Spectrum24

Wireless LAN Adapter Models LA-4111 PC Card & LA-4113 PCI Adapter

Product Reference Guide

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Patents

This product is covered by one or more of the following U.S. and foreign Patents:

U.S. Patent No. 4,360,798; 4,369,361; 4,387,297; 4,460,120; 4,496,831; 4,593,186; 4,603,262; 4,607,156; 4,652,750; 4,673,805; 4,736,095; 4,758,717; 4,816,660; 4,845,350; 4,896,026; 4,897,532; 4,923,281; 4,933,538; 4,992,717; 5,015,833; 5,017,765; 5,021,641; 5,029,183; 5,047,617; 5,103,461; 5,113,445; 5,130,520 5,140,144; 5,142,550; 5,149,950; 5,157,687; 5,168,148; 5,168,149; 5,180,904; 5,229,591; 5,230,088; 5,235,167; 5,243,655; 5,247,162; 5,250,791; 5,250,792; 5,262,627; 5,262,628; 5,266,787; 5,278,398; 5,280,162; 5,280,163; 5,280,164; 5,280,498; 5,304,786; 5,304,788; 5,306,900; 5,321,246; 5,324,924; 5,337,361; 5,367,151; 5,373,148; 5,378,882; 5,396,053; 5,396,055; 5,399,846; 5,408,081; 5,410,139; 5,410,140; 5,412,198; 5,418,812; 5,420,411; 5,436,440; 5,444,231; 5,449,891; 5,449,893; 5,468,949; 5,471,042; 5,478,998; 5,479,000; 5,479,002; 5,479,441; 5,504,322; 5,519,577; 5,528,621; 5,532,469; 5,543,610; 5,545,889; 5,552,592; 5,578,810; 5,581,070; 5,589,679; 5,589,680; 5,608,202; 5,612,531; 5,619,028; 5,664,229; 5,668,803; 5,675,139; 5,693,929; 5,698,835; 5,705,800; 5,714,746; 5,723,851; 5,734,152; 5,734,153; 5,745,794; 5,754,587; 5,658,383; D305,885; D341,584; D344,501; D359,483; D362,453; D362,435; D363,700; D363,918; D370,478; D383,124; D391,250.

Invention No. 55,358; 62,539; 69,060; 69,187 (Taiwan); No. 1,601,796; 1,907,875; 1,955,269 (Japan).

European Patent 367,299; 414,281; 367,300; 367,298; UK 2,072,832; France 81/03938; Italy 1,138,713.

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About This Document

Reference Documents

This Reference Guide refers to the following documents:

Part Number	Document Title
70-20708-01	Spectrum24 Site Survey System Administrators Guide
70-20706-01	Spectrum24 AP-4111 DS Access Point Product Reference Guide
70-20709-01	Spectrum24 Plus Pack User Guide
70-20136-01	Mountable F-Plane Antenna (ML-2499-DSA1-00)

Conventions

Keystrokes are indicated as follows:

ENTER	identifies a key.
FUNC, CTRL, C	identifies a key sequence. Press and release each key in turn.
Press A+B	press the indicated keys simultaneously.
Hold A+B	press and hold the indicated keys while performing or waiting for another function. Used in combination with another keystroke.

Typeface conventions used include:

<angles>	indicates mandatory parameters in a given syntax.
[brackets]	for command line, indicates available parameters; in configuration files brackets act as separators for options.
GUI Screen text	indicates the control name in a GUI-based application.
Italics	indicates the first use of a term, book title, or menu.
'single quotes'	indicates the exact setting for a parameter.

`Screen`	indicates monitor screen dialog. Also indicates user input. A screen is the hardware device on which data appears. A display is data arranged on a screen.
`Terminal`	indicates text shown on a terminal screen.

This document uses the following icons for certain conditions or types of information:

Indicates tips or special requirements.

Indicates conditions that can cause equipment damage or data loss.

Indicates a potentially dangerous condition or procedure that only Symbol-trained personnel should attempt to correct or perform.

Contents

Chapter 1 Introduction

The LA-4111 PC Card and the LA-4113 PCI adapter are Spectrum24 direct-sequence (DS) products. Spectrum24 DS is a spread spectrum network operating between 2.4 and 2.5 GHz. Spread spectrum communication provides a high-capacity network within large or small environments. Spectrum24 DS products provide a high-capacity network using multiple access points within large or small environments.

- Spectrum24 bridging architecture allows communication between wired network devices and mobile devices.

- Spectrum24 supports the IEEE 802.11 specification. This open architecture allows Spectrum24 devices to communicate with wireless devices from other manufacturers.

- Spectrum24 allows mobile devices to roam throughout large facilities while remaining connected to the LAN.

- Spectrum24 allows protocol firmware upgrades while devices remain operational.

- Spectrum24 antenna diversity feature alternates between antennas with the best reception, increasing overall performance.

Chapter 2 About the Spectrum24 Wireless LAN Adapter

The Spectrum24 *Wireless LAN (WLAN)* adapter allows PC Card or PCI adapter slot-equipped host systems to configure, connect to and establish a Spectrum24 network. The PCI version of the WLAN adapter implements the Plug and Play standard.

Features Include:

- Low-power operation for battery-powered devices with PC Card slots.
- Standard *NDIS (Network Driver Interface Specification)* and drivers.
- Windows 95, 98, NT 4.0 and CE driver support.
- Card and Socket Services support.
- Plug and Play support.
- Power management [*Continuously Aware Mode (CAM)* and *Power Save Polling (PSP)*]

The WLAN adapter supports different modes of operation including:

- MU mode
- Mobile IP mode

These modes enable the adapter to roam between different access points in a network or roam across routers.

2.1 MU Mode

In the *Mobile Unit (MU)* mode, the WLAN adapter connects to an access point (AP) or another WLAN installed system. MU mode allows the device to roam freely between AP cells in the network. MUs appear as network nodes to other devices.
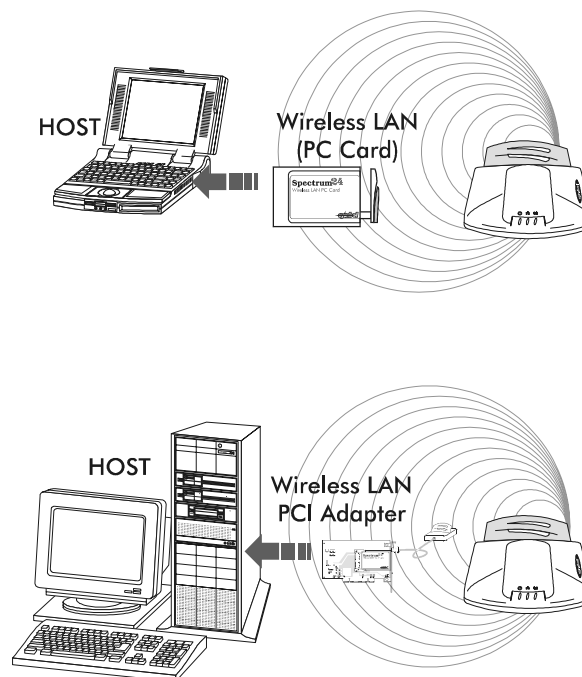
2.2   11 Mbps Operation

The Spectrum24 Wireless LAN adapter supports an 11 Mbps data rate. The adapter can default to a 5.5, 2 or 1 Mbps data rate when unable to establish an 11 Mbps association. Ensure that the MU and the access point are compatible to maintain network connectivity.

