

Note: The DOS utility currently supports only the LAN9500/LAN9500i and LAN9500A/LAN9500Ai. A future version will add support for the LAN9512/LAN9514 at a later date.

These executables along with environment requirements are discussed in the following sections.

11.1 Environment Requirements and Limitations

The following sub-sections detail the requirements and limitations for execution of the DOS Utilities.

11.1.1 OS, Processor Mode and Memory

1. The DOS Utilities run under plain DOS only. They cannot run in a Windows command prompt.
2. The DOS Utilities assume the system is running in the x86 processor's real mode at the time of invocation. The utilities will switch to protected mode, stay in protected mode during execution, and switch back to real mode before exit.
3. Due to #2 above, no expanded memory managers (i.e., EMM386.exe) can be running when using the DOS Utilities. Note: extended memory managers (i.e., HIMEM.SYS) are compatible and may be used.
4. The DOS Utilities are stand alone EXEs which are completely unloaded from memory on exit. After the utilities exit, the device will not provide any service whatsoever (i.e., networking access) to the DOS operating system.

11.1.2 USB

1. The DOS Utilities work with EHCI host controllers only.
2. The device can be located on any port of any EHCI host controller, or on any port behind ONE (and only one) HIGH SPEED hub connected to any port on any EHCI host controller.
3. The DOS Utilities will scan the PCI and USB buses starting from their lowest ordinals until a device is found. Once found, the utility stops scanning and uses the found device. Only one (and the first found) device is supported.
4. It is assumed that during execution, the DOS Utilities can take complete control of the USB EHCI host controller (and high speed hub if behind one) that the device is connected to. In particular, the DOS utilities may reset the host controller/hub during initialization and again before exiting, and will not save or restore any context. Note that this will most likely cause other USB devices under the same host controller to stop operating.

11.1.3 Networking Partner

1. To use the 9500TEST.EXE, a network partner is REQUIRED. While some functionality can be supported with a simple link network partner (i.e., a switch), support of ALL 9500TEST.EXE test features, including data passing tests, requires the network partner be another machine with ping echo capabilities.

11.2 9500EEP.EXE

The 9500EEP.EXE utility is used to program or verify the EEPROM contents. The function parameters are provided by either command line switches, files in the same directory as the application, or a combination of both. Upon exit, the utility displays an appropriate status message. It also returns an errcode=0 if it passes, or !=0 if it fails, which is suitable for scripting/batching.

The 9500EEP.EXE command line switches are used as follows:

```
9500EEP (-b <bin_filename> -i <ini_filename>) (-w -r -v) [-M <mac_address>
-S <serial_num> -m <mac_increment> -s <serial_increment> -q -h]
```

Table 11.1 9500EEP.EXE Command Switch Definitions

COMMAND SWITCH	DESCRIPTION
`-b <bin_filename>`	Uses the binary file `bin_filename` as a “base” for the EEPROM contents. This option is mutually exclusive with the `-i` option, but either `-b` or `-i` must be present when any operations other than displaying the current EEPROM content of the device (`-r`) are selected. The MAC address and/or serial in the binary `bin_filename` can be overwritten using the `-m` or `-s` options.
`-i <ini_filename>`	Uses the options file `ini_filename` as the “base” for the EEPROM contents. This option is mutually exclusive with the `-b` option, but either `-b` or `-i` must be present when any operations other than displaying the current EEPROM content of the device (`-r`) are selected. The MAC address and/or serial in the ini `ini_filename` can be overwritten using the `-m` or `-s` options.
`-w`	Writes the EEPROM contents specified in the file (+ overrides) to the device and verifies them. The input file specified with the `-b` or `-i` will be updated after the verification is complete according to the (mac and serial) increment values. Either `-w`, `-r` or `-v` must be specified.
`-r`	Reads the current EEPROM contents in the device and writes to the `9500.bin` binary file. Either `-w`, `-r` or `-v` must be specified.
`-v`	Reads the current EEPROM contents in the device and verifies against the EEPROM contents specified in the file + overrides. Either `-w`, `-r` or `-v` must be specified.
`-M <mac_address>`	Overrides the MAC address included in the `-b` or `-i` options with the `mac_address` provided. The supported mac_address formats are “`ab:cd:ef:gh:ij:kl`”, “`ab-cd-ef-gh-ij-kl`” or “`abcdefghijkl`”, where “`a`” through “`l`” are hex digits (e.g., `00:80:0F:95:04:00`).
`-m <mac_address>`	Overrides the increment for the MAC address from the `ini_filename` if the `-i` option is used, or the default of 0 (no increment) if the `-b` option is used.
`-S <serial_num>`	Overrides the serial number address included in the `-b` or `-i` with the `serial_num` provided. The `serial_num` format is “`abcdefghi`”, where “`a`” through “`i`” are hex digits (e.g., `000950404`).
`-s <serial_increment>`	Overrides the increment for the serial number from the `ini_filename` if the `-i` option is used, or the default of 0 (no increment) if the `-b` option is used.
`-q`	Quiet operation.
`-h`	Displays help menu.

11.2.1 Bar Code Scanner Support

For many production lines, the ability to support MAC address programming from a barcode scanned ASCII file is highly desirable. This functionality is supported using the standard DOS utility command switches and simple file concatenation constructs provided in DOS. This functionality is explained below using an example:

A user desires to run the following command:

```
9500EEP -b filename.bin -w -M <mac_addr>-S <serial_num>
```

If the mac address (e.g., `00:11:22:33:44:55`) is scanned into the `mac.txt` file and the serial number (e.g., `012345678`) is scanned into the `serial.txt` file, the desired run command can be produced with the following DOS command lines:

```
copy /A cmdpfix.txt+mac.txt+s.txt+serial.txt command.bat
```

...where `cmdpfix.txt` is an ASCII file that contains the characters:

```
9500EEP -b filename.bin -w -M
```

...and `s.txt` a file that contains the characters:

```
-S
```

The following `command.bat` file will be created:

```
9500EEP -b filename.bin -w -M 00:11:22:33:44:55 -S 012345678
```

11.2.2 9500EEP ini Format

The items in the 9500EEP ini are self-explanatory based upon their names. An illustrative example `LAN9500Utilty.ini` is shown below for reference:

Note: The 9500EEP ini format is identical to the format used by the LAN9500/LAN9500i Windows Manufacting Utility. See Section 10.2.2.1.1, "EEPROM Contents Editor Fields," on page 79 for descriptions of each field.

```
[MacAddress]
CurrentMacAddress=00:80:0F:95:04:00
MacAddressIncrement=1
MaximumMacAddress=00:80:0F:95:04:99
[SerialNumber]
CurrentSerialNumber=00950400
SerialNumberIncrement=1
MaximumSerialNumber=00950499
[String]
ManufacturerString=SMSC
ManufactureEnable=1
ProductString=LAN9500
ProductEnable=1
ConfigurationString=CFG
ConfigurationEnable=0
InterfaceString=I/F
InterfaceEnable=0
[ID]
VendorID=0424
ProductID=9500
[PollingInterval]
HighSpeed=1
FullSpeed=1
[Power]
BusPower=1
RemoteWakeupEnable=0
MaxPower=250
```

11.3 9500TEST.EXE

The 9500TEST.EXE DOS Utility is used to perform basic functionality tests on the device in a production manufacturing environment. Its parameters are provided by command line switches. Upon exit, the utility displays an appropriate status message. It also returns an errcode=0 if it passes, or !=0 if it fails, which is suitable for scripting/batching.

Note: IMPORTANT: A network partner device/system is always required to be in the same network segment as 9500TEST.EXE:

- For the link (`-l`) test options, the network partner can simply be a switch with support for the 4 combinations of link and duplex.
- If the data passing option (`-d master`) is used, the network partner should be a station in the same network segment with ping echo capabilities.

The 9500TEST.EXE command line switches are used as follows:

```
9500TEST (-l <link_mode> -d <data_mode> -i <ip_address> -I <ip_address>
-V <Vendor_ID> -P <Product_ID> -M <MAC_address> -r -q -h)
```

Note: At least one of the `-l` or `-d` options must be specified.

Table 11.2 9500TEST.EXE Command Switch Definitions

COMMAND SWITCH	DESCRIPTION
`-l <link_mode>`	The utility will attempt to autonegotiate using one of the following restricted negotiation “link mode” capabilities: “`10hd`” - for 10BASE-T Half-Duplex “`10fd`” - for 10BASE-T Full-Duplex “`100hd`” - for 100BASE-TX Half-Duplex “`100fd`” - for 100BASE-TX Full-Duplex If the “`-d ping`” option is present, the -l will be performed first. If the “`-d iloopback`” or “`-d eloopback`” option is present, the -l option will be ignored.
`-d <data_mode>`	The utility will perform data passing tests. Valid `data_mode` values are “`ping`”, “`iloopback`”, or “`eloopback`”. If the option selected is “`ping`”, the utility will send a few packets and expect to receive them back from the partner. If the option selected is “`iloopback`”, the utility will test with internal loopback mode and no partner is required. If the option selected is “`eloopback`”, the utility will send a few packets, expecting to receive the same packets from the external loopback partner. An external loopback plug is required to use this operation.
`-i <ip_address>`	This option sets the IP address of the LAN9500/LAN9500i device. It is required when the “`-d ping`” option is present.
`-I <ip_address>`	This option sets the partner’s IP address. It is required when the “`-d ping`” option is present.
`-V <Vendor_ID>`	Specifies the Vendor ID to identify the device. This command switch is optional, buit if used, must be used with the `-P` command switch. If not specified, the internal chip ID register will be used to identify the device.
`-P <Product_ID>`	Specifies the Product ID to identify the device. This command switch is optional, buit if used, must be used with the `-V` command switch. If not specified, the internal chip ID register will be used to identify the device.

Table 11.2 9500TEST.EXE Command Switch Definitions (continued)

COMMAND SWITCH	DESCRIPTION
`-M <MAC_address>`	Specifies the MAC address to be written into the MAC address register instead of reading it from EEPROM
`-r`	Reloads the Ethernet EEPROM contents before beginning the test
`-q`	Quiet operation
`-h`	Displays help menu

Note: At least one of the `-l` or `-d` options must be specified.

APPENDIX A: EEPROM

A.1 EEPROM Format

The EEPROM format for data storage varies by device. The following sections detail the EEPROM contents for each device:

- LAN9500/LAN9500i EEPROM Format
- LAN9500A/LAN9500Ai EEPROM Format
- LAN9512 EEPROM Format
- LAN9514 EEPROM Format

All EEPROM offsets are given in units of 16-bit word offsets. A length field with a value of zero indicates that the field does not exist in the EEPROM. The device will use the field’s HW default value in this case.

Note: For Device Descriptors, the only valid values for the length are 0 and 18.

Note: For Configuration and Interface Descriptors, the only valid values for the length are 0 and 18.

Note: The EEPROM programmer must ensure that if a String Descriptor does not exist in the EEPROM, the referencing descriptor must contain 00h for the respective string index field.

Note: If all string descriptor lengths are zero, then a Language ID will not be supported.

A.1.1 LAN9500/LAN9500i EEPROM Format

Table A.1 LAN9500/LAN9500i EEPROM Format

EEPROM ADDRESS	EEPROM CONTENTS
00h	0xA5
01h	MAC Address [7:0]
02h	MAC Address [15:8]
03h	MAC Address [23:16]
04h	MAC Address [31:24]
05h	MAC Address [39:32]
06h	MAC Address [47:40]
07h	Full-Speed Polling Interval for Interrupt Endpoint
08h	Hi-Speed Polling Interval for Interrupt Endpoint
09h	Configuration Flags
0Ah	Language ID Descriptor [7:0]
0Bh	Language ID Descriptor [15:8]
0Ch	Manufacturer ID String Descriptor Length (bytes)
0Dh	Manufacturer ID String Descriptor EEPROM Word Offset

Table A.1 LAN9500/LAN9500i EEPROM Format (continued)

0Eh	Product Name String Descriptor Length (bytes)
0Fh	Product Name String Descriptor EEPROM Word Offset
10h	Serial Number String Descriptor Length (bytes)
11h	Serial Number String Descriptor EEPROM Word Offset
12h	Configuration String Descriptor Length (bytes)
13h	Configuration String Descriptor Word Offset
14h	Interface String Descriptor Length (bytes)
15h	Interface String Descriptor Word Offset
16h	Hi-Speed Device Descriptor Length (bytes)
17h	Hi-Speed Device Descriptor Word Offset
18h	Hi-Speed Configuration and Interface Descriptor Length (bytes)
19h	Hi-Speed Configuration and Interface Descriptor Word Offset
1Ah	Full-Speed Device Descriptor Length (bytes)
1Bh	Full-Speed Device Descriptor Word Offset
1Ch	Full-Speed Configuration and Interface Descriptor Length (bytes)
1Dh	Full-Speed Configuration and Interface Descriptor Word Offset

Note: EEPROM byte addresses past 1Dh can be used to store data for any purpose.

Table A.2 describes the LAN9500/LAN9500i Configuration Flags.

Table A.2 LAN9500/LAN9500i Configuration Flags Description

BIT	NAME	DESCRIPTION
7:3	**RESERVED**	-
2	Remote Wakeup Support	0 = The device does not support remote wakeup. 1 = The device supports remote wakeup.
1	**RESERVED**	-
0	Power Method	0 = The device is bus powered. 1 = The device is self powered.