The following factors can dynamically alter the data rate:

- signal strength between the AP and the MU
- the ratio of good transmitted packets to attempted
- transmitted packets fall below a threshold
- the MU finds a higher transmit rate with another AP or it encounters an unspecified data rate.

2.3   Mobile IP

The Spectrum24 Wireless LAN adapter supports Mobile IP (roaming across routers) when properly configured as an MU and configured to support Mobile IP. The Mobile IP feature allows Spectrum24 Wireless LAN devices to roam across routers.

The MU retains its IP address when configured for Mobile IP and can:

• move from one IP subnet to another

• move from an Ethernet segment to a wireless LAN

• move from one Ethernet segment to another.
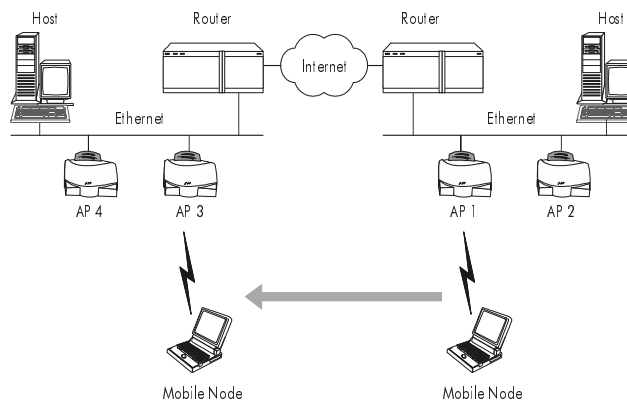
2.4   Power Management

The WLAN adapter supports the Continuously Aware (CAM) and Power Save Polling (PSP) power-management modes. CAM requires the radio to remain on. Symbol does not recommend CAM for battery powered devices.

PSP mode allows the MU to conserve power by suspending communication while still associated with an AP. The AP saves data for transmission to the MU when it wakes at given intervals. When the adapter wakes to check for data, it switches back into CAM until it is ready suspend communications again.

The PSP rate, which varies from 1 to 10, specifies how often the MU wakes up. The WLAN adapter drivers support dynamic power management, Algorithm 11 and 12. Algorithm 11 varies the PSP parameter between 1 and 10 depending on data traffic. Algorithm 12 switches the LAN adapter from PSP mode to CAM, also depending on data traffic.

Note   The PCI version of the Spectrum24 WLAN adapter functions in CAM only.

2.5   Card and Socket Services

The Spectrum24 WLAN adapter supports Card and Socket services. Card and Socket Service software packages work with the host computer operating system enabling the Wireless LAN adapter to interface with host computer configuration and power management functions. Card and Socket Service software packages include SystemSoft, CardSoft or CardWizard.

The WLAN adapter supports Card and Socket Services native to Microsoft Windows 95 but not in Windows NT.

2.6   Plug and Play

The PCI version of the Spectrum24 WLAN adapter supports Plug and Play systems. This allows a computer to recognize the PCI adapter, and configure the hardware interrupt, memory and device recognition addresses. This feature requires less user interaction and minimizes hardware conflicts.

2.7 Spectrum24 Adapter LED Descriptions

The WLAN adapter LED illuminates during connection or data transfer to indicate the functional status of the adapter.

Status	Function
Off	WLAN adapter radio is disabled or incapable of transmission
Slow Green Flash	Adapter associating with an access point
Rapid Green Flash	Indicates data traffic between adapter and access point. The faster the flash, the more data traffic on the network.

Chapter 3 # Hardware Installation

Physical installation for the PC Card and PCI adapter differ for each system. Refer to the system manufacturer documentation for specific information.

3.1 Preparation

Before beginning the installation, verify the hardware package contains:

- Spectrum24 Wireless LAN adapter
- installation CD and utilities.

Verify the model indicated on the card and packaging before use. Contact the Symbol Support Center if an item is missing or not functioning.

3.2   Installing the PC Card

The Spectrum24 WLAN adapter requires:

- a computer with a Type II PC Card slot

- a CDROM drive

- an available interrupt (IRQ)

- an available I/O port address

- Spectrum24 driver installation CDROM

- an available upper memory range of 4KB if setting up for I/O mode

- an available upper memory range of 32KB for setting up memory mode

- 10 to 16KB available conventional or upper memory space (terminate and stay resident driver only; does not include network protocol stack).

Installation and removal methods vary for different host devices. Refer to system documentation for information.

Avoid WLAN adapter contact with liquids or abrasive materials.

To install the PC Card:

1. Insert the PC Card into the PC slot. Arrows on the front of the PC Card indicate the insertion point to the slot.

2. Slide in the PC Card until it firmly seats.

Caution

Align the card properly when inserting. Insert the card firmly without forcing. Forcing the card into the slot can damage the device or the card.
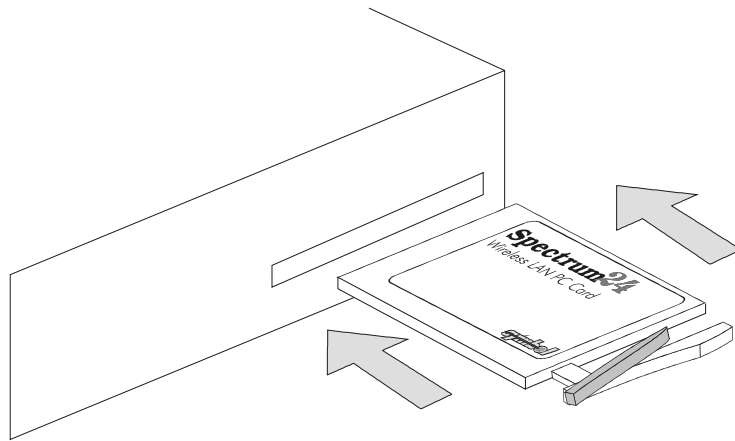
3.3 Installing the PCI Adapter
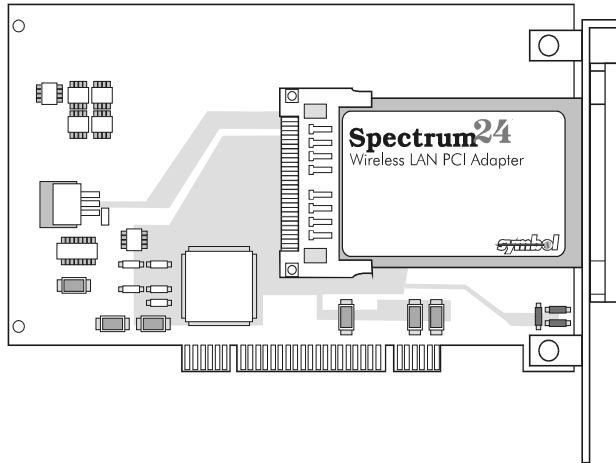
Use proper grounding for the environment when
handling computer components.

Caution

1. Power off the computer before installing the adapter.

   If the system has a PCMCIA adapter installed, the
   PCI adapter can function as a second controller.

2. Set the socket number, and the Plug and Play option
   in the configuration file as required.

3. Remove the computer cover.

4. Locate an available PCI slot in the computer.

5. Remove the retaining screw and bracket for the slot.

6. Align adapter with the slot and insert firmly.

   Verify the adapter seats into the slot evenly.