A.1.2 LAN9500A/LAN9500Ai EEPROM Format

Table A.3 LAN9500A/LAN9500Ai EEPROM Format

EEPROM ADDRESS	EEPROM CONTENTS
00h	0xA5
01h	MAC Address [7:0]
02h	MAC Address [15:8]
03h	MAC Address [23:16]
04h	MAC Address [31:24]
05h	MAC Address [39:32]
06h	MAC Address [47:40]
07h	Full-Speed Polling Interval for Interrupt Endpoint
08h	Hi-Speed Polling Interval for Interrupt Endpoint
09h	Configuration Flags
0Ah	Language ID Descriptor [7:0]
0Bh	Language ID Descriptor [15:8]
0Ch	Manufacturer ID String Descriptor Length (bytes)
0Dh	Manufacturer ID String Descriptor EEPROM Word Offset
0Eh	Product Name String Descriptor Length (bytes)
0Fh	Product Name String Descriptor EEPROM Word Offset
10h	Serial Number String Descriptor Length (bytes)
11h	Serial Number String Descriptor EEPROM Word Offset
12h	Configuration String Descriptor Length (bytes)
13h	Configuration String Descriptor Word Offset
14h	Interface String Descriptor Length (bytes)
15h	Interface String Descriptor Word Offset
16h	Hi-Speed Device Descriptor Length (bytes)
17h	Hi-Speed Device Descriptor Word Offset
18h	Hi-Speed Configuration and Interface Descriptor Length (bytes)
19h	Hi-Speed Configuration and Interface Descriptor Word Offset
1Ah	Full-Speed Device Descriptor Length (bytes)
1Bh	Full-Speed Device Descriptor Word Offset
1Ch	Full-Speed Configuration and Interface Descriptor Length (bytes)
1Dh	Full-Speed Configuration and Interface Descriptor Word Offset

Table A.3 LAN9500A/LAN9500Ai EEPROM Format (continued)

1Eh	GPIO7:0 Wakeup Enables Bit x = 0 -> GPIOx Pin Disabled for Wakeup Use Bit x = 1 -> GPIOx Pin Enabled for Wakeup Use
1Fh	GPI010:8 Wakeup Enables Bit x = 0 -> GPIO(x+8) Pin Disabled for Wakeup Use Bit x = 1 -> GPIO(x+8) Pin Enabled for Wakeup Use **Note:** Bits 7:3 Unused
20h	GPIO PME Flags

Note: EEPROM byte addresses past 20h can be used to store data for any purpose.

Table A.4 describes the Configuration Flags.

Table A.4 LAN9500A/LAN9500Ai Configuration Flags

BIT	NAME	DESCRIPTION
7:6	**RESERVED**	-
5:4	**PHY Boost**	This field provides the ability to boost the electrical drive strength of the HS output current to the upstream port. 00 = Normal electrical drive strength 01 = Elevated electrical drive strength (+4% boost) 10 = Elevated electrical drive strength (+8% boost) 11 = Elevated electrical drive strength (+12% boost)
3	**RESERVED**	-
2	**Remote Wakeup Support**	0 = The device does not support remote wakeup. 1 = The device supports remote wakeup.
1	**LED Select**	This bit determines the functionality of external LED pins. (see table below)
0	**Power Method**	0 = The device is bus powered. 1 = The device is self powered.

BIT VALUE	PIN NAME	FUNCTION
0	nSPD_LED	Speed Indicator
	nLNKA_LED	Link and Activity Indicator
	nFDX_LED	Full Duplex Link Indicator
1	nSPD_LED	Speed Indicator
	nLNKA_LED	Link Indicator
	nFDX_LED	Activity Indicator

Table A.5 describes the GPIO PME flags.

Table A.5 LAN9500A/LAN9500Ai GPIO PME Flags

BIT	NAME	DESCRIPTION
7	**GPIO PME Enable**	Setting this bit enables the assertion of the GPIO0 or GPIO8 pin, as a result of a Wakeup (GPIO) pin, Magic Packet, or PHY Link Up. The host processor may use the GPIO0/GPIO8 pin to asynchronously wake up, in a manner analogous to a PCI PME pin. GPIO0 signals the event when operating in Internal PHY mode, while GPIO8 signals the event when operating in External PHY mode. Internal or External PHY mode of operation is dictated by the PHY_SEL pin. 0 = The device does not support GPIO PME signaling. 1 = The device supports GPIO PME signaling. **Note:** When this bit is 0, the remaining GPIO PME parameters in this flag byte are ignored.
6	**GPIO PME Configuration**	This bit selects whether the GPIO PME is signaled on the GPIO pin as a level or a pulse. If pulse is selected, the duration of the pulse is determined by the setting of the GPIO PME Length bit of this flag byte. The level of the signal or the polarity of the pulse is determined by the GPIO PME Polarity bit of this flag byte. 0 = GPIO PME is signaled via a level. 1 = GPIO PME is signaled via a pulse. **Note:** If GPIO PME Enable is 0, this bit is ignored.
5	**GPIO PME Length**	When the GPIO PME Configuration bit of this flag byte indicates that the GPIO PME is signaled by a pulse on the GPIO pin, this bit determines the duration of the pulse. 0 = GPIO PME pulse length is 1.5 mS. 1 = GPIO PME pulse length is 150 mS. **Note:** If GPIO PME Enable is 0, this bit is ignored.
4	**GPIO PME Polarity**	Specifies the level of the signal or the polarity of the pulse used for GPIO PME signaling. 0 = GPIO PME signaling polarity is low. 1 = GPIO PME signaling polarity is high. **Note:** If GPIO PME Enable is 0, this bit is ignored.
3	**GPIO PME Buffer Type**	This bit selects the output buffer type for GPIO0/GPIO8. 0 = Open drain driver / open source 1 = Push-Pull driver **Note:** Buffer Type = 0, Polarity = 0 implies Open Drain Buffer Type = 0, Polarity = 1 implies Open Source **Note:** If GPIO PME Enable is 0, this bit is ignored.
2	**GPIO PME WOL Select**	Three types of wakeup events are supported; Magic Packet, PHY Link Up, and Wakeup Pin(s) assertion. Wakeup Pin(s) are selected via the GPIO Wakeup Enables specified in bytes 1Eh and 1Fh of the EEPROM. This bit selects whether Magic packet or Link Up wakeup events are supported. 0 = Magic packet wakeup supported. 1 = PHY linkup wakeup supported. (not supported in External PHY mode) **Note:** If GPIO PME Enable is 0, this bit is ignored.

Table A.5 LAN9500A/LAN9500Ai GPIO PME Flags (continued)

BIT	NAME	DESCRIPTION
1	**GPIO10 Detection Select**	This bit selects the detection mode for GPIO10 when operating in PME mode. In PME mode, GPIO10 is usable in both Internal and External PHY mode as a wakeup pin. This parameter defines whether the wakeup should occur on an active high or active low signal. 0 = Active-low detection for GPIO10 1 = Active-high detection for GPIO10 **Note:** If GPIO PME Enable is 0, this bit is ignored.
0	**RESERVED**	-

A.1.3 LAN9512 EEPROM Format

Table A.6 LAN9512 EEPROM Format

EEPROM ADDRESS	EEPROM CONTENTS
00h	0xA5
01h	MAC Address [7:0]
02h	MAC Address [15:8]
03h	MAC Address [23:16]
04h	MAC Address [31:24]
05h	MAC Address [39:32]
06h	MAC Address [47:40]
07h	Full-Speed Polling Interval for Interrupt Endpoint
08h	Hi-Speed Polling Interval for Interrupt Endpoint
09h	Configuration Flags
0Ah	Language ID Descriptor [7:0]
0Bh	Language ID Descriptor [15:8]
0Ch	Manufacturer ID String Descriptor Length (bytes)
0Dh	Manufacturer ID String Descriptor EEPROM Word Offset
0Eh	Product Name String Descriptor Length (bytes)
0Fh	Product Name String Descriptor EEPROM Word Offset
10h	Serial Number String Descriptor Length (bytes)
11h	Serial Number String Descriptor EEPROM Word Offset
12h	Configuration String Descriptor Length (bytes)
13h	Configuration String Descriptor Word Offset

Table A.6 LAN9512 EEPROM Format (continued)

14h	Interface String Descriptor Length (bytes)
15h	Interface String Descriptor Word Offset
16h	Hi-Speed Device Descriptor Length (bytes)
17h	Hi-Speed Device Descriptor Word Offset
18h	Hi-Speed Configuration and Interface Descriptor Length (bytes)
19h	Hi-Speed Configuration and Interface Descriptor Word Offset
1Ah	Full-Speed Device Descriptor Length (bytes)
1Bh	Full-Speed Device Descriptor Word Offset
1Ch	Full-Speed Configuration and Interface Descriptor Length (bytes)
1Dh	Full-Speed Configuration and Interface Descriptor Word Offset
1Eh-1Fh	RESERVED
20h	Vendor ID LSB Register (VIDL)
21h	Vendor ID MSB Register (VIDM)
22h	Product ID LSB Register (PIDL)
23h	Product ID MSB Register (PIDM)
24h	Device ID LSB Register (DIDL)
25h	Device ID MSB Register (DIDM)
26h	Config Data Byte 1 Register (CFG1)
27h	Config Data Byte 2 Register (CFG2)
28h	Config Data Byte 3 Register (CFG3)
29h	Non-Removable Devices Register (NRD)
2Ah	Port Disable (Self) Register (PDS)
2Bh	Port Disable (Bus) Register (PDB)
2Ch	Max Power (Self) Register (MAXPS)
2Dh	Max Power (Bus) Register (MAXPB)
2Eh	Hub Controller Max Current (Self) Register (HCMCS)
2Fh	Hub Controller Max Current (Bus) Register (HCMCB)
30h	Power-on Time Register (PWRT)
31h	Boost_Up Register (BOOSTUP)
32h	RESERVED
33h	Boost_3:2 Register (BOOST32)
34h	RESERVED
35h	Port Swap Register (PRTSP)

Table A.6 LAN9512 EEPROM Format (continued)

36h	Port Remap 12 Register (PRTR12)
37h	Port Remap 3 Register (PRTR3)
38h	RESERVED
39h	Status/Command Register (STCD)

Note: EEPROM byte addresses past 39h can be used to store data for any purpose.

Table A.7 describes the LAN9512 Configuration Flags.

Table A.7 LAN9512 Configuration Flags Description

BIT	NAME	DESCRIPTION
7:3	**RESERVED**	00000b
2	Remote Wakeup Support	0 = The device does not support remote wakeup. 1 = The device supports remote wakeup.
1	**RESERVED**	0b
0	Power Method	0 = The device Controller is bus powered. 1 = The device Controller is self powered.

A.1.4 LAN9514 EEPROM Format

Table A.8 LAN9514 EEPROM Format

EEPROM ADDRESS	EEPROM CONTENTS
00h	0xA5
01h	MAC Address [7:0]
02h	MAC Address [15:8]
03h	MAC Address [23:16]
04h	MAC Address [31:24]
05h	MAC Address [39:32]
06h	MAC Address [47:40]
07h	Full-Speed Polling Interval for Interrupt Endpoint
08h	Hi-Speed Polling Interval for Interrupt Endpoint
09h	Configuration Flags
0Ah	Language ID Descriptor [7:0]
0Bh	Language ID Descriptor [15:8]
0Ch	Manufacturer ID String Descriptor Length (bytes)

Table A.8 LAN9514 EEPROM Format (continued)

0Dh	Manufacturer ID String Descriptor EEPROM Word Offset
0Eh	Product Name String Descriptor Length (bytes)
0Fh	Product Name String Descriptor EEPROM Word Offset
10h	Serial Number String Descriptor Length (bytes)
11h	Serial Number String Descriptor EEPROM Word Offset
12h	Configuration String Descriptor Length (bytes)
13h	Configuration String Descriptor Word Offset
14h	Interface String Descriptor Length (bytes)
15h	Interface String Descriptor Word Offset
16h	Hi-Speed Device Descriptor Length (bytes)
17h	Hi-Speed Device Descriptor Word Offset
18h	Hi-Speed Configuration and Interface Descriptor Length (bytes)
19h	Hi-Speed Configuration and Interface Descriptor Word Offset
1Ah	Full-Speed Device Descriptor Length (bytes)
1Bh	Full-Speed Device Descriptor Word Offset
1Ch	Full-Speed Configuration and Interface Descriptor Length (bytes)
1Dh	Full-Speed Configuration and Interface Descriptor Word Offset
1Eh-1Fh	RESERVED
20h	Vendor ID LSB Register (VIDL)
21h	Vendor ID MSB Register (VIDM)
22h	Product ID LSB Register (PIDL)
23h	Product ID MSB Register (PIDM)
24h	Device ID LSB Register (DIDL)
25h	Device ID MSB Register (DIDM)
26h	Config Data Byte 1 Register (CFG1)
27h	Config Data Byte 2 Register (CFG2)
28h	Config Data Byte 3 Register (CFG3)
29h	Non-Removable Devices Register (NRD)
2Ah	Port Disable (Self) Register (PDS)
2Bh	Port Disable (Bus) Register (PDB)
2Ch	Max Power (Self) Register (MAXPS)
2Dh	Max Power (Bus) Register (MAXPB)
2Eh	Hub Controller Max Current (Self) Register (HCMCS)

Table A.8 LAN9514 EEPROM Format (continued)

2Fh	Hub Controller Max Current (Bus) Register (HCMCB)
30h	Power-on Time Register (PWRT)
31h	Boost_Up Register (BOOSTUP)
32h	Boost_5 Register (BOOST5)
33h	Boost_4:2 Register (BOOST42)
34h	RESERVED
35h	Port Swap Register (PRTSP)
36h	Port Remap 12 Register (PRTR12)
37h	Port Remap 34 Register (PRTR34)
38h	Port Remap 5 Register (PRTR5)
39h	Status/Command Register (STCD)

Note: EEPROM byte addresses past 39h can be used to store data for any purpose.