7. Verify that the BNC antenna connectors in the back of the PC are exposed.

8. Secure the adapter to the chassis with a retaining screw.

9. Replace the computer cover.

3.3.1   External Antenna Connection

The PCI adapter includes a desktop dual-dipole antenna.

Install the antenna parallel to the ground for optimal performance.

1. Attach the antenna to the PRIMARY antenna connector as shown:
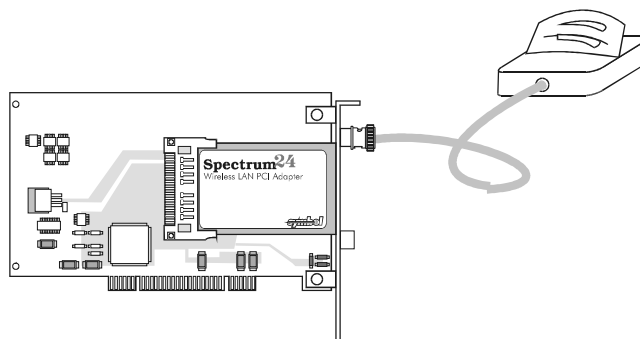
2. Modify the DIVERSITY parameter.

    Configure diversity (for dual antennae applications) by selecting Both Antenna from the NCPA WLAN Adapter property page.

The Mountable F-Plane Antenna (ML-2499-HPA-00) can be used when a single antenna application is desirable.

The Spectrum24 Wireless LAN adapter hardware installation is complete.

Chapter 4   # Verifying the Firmware Version

Verify the Spectrum24 Wireless LAN adapter firmware is the most recent version to ensure optimal functionality. In Windows 95/98, NT 4.0 and CE, WLAN adapters use the Network Interface Card Task Tray (NICTT) utility to view driver and firmware revision data. The NICTT General Properties page allow users to verify driver firmware version data and view wireless LAN adapter signal and transmission quality information.

The NICUpdate utility updates the firmware in a Spectrum24 PC Card or PCI adapter. Refer to the documentation shipped with the Spectrum24 Plus Pack utility suite for instructions on using NICUpdate.

Chapter 5 # Installing and Configuring the Windows 95/98 Driver

5.1 Installing the Spectrum24 32-Bit Driver in Windows 95

The Spectrum24 Windows 32-bit driver ships with the Network Control Panel Applet (NCPA) utility on a CDROM.

Symbol recommends updating the Spectrum24 WLAN adapter to the latest firmware. Use the NICUpdate utility to update the firmware in Windows 95. Refer to the documentation shipped with the Spectrum24 Plus Pack utility suite for instructions on using NICUpdate. Download the latest firmware from the firmware and software section of the Symbol Web site at (www.symbol.com/software/index.html).

Before installing the Spectrum24 32-bit Windows driver:

- obtain Windows 95 installation media
- verify the Spectrum24 WLAN adapter is installed
- obtain the Spectrum24 Windows driver installation CDROM.

The Spectrum24 32-bit driver is bundled with the Spectrum24 NCPA utility. Use NCPA to view and edit Spectrum24 WLAN adapter settings.

To install the Spectrum24 32-bit driver in Windows 95:

1. Install the Symbol Spectrum24 WLAN adapter.

2. Power up the system.

3. When Windows 95 recognizes the Spectrum24 WLAN adapter, an Update Device Driver Wizard dialog box appears requesting a driver to install. Click Next.

    The Update Device Driver Wizard dialog box displays driver descriptions.

4. Click Finish to continue.

5. Click Finish again when Windows displays Windows found the following updated driver for this adapter device Symbol Spectrum24 WLAN PC Card.

    If using the Spectrum24 PCI adapter, Windows displays Windows found the following updated driver for this adapter device Symbol Spectrum24 WLAN PCI Adapter. Click Finish to continue.

6. Insert the Spectrum24 Windows 32-bit driver installation CD.

7. Click OK when Windows displays please insert the disk labeled Symbol Spectrum24 PC/PCI Card Installation Disk.

8. When the Install From Disk dialog box appears, select the default entry X:\.

    Where X is the letter assigned to the CDROM drive.

    Click OK

9. Proceed to *5.3 Spectrum24 Adapter Configuration for Windows 95/98* on page 23.

5.2 Installing the Spectrum24 32-Bit Driver in Windows 98

The Spectrum24 Windows 32-bit driver ships with the Network Control Panel Applet (NCPA) utility on a CDROM.

Symbol recommends updating the Spectrum24 WLAN adapter to the latest firmware. Use the NICUpdate utility to update the firmware in Windows 98. Refer to the documentation shipped with the Spectrum24 Plus Pack utility suite for instructions on using NICUpdate. Download the latest firmware from the firmware and software section of the Symbol Web site at (www.symbol.com/software/index.html).

Before installing the Spectrum24 32-bit Windows driver:

- obtain Windows 98 installation media
- verify the Spectrum24 WLAN adapter is installed
- obtain the Spectrum24 Windows driver installation CDROM.

The Spectrum24 32-bit driver is bundled with the Spectrum24 NCPA utility. Use NCPA to view and edit Spectrum24 WLAN adapter settings.

To install the Spectrum24 32-bit driver in Windows 98:

1. Install the Spectrum24 WLAN adapter.

2. Power up the system.

3. When Windows 98 recognizes the Spectrum24 WLAN adapter, the Add New Hardware Wizard dialog box appears. Click Next to continue.

4. Insert the Spectrum24 Windows 32-bit driver installation CD.

5. When Windows displays What do you want Windows to do?, Select Search for the best drivers for your device and click Next.

   The Add New Hardware Wizard dialog box appears.

6. Ensure the appropriate drive check box is selected and click Next.

7. Click Next when Windows displays Symbol Spectrum24 WLAN PC Card and Windows is ready to install the best driver for this device.

   If using the Spectrum24 PCI adapter, Windows displays Symbol Specrtrum24 WLAN PCI Adapter and Windows is ready to install the best driver for this device. Click Next to continue.

8. Proceed to *5.3 Spectrum24 Adapter Configuration for Windows 95/98* on page 23.

5.3   Spectrum24 Adapter Configuration
for Windows 95/98
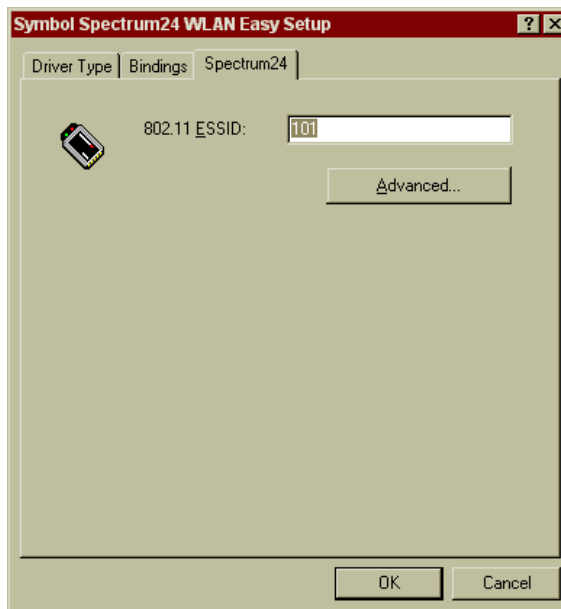
To configure the Spectrum24 WLAN adapter in
Windows 95/98:

1. From the NCPA Easy Setup configuration screen,
    set the 802.11 ESSID to the desired network access
    point.

When the driver extraction concludes, the Spectrum24
Easy Setup window appears. Use NCPA to configure the
Spectrum24 WLAN adapter.

2. Click the Advanced button to view adapter
    properties settings.

Use the Mobile Unit, Mobile IP, Encryption and WLAN Adapter tabs to view or adjust the adapter configuration settings.
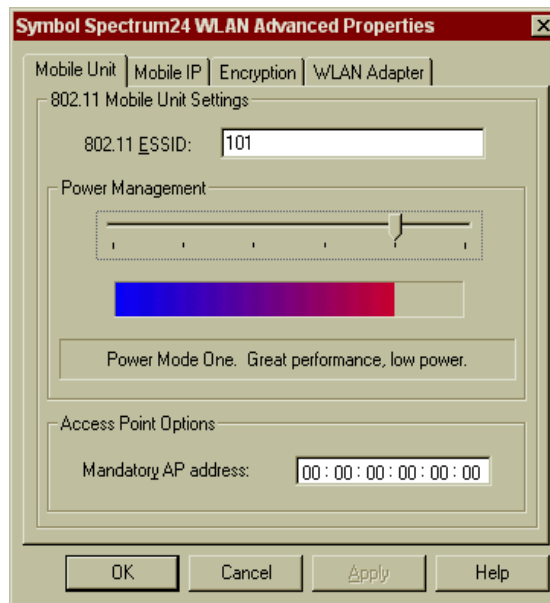
Select Diversity from within the WLAN Adapter page for dual antennae applications.

3. Exit and save the configuration settings in the Symbol Spectrum24 WLAN Advanced Properties pages by clicking OK or Finish when complete or Cancel to use the default values.

4. Restart the system for changes to take effect.

Chapter 6 # Installing and Configuring the Windows NT Driver

The Spectrum24 Windows 32-bit driver ships with the Network Control Panel Applet (NCPA) utility on a CDROM.

Symbol recommends updating the Spectrum24 WLAN adapter to the latest firmware. Use the NICUpdate utility to update the firmware in Windows NT. Refer to the documentation shipped with the Spectrum24 Plus Pack utility suite for instructions on using NICUpdate. Download the latest firmware from the firmware and software section of the Symbol Web site at (`www.symbol.com/software/index.html`).

Before installing the Spectrum24 32-bit Windows NT driver:

• obtain Windows NT installation media

• verify the Spectrum24 WLAN adapter is installed

• obtain the Spectrum24 Windows driver installation CDROM.

The Spectrum24 32-bit driver is bundled with the Spectrum24 NCPA utility. Use NCPA to view and edit Spectrum24 WLAN adapter settings.

6.1 Workstation/Server Initial Operating System Installation

To install the Spectrum24 32-bit driver in Windows NT:

1. Install the Spectrum24 WLAN adapter.

2. Power up the system.

3. Click the Select from list button for Network Adapters when the Windows NT Setup dialog box appears.

   The Select Network Adapters dialog box appears.

4. Click Have Disk.

5. Insert the Spectrum24 Windows NT driver installation CDROM. Click OK to select the default path to the driver files (X:\).

   Where X is the letter assigned to the CD drive.

6. When the Select OEM option dialog box appears, select the Symbol Spectrum24 WLAN PC Card or the Symbol Spectrum24 WLAN PCI Adapter. Click OK to continue.

7. Click Next at the Windows NT Setup dialog box.

8. Select the appropriate Network Protocols and Network Services when the Windows NT Setup dialog box appears.

9. Click Next to start the network installation.

10. Proceed to *6.4 Configuring the Spectrum24 WLAN Adapter for Windows NT* on page 30.

6.2   New Adapter Installation

Users need Administrator group privileges to install network components.

To install the 32-bit driver in a new Windows NT Spectrum24 WLAN adapter installation:

1. Install the Spectrum24 WLAN adapter.

2. Power up the system and login.

3. Open the Network applet from the Control Panel.

    The Network Configuration dialog box prompts for Windows NT Networking installation, click Yes.

4. Select the Wired to the network check box when the Network Setup Wizard dialog box appears. Click Next to continue.

5. Click the Select from list… button when the Network Setup Wizard dialog box queries for a network installation.

6. From the Select Network Adapter dialog box, click the Have Disk… button.

7. Insert the Spectrum24 Windows NT driver installation CD. Click OK to select the default path to the driver files (*X*:\).

    Where *X* is the letter assigned to the CDROM drive.

8. Select the Symbol Spectrum24 WLAN PC Card or the Symbol Spectrum24 WLAN PCI Adapter and click OK.

9. Click Next when the Network Setup Wizard reappears.

10. The Network Setup Wizard displays protocol choices.

    Select the protocols that apply and click Next.

11. Click Next to scroll through the next two dialog boxes.

12. The Network Setup Wizard displays the Windows NT Setup dialog box requesting Windows NT files.

    Enter the path name of the Windows NT distribution files, click Next.

13. Proceed to *6.4 Configuring the Spectrum24 WLAN Adapter for Windows NT* on page 30.

6.3   Existing Adapter Installation

Use the NCPA Update function to update Spectrum24 drivers. The existing driver/adapter configuration does not change, only new drivers and utilities are installed.

To update the 32-bit driver in an existing Spectrum24 WLAN adapter installation:

1. Power up and log into the system.

2. Open the Network applet from the Control Panel.

3. Click the Adapters tab.

4. Select the Symbol Spectrum24 WLAN PC Card, or Symbol Spectrum24 WLAN PCI Adapter and click Update.

5. Insert the Spectrum24 Windows NT 32-bit driver installation CD.

6. Click OK to select the default path to the driver files (*X*:\).

    Where *X* is the letter assigned to the CDROM.

    When prompted, remove the installation CD. Click OK to continue.

7. Click Close to exit the Network applet.

8. Click Yes to restart the system.

9. Remove the Symbol Spectrum24 Windows driver installation CD.

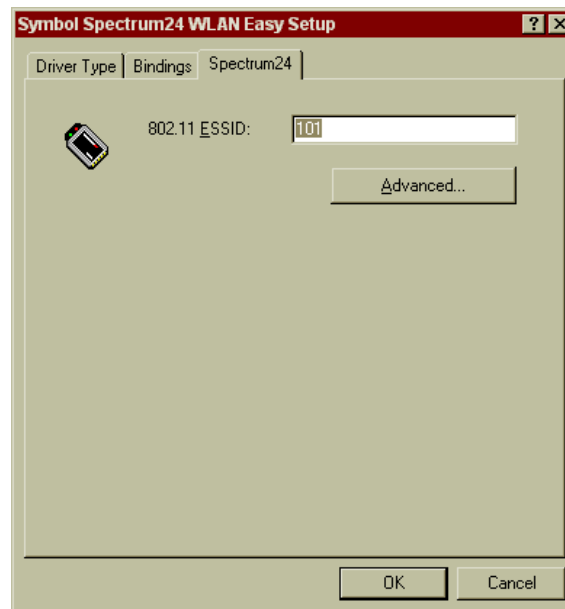## 6.4 Configuring the Spectrum24 WLAN Adapter for Windows NT

To configure the Spectrum24 WLAN adapter for NT:

1. From the NCPA Easy Setup configuration screen, set the 802.11 ESSID to the desired network access point.

When the driver extraction concludes, the Spectrum24 Easy Setup window appears. Use NCPA to configure the Spectrum24 WLAN adapter.