Table A.9 describes the LAN9514 Configuration Flags.

Table A.9 LAN9514 Configuration Flags Description

BIT	NAME	DESCRIPTION
7:3	**RESERVED**	00000b
2	Remote Wakeup Support	0 = The device does not support remote wakeup. 1 = The device supports remote wakeup.
1	**RESERVED**	0b
0	Power Method	0 = The device Controller is bus powered. 1 = The device Controller is self powered.

A.2 EEPROM Programming

EEPROM programming is performed differently depending on the OS used. This chapter details the various methods of programming the device EEPROM:

- EEPROM Programming in Windows
- EEPROM Programming in DOS
- EEPROM Programming in Linux
- EEPROM Programming in Windows CE

A.2.1 EEPROM Programming in Windows

EEPROM programming in Windows is accomplished via the Windows Manufacturing Utility. Refer to Chapter 10, "Windows Manufacturing Utility," on page 70 for detailed information on the usage of this tool.

A.2.2 EEPROM Programming in DOS

EEPROM programming in DOS is accomplished via the DOS Utility Suite. Refer to Chapter 11, "DOS Utility Suite," on page 89 for detailed information on the usage of these tools.

A.2.3 EEPROM Programming in Linux

In Linux, there are two available methods to read and modify the device's EEPROM:

- ethtool
- cmd9500

A.2.3.1 ethtool

Using standard "ethtool" commands, the device EEPROM can be read or written.

To read the EEPROM contents, use ethtool as follows:

```
ethtool -e|--eeprom-dump ethX [raw on|off] [offset N] [length N]
```

The "`-e`" option retrieves and prints an EEPROM dump for the specified device. When `raw` is enabled, the raw EEPROM data is dumped to stdout. The `length` and `offset` parameters allow dumping of only the specified portions of the EEPROM. By default, the entire EEPROM is dumped.

To write the EEPROM contents, use ethtool as follows:

```
ethtool -E|--change-eeprom ethX [magic N] [offset N] [value N]
```

The "`-E`" option writes to the EEPROM of the specified device. The `offset` and `value` parameters specify the byte to be written and it's new value, respectively. The `magic` parameter is used to provide the device-specific magic key (0x9500 for the LAN9500/LAN9500i), preventing accidental writing to the EEPROM.

A.2.3.2 cmd9500

Using the SMSC utility "cmd9500", the device EEPROM can be read or written. The cmd9500 utility is used as follows:

```
./cmd9500 [-h] [-e adaptername] [-c command] [-a address] [-d data] [-f filename]
```

The cmd9500 options are defined in Table A.10.

Table A.10 cmd9500 Option Descriptions

OPTION	DESCRIPTION
`-h`	Displays command usage information, other options are ignored.
`-e`	Specifies the adapter name (eth0,eth1...). If no adapter name is specified, cmd9500 will attempt to auto-detect.
`-c`	Specifies the command code: DUMP_EEPROM = dumps the EEPROM contents READ_EEPROM = reads a value from the EEPROM at the specified address WRITE_EEPROM = writes a value to the EEPROM at the specified address WRITE_FILE_TO_EEPROM = writes the specified binary file contents (`-f`) into EEPROM READ_EEPROM_TO_FILE = reads EEPROM and writes contents to the specified binary file (`-f`) VERIFY_EEPROM_WITH_FILE = compares EEPROM contents with the specified binary file (`-f`)
`-a`	The EEPROM address to be read/written
`-d`	Data to be written in hexadecimal format
`-f`	Specifies the file name used for WRITE_FILE_TO_EEPROM, READ_EEPROM_TO_FILE, and VERIFY_EEPROM_WITH_FILE commands

A.2.4 EEPROM Programming in Windows CE

In Windows CE, the device EEPROM can be read or written using the `CE9500eep.exe` SMSC utility. The CE9500eep utility can be downloaded from the E-Services section of the SMSC website. To create an E-Services account, visit the SMSC E-Services webpage: https://www2.smsc.com/main.nsf.

To use the CE9500eep utility, double click the CE9500eep icon or run it at the command line. When run, the following options are available:

1. program EEPROM
2. program & Verify EEPROM
3. Read EEPROM

Q. Exit

Selecting option 1 or 2 will write the EEPROM. For these options, the user must provide the EEPROM contents in a binary file located in the `\Windows\` directory. The file name must be `9500.bin`.

Selecting option 3, "Read EEPROM", will read the EEPROM contents to a binary file, `9500.bin`, located in the `\Windows\` directory.

Selecting Q, will exit the application.

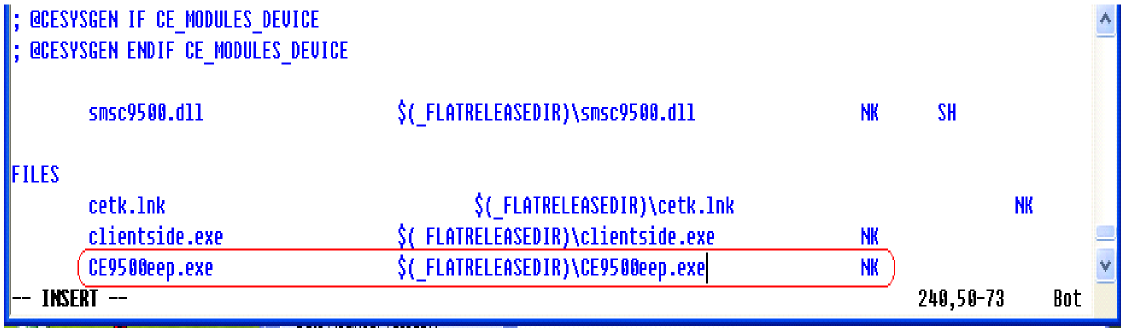
For the latest CE9500eep information, refer to the release readme file.

A.2.4.1 Including CE9500eep.exe in a CE Image

The `CE9500eep.exe` file can be included in a CE image via two methods. If the CE target supports USB mass storage devices, a USB flash drive can be used to copy the `CE9500eep.exe` file to the `\Windows\` folder of the image while the CE device is actually running. The same method ("runtime") is applicable to any other means by which files can be copied into the running CE device.