2. Click the Advanced button.

3. Select the WLAN Adapter tab from the Symbol Spectrum24 WLAN Advanced Properties dialog box.

4. Configure the hardware and radio link parameters for the Spectrum24 WLAN adapter.

    Select Both Antenna in the Diversity pull-down menu for dual antennae applications. During the installation process the computer detects free resources. The Interrupt Number, I/0 Port Address and Memory Base Address could need modification to fit system addressing requirements. Check the system resources for nonconflicting settings before proceeding with installation.

5. Exit and save the configuration settings in the Symbol Spectrum24 WLAN Advanced Properties window and the NCPA Spectrum24 Easy Setup window by clicking OK.

   Click Cancel to use the default values.

6. Remove the Spectrum24 Windows driver installation CD and follow the remaining instructions.

Chapter 7 # Installing and Configuring the Driver in Windows CE

7.1 Installing the Spectrum24 Windows CE Driver

Download the Spectrum24 32-bit Windows CE device driver from the Symbol Web site to a desktop computer. Upload to a handheld computer using a 9-pin serial cable. Symbol has bundled the NICTT and NCPA utilities with the Spectrum24 Windows CE driver. Use these utilities to monitor and status the Network Interface Card (NIC) as used within a handheld computer device.

Symbol recommends updating the Spectrum24 WLAN adapter to the latest firmware. Use the NICUpdate utility to update the firmware in Windows CE. Refer to the documentation shipped with the Spectrum24 Plus Pack utility suite for instructions on using NICUpdate. Download the latest firmware from the firmware and software section of the Symbol Web site at (`www.symbol.com/software/index.html`).

Before installing the Windows CE device driver:

- obtain Windows CE installation media
- verify the Spectrum24 PC Card is installed

For instructions on using a handheld computer in a Windows CE environment, refer to the Microsoft documentation included with the Windows CE program.

7.1.1 Downloading the Spectrum24 Windows CE Device Driver

Before copying the Spectrum24 device driver to a handheld computer, download the driver from the Symbol web site.

To download the Spectrum24 device driver from the Symbol web site:

1. From the desktop computer, go to the Firmware and Software Downloads section of the Symbol web site (www.symbol.com/software/index.html).

2. Locate and select the Windows CE 2.1driver.

    A File Download window appears prompting the user to run the utility from its current location or save it to disk.

3. Check the Save this program to disk option and click OK.

   A Save As window appears prompting the user to enter the destination of the Windows CE driver and utilities.

4. Select the drive letter assigned to the computer hard drive and click Save.

    The computer copies the zipped Windows CE driver and utility files to the hard drive.

5. Extract the Windows CE device driver by double-clicking the Spectrum24 Windows CE 2.1icon and completing the instructions provided by the program.

    When the driver extraction concludes, the Spectrum24 Easy Setup window appears. Use NCPA to configure the Spectrum24 WLAN adapter.
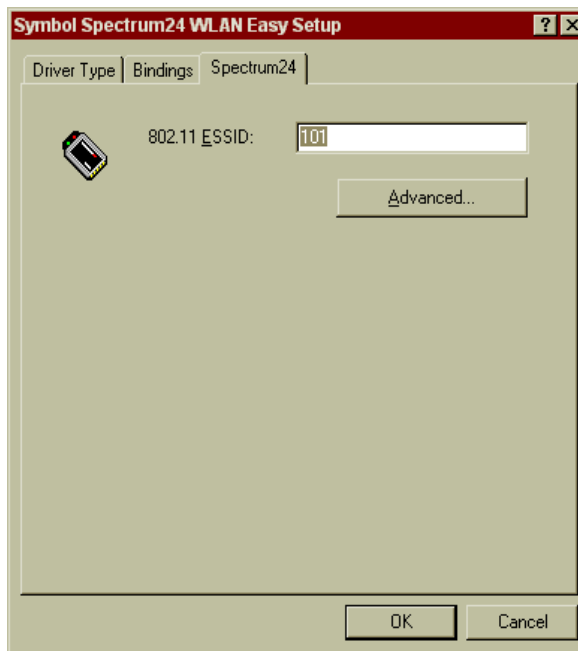
6. Insert the PC Card in the handheld computer device right-side up.

    If the handheld computer has a PC Card lock mechanism, verify that the card locks in place.

When users insert the PC Card in a handheld computer device for the first time, an Unidentified PC Card Adapter window could display. Assign a name to the card and click OK.

7.1.2 Uploading the Spectrum24 Driver to an Handheld Computer Device

Upload the driver using the 9-pin serial cable included with the handheld computer.

To upload the Spectrum24 Windows CE driver to a handheld computer:

1. From the NCPA Easy Setup window, click on the Advanced button.

   The Symbol Spectrum24 WLAN Adapter Properties window appears. This window contains default ESS parameters. Configure these parameters for the Spectrum24 AP with which the handheld computer associates.

2. Click the Mobile Unit tab to change the ESSID.

3. Reset the device and return to the Windows CE desktop.

   The driver upload process is complete.

Appendix A

# Spectrum24 Network Control Panel Applet (NCPA)

A.1   Installing NCPA

NCPA supports Windows 95/98, NT 4.0 and CE. Future releases will support Windows 2000.

The *Network Control Panel Applet* (NCPA) utility comes bundled with the Spectrum24 32-bit Windows device driver on a CDROM. Use NCPA to configure the Spectrum24 adapter. Complete the 32-bit driver installation instructions described in Chapters 6, 7 and 8 for the Windows 95/98, NT and CE operating systems to install NCPA.

A.2 Using NCPA

NCPA allows users to view and edit Spectrum24 NIC settings. Access the Spectrum24 NCPA utility through the Windows Network Control Panel. When NCPA is installed, the applet displays an Easy Setup window allowing users to set the 802.11 ESSID.
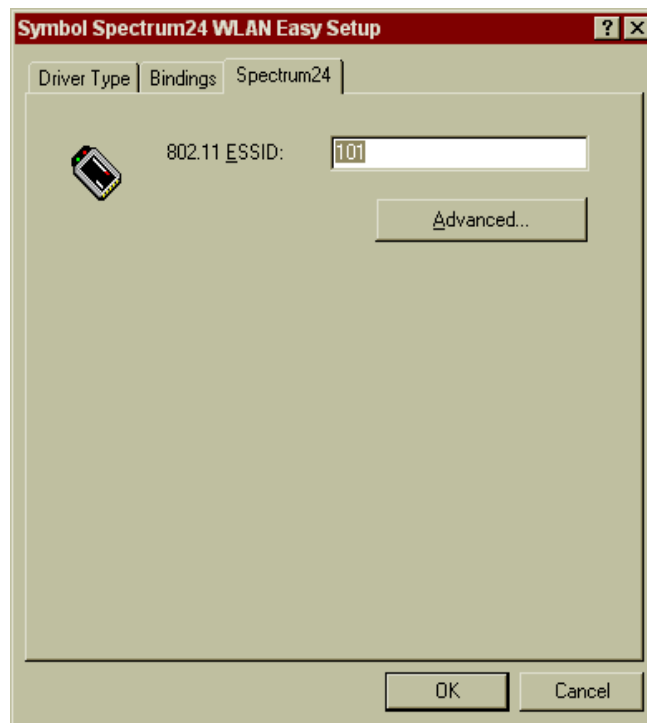
Clicking the Advanced button allows users to view or edit 802.11 parameters.