For those CE targets that do not support USB mass storage devices or any other means of copying files into the running CE device (and therefore require the utility to be built into the image), the following method should be used:

1. Copy the `CE9500eep.exe` file to the `%_TARGETPLATROOT%\FILES\` folder.
2. Edit the `Platform.bib` file in the `%_TARGETPLATROOT%\FILES\` folder to include the `CE9500eep.exe` file into the target image, as shown in Figure A.1.



```
; @CESYSGEN IF CE_MODULES_DEVICE
; @CESYSGEN ENDIF CE_MODULES_DEVICE

        smsc9500.dll             $(_FLATRELEASEDIR)\smsc9500.dll            NK      SH

FILES
        cetk.lnk                          $(_FLATRELEASEDIR)\cetk.lnk                          NK
        clientside.exe           $(_FLATRELEASEDIR)\clientside.exe          NK
        CE9500eep.exe            $(_FLATRELEASEDIR)\CE9500eep.exe           NK
-- INSERT --                                                              240,50-73     Bot
```

Figure A.1 Inserting CE9500eep.exe into Platform.bib

3. Build the CE Image:

   For CE 5.0, Select "Build OS" -> "Sysgen" from Platform Builder 5.0. This will generate the CE image, `NK.BIN`, which will include the `CE9500eep.exe` utility.

   For CE 6.0, Platform Builder is a plug- in under the Visual Studio 2005. Select "Build" -> "Build solution". This will generate the CE image, `NK.BIN`, which will include the `CE9500eep.exe` utility.

A.3 EEPROM-less Design

Reducing BOM costs has prompted many designers to utilize the LAN9500/LAN9500i without EEPROM. The purpose of this appendix section is to:

- Determine if a particular design may utilize the LAN9500/LAN9500i without EEPROM
- Detail the implications of utilizing the LAN9500/LAN9500i without EEPROM
- Explain alternative configuration requirements when utilizing the LAN9500/LAN9500i without EEPROM

Note: Unless otherwise noted, the contents of this section are specifically written for the LAN9500/LAN9500i, LAN9512, and LAN9514 devices. While the LAN9500A device can operate in an EEPROM-less environment in the same way as the previously mentioned devices, the LAN9500A provides enhanced support for EEPROM-less operation. If using a LAN9500A, refer to the LAN9500A Datasheet for additional details on the enhanced EEPROM-less support.

A.3.1 EEPROM Item Defaults and Changeability

Table A.11 details the items stored in the EEPROM. For each individual item, the default contents and the item's changeability when EEPROM is not present are shown. A "Change Required" column provides an overview of whether the default value is suitable when there is no EEPROM.

Table A.11 EEPROM Items Defaults and Changeability

Item	Change Possible	Change Required	Default
Mac Address	Yes	Yes	FF-FF-FF-FF-FF-FF
Full Speed Polling Interval	Note A.1	Note A.3	1ms
High Speed Polling Interval	Note A.1	Note A.3	1ms
Configuration Flags	Note A.2	Note A.3	Bus powered, remote wakeup supported
Maximum Power	No	Note A.3	500mA if bus powered, 2mA if self powered
Vendor ID	No	Note A.3	424h
Product ID	No	Note A.3	9500h
Language ID	No	Note A.3	Not present
Manufacturer String	No	Note A.3	Not present
Product String	No	Note A.3	Not present
Serial Number String	No	Note A.3	Not present
Configuration String	No	Note A.3	Not present
Interface String	No	Note A.3	Not present
Full Speed Device Descriptor	No	Note A.3	No strings, 424/9500 Vendor/Product ID
Full Speed Config Descriptor	No	Note A.3	No string, others per Config Flags & MaxPow
High Speed Device Descriptor	No	Note A.3	No strings, 424/9500 Vendor/Product ID
High Speed Config Descriptor	No	Note A.3	No string, others per Config Flags & MaxPow

Note A.1 The information on the endpoint descriptor itself cannot be changed. However, the polling interval used when submitting interrupt transactions may be changed depending on the OS. Refer to Section A.3.4.2, "Overriding USB Behavioral Parameters" for additional information.

Note A.2 Configuration Flags can be overwritten by PWR_SEL and RMT_WKP straps. Remote wake up behavior can be modified in some operating systems despite the value returned by the Config descriptor.

Note A.3 Depends on the particular device application.

A.3.2 Determining EEPROM Necessity

When utilizing the device without EEPROM, the following limitations are established:

- Standard USB requests will be answered with the non-changeable default values detailed in Table A.11.
- Items that are listed as changeable in Table A.11 can be changed via software only.

If the above limitations are acceptable to the designer, then the device may be used without EEPROM. Otherwise, the designer must use EEPROM.

Note: Using the device without EEPROM requires additional software development effort by the designer to modify the changeable items in Table A.11 from their default values. Details on how to change these values via software are provided in Section A.3.4.1, "Overriding the MAC Address" and Section A.3.4.2, "Overriding USB Behavioral Parameters".

A.3.3 Utilizing Unchangeable Defaults

As detailed in Table A.11, there are many parameters that cannot be changed if the device is used without EEPROM. The following sub-sections detail typical examples of these cases.

Note: These examples are intended to illustrate the main limitations of EEPROM-less design. They are not exhaustive, and do not represent all possible design cases.

A.3.3.1 Example 1 - Missing Manufacturer and Product Strings

<u>An EEPROM-less design will not contain any strings, including Manufacturer and Product strings.</u>

Several implementations of USB System software (i.e. Windows XP/Vista, Mac OSX, etc.) display information about devices based on Manufacturer/Product strings as part of their plug and play discovery and/or bus browsing applications. Without EEPROM, the design will not be able to provide Company or Product specific names in these scenarios (PnP discovery, USB device browsers).

A.3.3.2 Example 2 - Missing Serial Number

<u>An EEPROM-less design will not contain any strings, including the Serial Number string.</u>

In many cases it is desirable to associate software configuration items (i.e.: manually assigned IP addresses, wake up configurations, etc.) with a particular device if the device is moved from one USB port to a another, and/or more than one LAN9500/LAN9500i is used simultaneously in the same system (connected to different USB ports). Environments such as Windows use the serial number string in order to uniquely identify a device in these conditions. Using an EEPROM-less configuration will provide an unsuccessful experience in this scenario.

A.3.3.3 Example 3 - Maximum Power

<u>An EEPROM-less design will use a Configuration descriptor that specifies maximum power consumption of 500 mA for a bus powered configuration, or 2 mA for a self powered configuration.</u>

In most cases these values are acceptable since they specify the maximum allowable power for a bus powered device (the device is nevertheless allowed to consume less); or the minimum for a self powered device (value specifies power drawn from the bus, but self powered devices will most likely take all their power from their self-source rather than the bus). If other values are required for a particular application, EEPROM is required.

A.3.4 Modification of Changeable Defaults

As shown in Table A.11, the MAC address MUST always be changed. This is the only item that must be changed in all cases.

A.3.4.1 Overriding the MAC Address

As per Ethernet 802.3 standards, the permanent MAC address for every device worldwide must be unique, and the MAC address for every device in a network (even if locally assigned instead of using its permanent address) must be unique. The permanent MAC Address for the device is provided from EEPROM. However, if a design does not utilize EEPROM, the default value is FF-FF-FF-FF-FF-FF. This value must be changed for two reasons:

- It is not unique
- It is the broadcast address and therefore invalid as a device's MAC address

During runtime operation, the MAC Address resides in two registers: ADDR_HI and ADDR_LO. When an EEPROM is present, these registers are automatically loaded from the EEPROM during a power up or reload operation. If an EEPROM is not present, changing these two registers during the device's software initialization allows the device to properly operate. Therefore, designs which can load the MAC address registers via software at device initialization can specify a unique MAC Address, alleviating conflicts.

Software based MAC address overrides can be accomplished via the following methods:

- MAC Address Overrides using Custom Software
- MAC Address Overrides using Off-The-Shelf Software Solutions
- MAC Address Overrides using Descriptor RAM
- MAC Address Overrides using Modified LAN9500/LAN9500i Drivers

A.3.4.1.1 MAC ADDRESS OVERRIDES USING CUSTOM SOFTWARE

In cases where the designer is utilizing custom software or has access to modify the source code of the USB/Network software used in the host system, complete control over the device MAC address is possible. This is accomplished by configuring the USB device to allow register writes, overwriting the MAC address registers before any other data is sent or received.

A.3.4.1.2 MAC ADDRESS OVERRIDES USING OFF-THE-SHELF SOFTWARE SOLUTIONS

When using an off-the-shelf software solution, the designer may not have access to modify the USB/Network Host software, the LAN9500/LAN9500i driver, or both. In these cases, careful evaluation is required to determine if the chosen software solution provides hooks to override the MAC address and evaluate how the solution will fit within the application implementation.

The following sub-sections detail examples of utilizing off-the-self software solutions under various operating systems.

Note: Additional details regarding specific parameters (registry, info-plist, insmod, etc.) can be found in the respective LAN9500/LAN9500i driver documentation.

Windows XP/Vista

Windows provides a "Network Address" registry parameter. If this key is present in the registry instance of the LAN9500/LAN9500i device (this can be easily done through the advanced properties of the device), the driver reads the key and uses it to populate the MAC address registers during the driver initialization. This solution requires the designer to generate a unique registry image for each system or alternatively read the information from elsewhere and populate the registry entry before the device driver loads.

Mac OSX

The LAN9500/LAN9500i Mac OSX driver does not currently support MAC address overrides. Support may be added in a future release by use of an info-plist parameter or other existing Mac OSX infrastructure.

Linux

The LAN9500/LAN9500i driver provides a load time option to specify the MAC address of the device. This is achieved by using the mac_addr_hi16 and mac_addr_lo32 insmod parameters. Note that these parameters override all instances of the device, so they cannot be used if more than one device is in use simultaneously. Similar to the Windows XP/Vista case, this solution requires the generation of a unique loading script for each system at image burn time, or alternatively, the information can be read from elsewhere and the LAN9500/LAN9500i load script modified before the device driver is loaded. Additionally, because the LAN9500/LAN9500i Linux driver source code is open, a custom solution may be devised. Refer to Section A.3.4.1.4, "MAC Address Overrides using Modified LAN9500/LAN9500i Drivers" for additional information.

Windows CE

Overrides are supported in the same way as the Windows XP/Vista driver. Alternatively, WinCE source code is provided by SMSC, allowing designers to create their own solution. Refer to Section A.3.4.1.4, "MAC Address Overrides using Modified LAN9500/LAN9500i Drivers" for additional information.

A.3.4.1.3 MAC ADDRESS OVERRIDES USING DESCRIPTOR RAM

Beginning in April 2009, SMSC added a new standardized method to the regular release of Windows, Windows CE, Linux, and PXE drivers which allows pre-OS boot software (i.e., PC Bios) to pass MAC address information to the driver.

A special area inside of the device (descriptor RAM) may be filled by the pre-OS boot software with the format shown in Table A.12. The definitions of each byte are detailed in Table A.13.

Table A.12 Descriptor RAM Contents

Address	Byte 3	Byte 2	Byte 1	Byte 0
0x0	‘s’ (0x73)	‘m’ (0x6D)	‘s’ (0x73)	‘c’ (0x63)
0x4	ADDRL			
0x8	ADDRH			
0xC	~CRC16		CRC16	

Table A.13 Descriptor RAM Definitions

Item	Description
First Byte (Address0x0)	The first byte contains the “smsc” signature (0x736D7363).
ADDRL	Contains the low address bytes of the desired Ethernet address. This value will be written to the ADDRL register.
ADDRH	Contains the high address bytes of the desired Ethernet address. This value will be written to the ADDRH register.
CRC16	Contains the 16-bit “IP-style” CRC of the array of bytes from address 0x00 to 0x0B.
~CRC16	Contains the bitwise-xor of the CRC16 and 0xFFFF.

Note: For example, if the desired Ethernet address is 00:12:34:56:78:9A, ADDRL should be 0x56341200 and ADDRH should be 0x00009A78.

SMSC standard drivers for Windows, Windows CE, Linux and PXE released after April 15th, 2009 will check for the presence of this information. If found, and the CRCs are validated, the driver will use this information to populate the MAC address registers of the device.

IMPORTANT NOTES:

- In order to program the descriptor RAM, a set of operations with the registers of the LAN9500 device need to be performed. Sample code illustrating these registers operations, as well as the CRC16 generation routine, is available via the E-Services portion of the SMSC website. Refer to https://www2.smsc.com/main.nsf for additional information.
- Writing to the device registers implies that the preOS-boot environment being used is able to perform USB enumeration (to find the device) and later perform USB vendor command transfers on the device.
- The LAN9500A provides an enhanced variation of EEPROM-less operation for pre-OS boot environments that allows customization of not only the MAC address, but all of the USB descriptors as well. Drivers released after April 15th, 2009 fully support this LAN9500A mode of operation. Refer to the LAN9500A specification for details.

A.3.4.1.4 MAC ADDRESS OVERRIDES USING MODIFIED LAN9500/LAN9500I DRIVERS

As mentioned in Section A.3.4.1.2, "MAC Address Overrides using Off-The-Shelf Software Solutions"previously, there are several off-the-shelf drivers for which the LAN9500/LAN9500i driver's source code is available. In these cases, if solutions such as generating a unique flash image for each system and/or modifying registry/load scripts before driver initialization are not optimal, it is also possible to modify the drivers directly.

In order to show the possibilities of what can be accomplished via driver customization, an example is provided below. Please note that this example does not represent an exhaustive solution for all applications. Because each particular application/implementation will be unique, this example is intended to present general guidelines only.

Example:
Implementing a function or separate module that reads the MAC Address data on demand

To correctly assign the MAC address to the device, it must be populated not only before the device starts receiving and sending data, but also before upper layers of the networking stack are notified. If the MAC address has not been communicated to the driver via standard registry keys or load time parameters, then it must be communicated to (or procured by) the driver in some other way during early initialization.