A.2.1 Mobile Unit Property Page

Use the Mobile Unit property page to configure the NIC ESSID, Preferred BSS ID, Mandatory BSS ID and Power Management values (the PCI adapter functions in CAM only).

These values control how the NIC associates and consumes power in MU mode.

Disable Power Management capabilities in NICTT to use the settings in the Spectrum24 Network Control Panel Applet (NCPA).
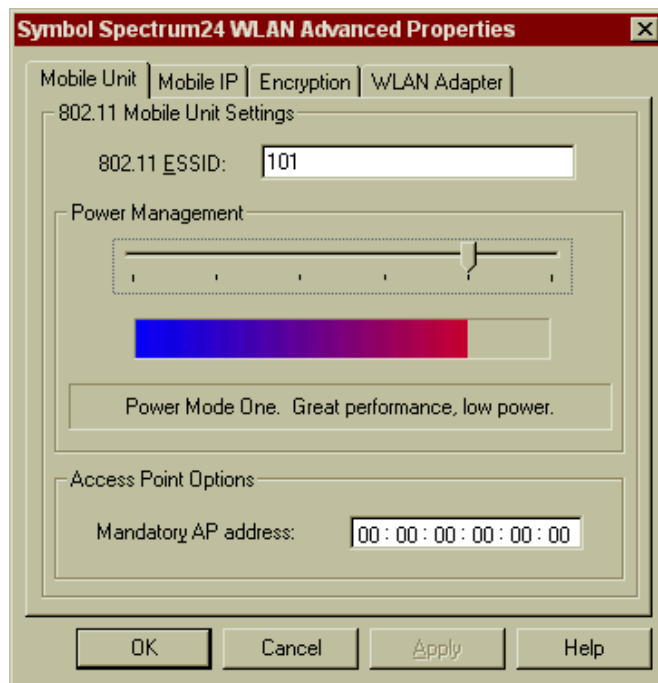
A.2.2 Mobile IP Property Page

Use the Mobile IP property page to configure the NIC to support the roaming across routers function. Mobile IP enables an MU to communicate with other hosts using only its home IP address after changing its point-of-attachment to the internet/intranet.

Select the Enable Mobile IP checkbox to enable Mobile IP support. Restart the system for the changes to take effect.
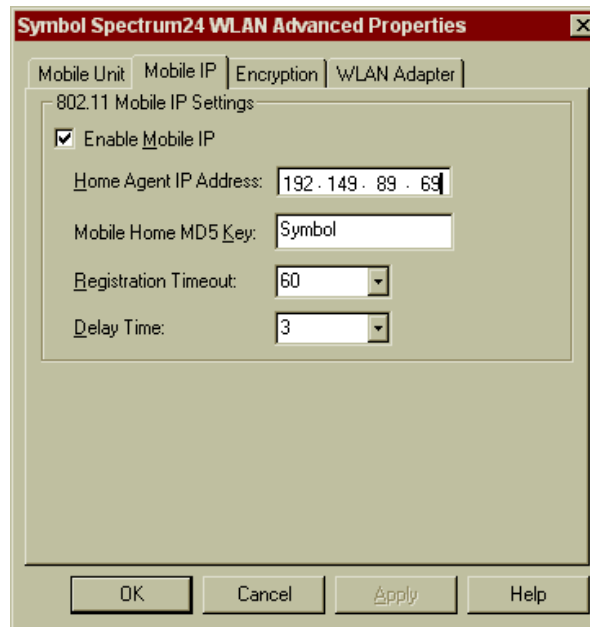
A.2.3   Encryption Property Page

Use the Encryption property page for configuring WLAN adapter 802.11 Encryption settings. The firmware supports IEEE 802.11 Open System and Shared Key encryption algorithms. The Open System algorithm (default setting) does not encrypt packets over the network. The Shared Key algorithm uses a 40-bit encryption key shared between the MU and the AP to encrypt and decrypt the WLAN data packets. Enter four encryption keys. MUs use Shared Key or Open System exclusively.
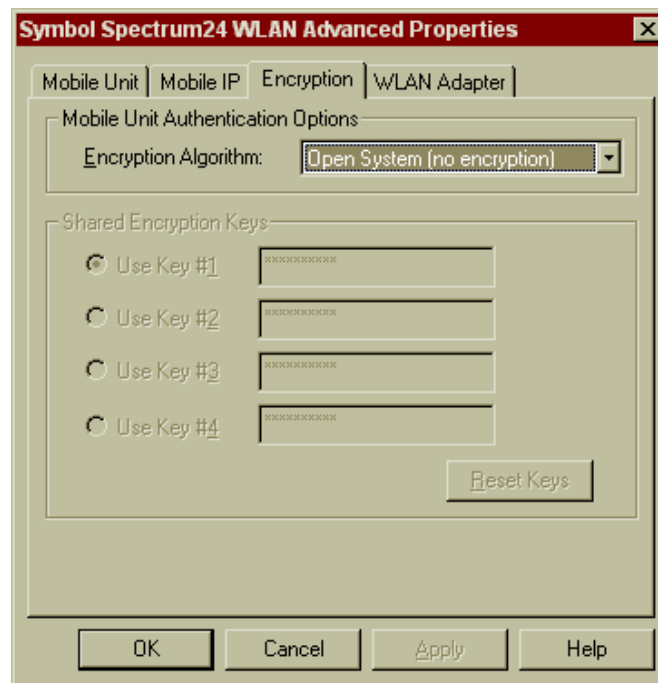
A.2.4   WLAN Adapter Property Page

Use the WLAN Adapter property page to view the WLAN adapter Interrupt Number, IO Port Address and Memory Base Address. If resource conflicts occur (on NT systems) modify these settings to fit system needs. Select the Radio Link Rate along with the antenna options within this page.
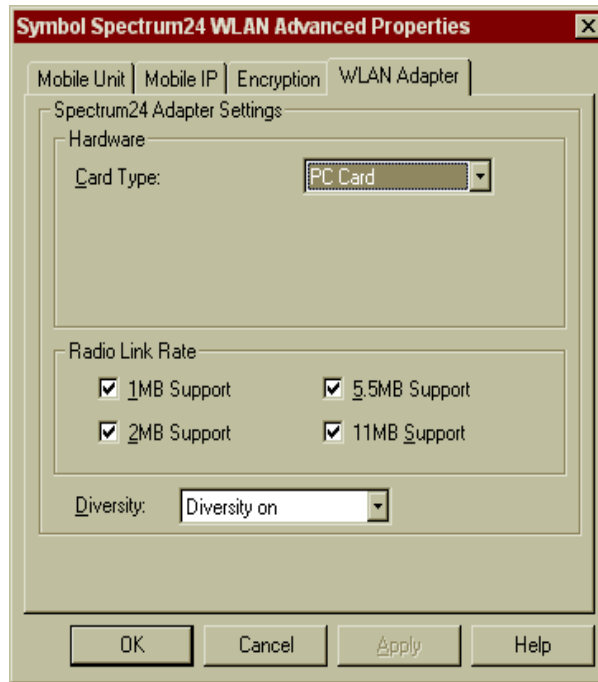
Appendix B

WLAN Adapter Specifications

PC Card Physical

Dimensions (less antenna)	3.3 inches x 2.1 in. x 0.2 inches (85 mm x 54 mm x 5 mm)
Weight (with antenna)	1.6 oz (45.36 g)
Operating temperature	32 to 130 °F (0 to 55 °C)
Humidity 95%	95% maximum non condensing
Cargo/Packaged	6ft(1.8m) drop 5hz vibration Mil-Std 810E
Altitude	15,000 ft. (4.6 km) - Storage 8,000 ft. (2.4 km) - Operating
Vibration	2 G peak, sine; 0.02 G peak random (5Hz - 2000Hz)
Shock	40 G, 11mS, half sine
ESD	meets CE-Mark
PCMCIA Compliance	Type II, Version x.xx, Card and Socket services x.xx

PCI Adapter Physical

Dimensions	6.8 in. x 5 in.
Weight	4.3 oz. (122 g)
Operating Temperature	32 to 100 °F (0 to 55 °C)
Storage Temperature	-15 to 140 °F (-40 to 90 °C)
Humidity	95% max. non-condensing
Cargo/Packaged	6 ft. drop; 5 Hz vibration Mil-Std 810E
Altitude	15,000 ft. - Storage, 8,000 ft. - Operating

PCI Adapter Physical

Vibration	2 G peak, sine; 0.02 G peak random (5Hz - 2000Hz)
Shock	40 G, 11 mS, half sine
ESD	meets CE-Mark

Radio

Frequency Range	country dependent. Typically 2402 MHz to 2480 MHz
Radio Data Rate	11 Mbps - Optional
	5.5 Mbps - Optional
	2 Mbps - Optional
	1 Mbps - Required
Radio Power Output	500 or 100 mW versions
Power Management	receive @ 5V
	500mW=300mA
	100mW=300mW
	transmit @ 5V
	500mW=650mA
	100mW=400mA
Range	open environment over 1000 ft. (300 m). Typical office/retail environment over 180 and within 250 ft. (56 to 76 m
TX Max. Radiated EIRP	US: FCC part 15.247
	Europe: ETS 300 320
	Japan: RCR STD-33
Modulation	Binary GFSK
TX Out-of-Band Emissions	US: FCC part 15.247, 15.205, 15.209

Radio

Europe: ETS 300 320

Japan: RCR STD-33

Appendix C **Troubleshooting**

C.1   Windows 95/98 Troubleshooting Tips

Use the tools provided by Windows 95/98 and LAN analyzers (i.e. FTP Software NETXRAY, Novell LAN analyzer) to diagnose problems. Some common problems exhibited when the Spectrum24 WLAN adapter has not been properly installed include:

- Windows 95/98 does not recognize the Spectrum24 WLAN adapter when installed.
    - Verify that Windows 95/98 PCMCIA support is installed.
    - Verify the computer has a Plug and Play BIOS or a Spectrum24 PCI adapter in use.

- The driver fails to load.
    - A resource conflict could exist. Use the Device Manager to resolve resource conflicts. Select the System applet from the Control Panel. Select the Device Manager tab.

- The workstation cannot attach to the Spectrum24 network.
    - Verify the adapter ESSID or NetId settings match the ESSID or NetId of the AP. Refer to the *Configuration* section of this document for details.
    - Verify that the adapter Data Rate is configured properly for the AP (refer to the AP Rate Control Table in this document).

- Degraded performance from the Spectrum24 WLAN adapter.
    - Verify a secure connection to Antenna 1on the PC Card or Primary Antenna on the PCI adapter.
    - Verify two antennas remain attached to the PC Card or PCI adapter if Diversity is selected.

- Network drive mappings disappear when the laptop suspends or the adapter is removed then reinserted. Windows 95/98 does not restore Netware network drive mappings under these conditions.
    - Log out and log in again, or restart the machine to restore the connections.

- Nonfunctioning PCI adapter LEDs.
    - Verify the *Card Type* parameter is set to PCI.
    - Verify that the adapter ESSID or NetId setting matches the ESSID or NetId of the AP.

C.2   Windows NT 4.0 Troubleshooting

Use the tools provided by Windows NT and LAN analyzers (i.e. FTP Software NETXRAY, Novell LAN analyzer) to diagnose problems.

- A resource conflict (usually IRQ or I/O base address) caused the driver not to load.
    - Check SLANT entries in the System Log to look for the conflicts.
- Check Service Monitor entries in the System Log to look for the conflicts.
    - Use the Windows NT Diagnostics program to locate a free resource. Use the NCPA Configure option to modify the appropriate key value.

Resource conflicts exist without an entry in the event log when another adapter failed to register its resources. When event log entries do not appear and the NetId is set appropriately, try different settings with the Memory Base Address, Interrupt Number and IO Port Address parameters.

- No resource conflicts were detected, but the system does not attach to the network.
    - When using the Spring protocol, verify the NetId of the Spectrum24 WLAN adapter matches the NetId of the AP. Use the NCPA Configure option to change the NetId.
    - When using IEEE 802.11, verify the ESSID of the Spectrum24 WLAN Adpater matches the ESSID of the AP. Use the NCPA Configure option to modify ESSID.

- When using IEEE 802.11, verify the Mandatory BSSID setting of the Spectrum24 WLAN adapter is set to 0 or matches the BSSID of the AP. Use the NCPA Configure option to modify the Mandatory BSSID.
- Verify the S24 WLAN adapter Data Rate is configured properly for the AP.

- A degraded performance from the Spectrum24 WLAN adapter.
    - Verify a secure connection to Antenna 1on the PC Card or Primary Antenna on the PCI adapter.
    - Verify two antennas remain attached to the PC Card or the PCI adapter when Diversity is selected.

- Nonfunctioning PCI adapter LEDs.
    - Verify the PCI adapter is selected in the Card Type field.
    - Verify the adapter ESSID or NetId setting matches the ESSID or NetId of the AP.

C.2.1   Useful Tool for Windows NT Troubleshooting

Windows NT Provides an additional tool for analyzing the network installation and performance.

PCMCIA.CPL   A Control Panel utility included with Windows NT 4.0 displays information about the Spectrum24 WLAN adapter. If the card is installed, but does not appear in the display it is probably defective.

C.2.2   Windows NT Errors

Errors occurring during driver installation appear in the System Log. Use the Event Viewer program from the Administrative Tools group to view the System Log. Locate the SLANT or Service Monitor entries. If the driver fails to load, one of the following messages display in the System Log.

SLANTn is the driver name, where n indicates the nth network driver installed.

```
SLANTn: Could not allocate the resources necessary for operation.
```

•   The driver could not allocate enough memory for internal data.

```
SLANTn: Has determined that the adapter is not functioning properly.
```

•   The driver could not initialize the Spectrum24 PC Card or PCI adapter. Possible problems include:
    –   The Spectrum24 PC Card or PCI adapter firmware could be corrupted. Use NICUpdate to verify the firmware status.
    –   The Spectrum24 PC Card or PCI adapter could have a hardware problem.

- The PCMCIA controller or host bus adapter is not opterating properly. Use an alternate PCMCIA socket or PCI slot.

`SLANTn: Could not find an adapter.`

- The driver could not locate a Spectrum24 PC Card in any PCMCIA socket or a Spectrum24 PCI adapter in any PCI slot.
  - Verify that the Spectrum24 PC Card or PCI adapter is firmly seated in a PCMCIA socket or PCI slot.