One solution to this problem is a custom written function that is called early-on during driver initialization to fetch the MAC address from it's specific location in storage (i.e. flash image address). If the designer is not concerned with modularity and does not break any host software rules, the entire function can be completely embedded within the LAN9500/LAN9500i driver. This function can then be called very early-on, during the driver initialization, and have all the MAC address information readily available by the time it is required.

While achieving the same result, a more elegant solution is to create a separate module that is loaded before the LAN9500/LAN9500i driver (or loaded on demand by the LAN9500/LAN9500i driver). This module would retrieve the MAC address information from it's specific location in storage (i.e. flash image address) and expose an interface (i.e.: exported function, IOCTL, etc.) for the LAN9500/LAN9500i driver to call when the MAC address information is needed.

A.3.4.2 Overriding USB Behavioral Parameters

While the MAC address value MUST be changed from its default in all cases, there are other parameters that depend on the application. USB descriptor values are fixed once the decision is made to not use an EEPROM and the straps are selected. However, some USB host software behaviors which are set through the USB descriptors can, in some cases, still be modified on-the-fly.

Similar to the case of the MAC address discussed in Section A.3.4.1, "Overriding the MAC Address", if custom software is created, the designer has the control to modify almost any desired USB behavior.

Similar to what was discussed in Section A.3.4.1.4, "MAC Address Overrides using Modified LAN9500/LAN9500i Drivers", if the host software allows modification, custom parameters can be stored elsewhere in the system (flash image address) and procured by the driver at initialization time.

When utilizing off-the-shelf OS/driver software, the following items should be noted:

Interrupt Polling Interval Override

Most SMSC drivers do not use the LAN9500/LAN9500i interrupt endpoint in it's default configuration, but allow for alternative modes that do. If use of the interrupt endpoint is required and the 1ms default polling interval the device uses for an EEPROM-less configuration is not optimal, it is possible to override it at initialization time in Mac OSX and Linux, but not in Windows.

Other USB Behavioral Parameter Overrides

In addition to the polling interval, some USB Host software environments may allow the designer to disregard information read from the standard descriptors and override them with custom information. Please check with the specific software environment used to verify if this option is available.

A.3.5 Typical Cases

Two typical LAN9500/LAN9500i design cases are detailed below. For each, the ability to function without EEPROM is assessed.

Stand alone USB-to-Ethernet dongle for the PC environment

The device is disassociated (and typically shipped separately) from the system, so a MAC address must be assigned by the device itself with no system interaction. Also, it is desirable to be able to use several devices simultaneously, or maintain per device parameters when moving across different USB ports in the same system. Therefore a serial number string is needed. Finally USB guidelines require the manufacturer to use it's own USB Manufacturer ID, not SMSC's. Given all the above, an attached EEPROM is required.

Soldered down LAN9500/LAN9500i with flash space available for LAN9500/LAN9500i Information which can be read at initialization time & can function with unchangeable defaults

Since the device is soldered down there is a one-to-one correspondence between the host and the LAN9500/LAN9500i as well as the specific USB port it is connected to. There is storage in flash for the MAC address and other device unique parameters and the design permits reading them early at initialization time. Finally, the design is able to function properly with unchangeable parameters. Therefore, there are no limitations preventing the usage of an EEPROM-less design.

APPENDIX B: Customer Requirements

This appendix details various customer requirements for device utilization, which include the following:

- MAC Address
- USB Vendor ID and Logo
- Serial Number
- WHQL Logo

B.1 MAC Address

If an organization manufactures or plans to manufacture products using ISO/IEC 8802 standards, it must obtain an Organizationally Unique Identifier (OUI) from the Institute of Electrical and Electronics Engineers, Inc. (IEEE). The three-octet OUI can be used to generate Universal LAN MAC addresses and Protocol Identifiers, per the ANSI/IEEE 802 standard, for use in Local and Metropolitan Area Network applications.

The IEEE has been designated by the ISO Council to act as the single, world-wide registration authority for the implementation of International Standards in the ISO/IEC 8802 series. For further details contact:

IEEE Registration Authority
IEEE Standards Department
445 Hoes Lane
Piscataway NJ 08854

Phone: (732) 465-6481
Fax: (732) 562-1571
E-mail: IEEE Registration Authority
Web: http://standards.ieee.org/regauth/oui/index.shtml

B.2 USB Vendor ID and Logo

Obtaining a USB vendor ID is recommended for all applications. For information on obtaining a Vendor ID, refer to the following USB organization website link:

http://www.usb.org/developers/vendor/

Note: The USB-IF logos may be used only in conjunction with products that have passed USB-IF compliance testing and are currently on the integrators list. This requires that the company be assigned a USB Vendor ID number.

Although SMSC silicon has passed all compliance tests, final stand alone products must also go through the compliance testing process. The company must have a unique Vendor ID to satisfy the USB-IF requirements. However, if the company decides not to use the USB logo for stand alone devices or if the product is a soldered down device, the company may use the SMSC VID and PID.

B.3 Serial Number

In many cases it is desirable to associate software configuration items (i.e., manually assigned IP addresses, wake up configurations, etc.) with a particular device. This allows the device to be moved from one USB port to a another and/or be used simultaneously with more than one SMSC device in the same system (connected to different USB ports). Environments such as Windows use the serial number string in order to uniquely identify a device in these conditions. Thus, a unique serial number string is required for Windows to avoid reinstallation of the driver each time the device is plugged into a different port.

Therefore, if the customer wants to use the SMSC VID and PID, SMSC requires the serial number to be equal to the MAC Address.

B.4 WHQL Logo

Refer to the following frequently asked questions regarding WHQL logo usage:

Q: Some of our customers will have a different product name on their boxes (sales/marketing perspective), but don't care that Windows UI will show SMSC's company and product name. They will use our PnP ID (USB-IF assigned Vendor ID and SMSC assigned Product ID). Therefore, the standard driver and INF files can be used with no further modifications. What is the standard procedure in this case?

A: If these customers will display the WHQL logo on the package or device, they must either obtain WHQL logo compliance themselves, or complete a reseller agreement with SMSC. By completing the reseller agreement, they will have signed all the legal agreements regulating the use of the WHQL logo. No WLK testing or upload of logs will be required.

Note: Reseller agreements can only be made with customers that have a Winqual account.

Q: Some of our customers are willing to use our unmodified driver binary, but want to use their PnP ID (customer's USB-IF assigned Vendor ID and customer's assigned Product ID) and/or reflect their Company and Product name in Windows' UI. Because of this, these customers need to modify the INF. What is the standard procedure in this case?

A: If a change is made to an INF that is already part of a logo-ed submission, the customer can utilize the Microsoft Acceptable Device and Driver Update Policy (Policy-0015). This policy, referred to commonly as Driver Update Acceptable (DUA), allows for certain changes in the INF and driver package without retesting. However, a submission must be made. Once the submission is complete, the submission number with the modified INF may be shipped.

Note: Submissions can only be made by customers that have a Winqual account.