`SLANTn: Could not connect to the interrupt number supplied.`

- The driver could not claim the configured interrupt.
  - The configured interrupt number could be in use by another adapter. Choose a different interrupt number.

`SLANTn: Does not support the configuration supplied.`

- An invalid driver configuration parameter was specified.
  - Use the NCPA Configure function to view the driver configuration. Make sure values appear in each data entry field. If a value is missing, key in or use the associated list box to select an appropriate value.

```
SLANTn: A required parameter is missing from the Registry.
```

- A required configuration parameter was not found in the system registry.
  - Use the NCPA Configure function to view the driver configuration. Ensure values appear in each data entry field. If a value is missing, key in or use the associated list box to select an appropriate value.

C.3 Windows CE Troublshooting

The following problem scenarios could be encountered when using the Spectrum24 PC Card in a Windows CE environment:

C.3.1 The Handheld Computer Does Not Recognize the Spectrum24 PC Card

The handheld computer could display an Unidentified PC Card Adapter window when the Spectrum24 PC Card is inserted into the handheld computer.

This probably means the Spectrum24 32-bit Windows CE driver was not loaded or was loaded incorrectly. If this is the case the driver files require reinstallation. Refer to the Spectrum24 32-bit Windows CE driver installation section of Chapter 8 for detailed installation instructions.

To verify that the handheld computer recognizes the Spectrum24 PC Card:

1. Tap Start and select Settings and Control Panel.

2. Double tap the System icon.

   The Expansion Slot: in the System: section of the System Properties window should list Low_Power_Ethernet.

   This window displays the type of processor the handheld computer uses.

3. If the handheld computer does not recognize the Spectrum24 WLAN adapter and does not display an Unidentified PC Card Adapter window, remove and reinsert the PC Card.

If the handheld computer has a PC Card locking mechanism verify it is engaged after the PC Card has been re-inserted.

C.3.2 An IP Address is Not Recognized by the Handheld Computer

Remove and reinsert the PC Card for changes to the IP address to take effect once the Network program has been run from the Windows CE Control Panel.

Troubleshooting

Appendix D

Customer Support

Symbol Technologies provides its customers with prompt and accurate customer support. Use the Symbol Support Center as the primary contact for any technical problem, question or support issue involving Symbol products.

If the Symbol Customer Support specialists cannot solve a problem, access to all technical disciplines within Symbol becomes available for further assistance and support. Symbol Customer Support responds to calls by email, telephone or fax within the time limits set forth in individual contractual agreements.

When contacting Symbol Customer Support, please provide the following information:

- serial number of unit
- model number or product name
- software type and version number.

North American Contacts

Inside North America, contact Symbol by:

- Symbol Technologies, Inc.
  One Symbol Plaza
  Holtsville, New York 11742-1300
  Telephone: 1-516-738-2400/1-800-SCAN 234
  Fax: 1-516-738-5990

- Symbol Support Center:
  - telephone: 1-800-653-5350
  - fax: (516) 563-5410
  - Email: support@symbol.com

International Contacts

Outside North America, contact Symbol by:

• Symbol Technologies Technical Support
12 Oaklands Park
Berkshire, RG41 2FD, United Kingdom
Tel: 011-44-118-945-7000 or 1-516-738-2400
ext. 6213

Symbol Developer Program Web Site

http://sdp.symbol.com

Additional Information

Obtain additional information by contacting Symbol at:

• 1-800-722-6234, inside North America

• +1-516-738-5200, in/outside North America

• http://www.symbol.com

Appendix E

Regulatory Compliance

To comply with U.S. and international regulatory requirements, the following information has been included. The document applies to the complete line of Symbol products. Some of the labels shown, and statements applicable to other devices might not apply to all products.

Radio Frequency Interference Requirements

This device has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Commissions Rules and Regulation. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Radio Frequency Interference Requirements - Canada

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

CE Marking & European Union Compliance

Products intended for sale within the European Union are marked with the CEMark which indicates compliance to applicable Directives and European Normes (EN), as follows. Amendments to these Directives or ENs are included: Normes (EN), as follows.

Applicable Directives:

- Electromagnetic Compatibility Directive 89/336/EEC

- Low Voltage Directive 73/23/EEC

Applicable Standards:

- EN 55 022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information technology Equipment

- EN 50 082-1 - Electromagnetic Compatibility - Generic Immunity Standard, Part 1: Residential, commercial, Light Industry

- IEC 801.2 - Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 2: Electrostatic Discharge Requirements

- IEC 801.3 - Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 3: Radiated Electromagnetic Field Requirements

- IEC 801.4 - Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Part 4: Electrical Fast Transients Requirements

- EN 60 950 + Amd 1 + Amd 2 - Safety of Information Technology Equipment Including Electrical Business Equipment

- EN 60 825-1 (EN 60 825) - Safety of Devices Containing Lasers

RF Devices

Symbol's RF products are designed to be compliant with the rules and regulations in the locations into which they are sold and will be labeled as required. The majority of Symbol's RF devices are type approved and do not require the user to obtain license or authorization before using the equipment. Any changes or modifications to Symbol Technologies equipment not expressly approved by Symbol Technologies could void the user's authority to operate the equipment.

Telephone Devices (Modems)

United States

If this product contains an internal modem it is compliant with Part 68 of the Federal Communications Commission Rules and Regulations and there will be a label on the product showing the FCC ID Number and the REN, Ringer Equivalence Number.   The REN is used to determine the quantity of devices which maybe connected to the telephone line. Excessive RENs on the telephone line may result in the device not ringing in response to an incoming call. In most but not all areas, the sum of the RENs should not exceed 5.0. To be certain of the number of devices that may be connected to the line, as determined by the total number of RENs, contact the telephone company to determine the maximum REN for the calling area.

If the modem causes harm to the telephone network, the telephone company will notify you in advance; however, if advance notice is not practical, you will be notified as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its acilities, equipment, operations or procedures that could affect the operation of the modem. If this happens the telephone company will provide advance notice so you may make any necessary modifications to maintain uninterrupted service.

Canada

If this product contains an internal modem it is compliant with CS-03 of Industry Canada and there will be a Canadian certification number (CANADA: _____) on a label on the outside of the product. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line, individual service maybe extended by means of a certified convector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

User should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution

User should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to the telephone loop which is used by the device, to prevent overloading. The termination of a loop may consist of any combination of devices, subject only to the requirement that the total of the Load Numbers of all devices not exceed 100.

The Load Number is located on a label on the product.

Contact your local Symbol Technologies, Inc., representative for service and support;

Symbol Technologies, Inc.,
Canadian Sales and Service
2540 Matheson Boulevard East
Mississauga, Ontario
Canada L4W 4Z2
Phone - 905 629 7226

Laser Devices

Symbol products using lasers comply with US 21CFR1040.10, Subchapter J and IEC825/EN 60 825 (or IEC825-1/EN 60 825-1, depending on the date of manufacture). The laser classification is marked one of the labels on the product.

Class 1 Laser devices are not considered to be hazardous when used for their intended purpose. The following statement is required to comply with US and international regulations:

Caution

Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous visible or invisible laser light exposure.

Class 2 laser scanners use a low power, visible light diode. As with any very bright light source, such as the sun, the user should avoid staring directly into the light beam. Momentary exposure to a Class 2 laser is not known to be harmful.

Laser information labels are found in the product Quick Reference Guide.

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