Spectrum24 Wireless LAN Adapter Models 3020 PC Card & 3025 ISA Adapter

Product Reference Guide

70-20505-01
October 1998

Copyright

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.

Symbol Technologies, Inc.
One Symbol Plaza
Holtsville, N.Y. 11742-1300
Telephone:(800)SCAN234/(516)738-2

Regulatory Addendum

Congratulations on your purchase of this Symbol Technologies product. It is manufactured to the highest standards to ensure trouble-free operation and durability. In order to comply with various U.S. and International regulatory requirements, we have included this addendum with your product. It is an all-encompassing document that applies to the complete line of Symbol products. Therefore, many of the labels shown, and statements indigenous to other devices may not apply to your particular product.

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 and European Union Compliance

CE

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 facilities, 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.

Telephone Devices (Modems) - 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.

About This Document

Reference Documents

This Reference Guide refers to the following documents:

Part Number	Document Title
70-20135-02	Single High Performance Antenna (ML-2499-HPA1-00/ Twin High Performance Diversity Antenna (ML-2499-DVA 1-00)
70-20136-01	Mountable F-Plane Antenna (ML-2499-DSA1-00)
70-20137-02	Universal Acess Point Wall Bracket (ML-2499-APB1-00)

RFC's (Request For Comments) may be found on the Web at: http://www.ctrl-c.lin.se/ftp/DOC/RFC.

Conventions

Terminal text is depicted as shown on a 4140 terminal screen.

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	means to press the indicated keys simultaneously.
Hold A+B	means to hold down the indicated keys. 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.
Italics	indicates the first time a term is used, a book title, information to be replaced by an actual value, and menu titles.

'single quotes'	indicates the exact setting for a parameter.
`Screen`	indicates monitor screen dialog. Also indicates user input.
`Terminal`	indicates text shown on a radio terminal screen.

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

Indicates tips or special requirements.

Indicates conditions that can cause equipment damage or data loss.

Indicates a condition or procedure that is potentially dangerous. Only qualified, Symbol-trained personnel should attempt to correct or perform.

Special Definitions:

Screen is the device on a terminal where the terminal shows data.

A *display* is an arrangement of data on a screen.

Customer Support

Symbol Technologies is committed to providing its customers with World Class Customer Service and Technical Support. The Symbol Support Center is the single point of contact for any technical problem, question or support issue.

The Support Center is operational 365 days a year, 24 hours a day, staffed by full-time professional Technical Specialists.

If Symbol Technical Specialists cannot solve the problem immediately within its tiered technical support center, access to all technical disciplines within Symbol become available for further assistance and support. First response/contact within 24 hours or one business day. Response by email, fax or telephone.

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

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/

Contents

Chapter 1 Introduction

Spectrum24 is a frequency-hopping, spread spectrum network that operates between 2.4 and 2.5 GHz. Spectrum24 operates similarly to Ethernet networks without a wired network infrastructure. Spread spectrum communication provides a high-capacity network within large or small environments. Interference reduction makes it ideal for mobile communications and real-time data access applications.

- Spectrum24 bridging architecture allows communication between wired network devices and mobile devices.
- Spectrum24 switchable data rates allow 1 Mbps and 2 Mbps devices to communicate in the same network environment.
- Spectrum24 supports the IEEE 802.11 specification. This open architecture allows Spectrum 24 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 Wireless LAN Adapter

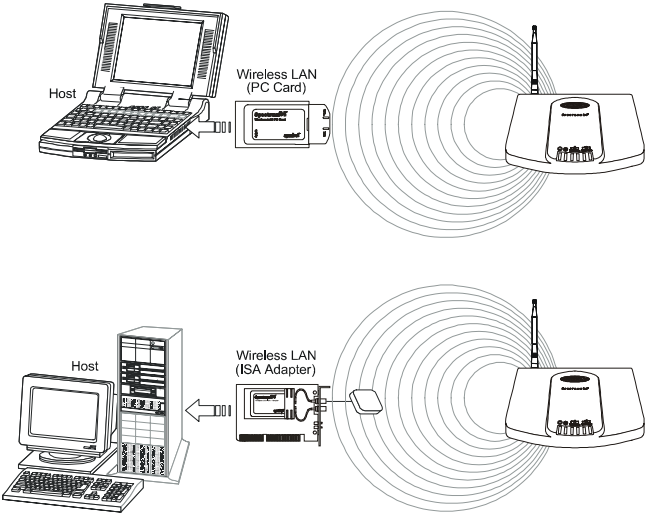
The Spectrum24 Wireless LAN (WLAN) adapter allows ISA (Industry Standard Architecture) or PC Card equipped host systems to configure, connect to and establish a Spectrum24 network. The ISA adapter version of the WLAN implements the Plug and Play standard. When installed in a system with a Plug and Play BIOS (basic input output system), the card requests system resources. The system allocates an Interrupt Request (IRQ), Input-Output (I/O) port and memory address range. Host systems without Plug and Play BIOS acquire Plug and Play functionality through the CSS (Card and Socket services) utilities that normally come bundled with system software.

Features Include:

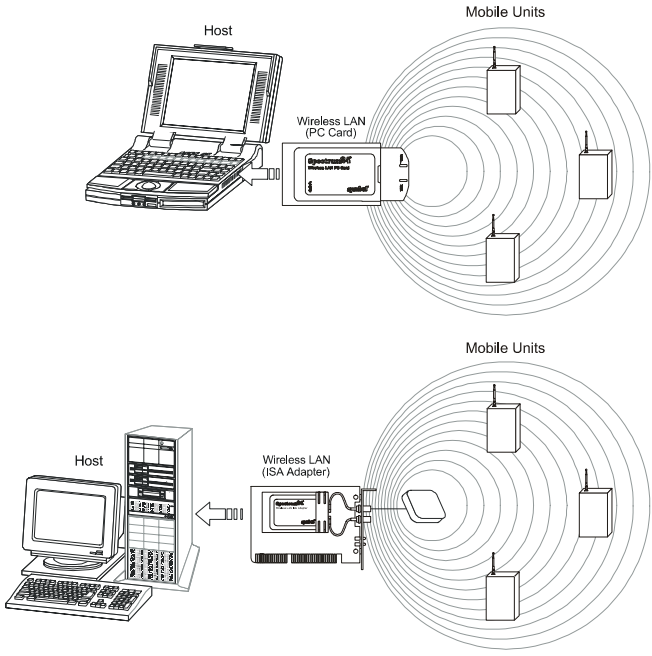
- Low power operation for battery-powered devices with PC Card slots.
- Standard NDIS (Network Driver Interface Specification) and ODI (Open Data-link Interface) drivers.
- Windows 95, NT 4.0/3.51 driver support.
- Card and Socket Services support.
- Plug and Play support.
- Antenna options (molded external antenna available for PC Card only).
- Power management (Continuously Aware Mode or Power Save Polling mode)

2.1 MU Mode Operation

In the Mobile Unit (MU) mode, the WLAN adapter connects to an Access Point (AP) or another WLAN installed system operating in MicroAP mode. The MU mode allows the device to roam freely between AP cells in the network. MUs appear as network nodes to other devices.



2.2 MicroAP Mode Operation



In the MicroAP mode, the WLAN adapter performs as an Access Point. The Spectrum24 WLAN adapter installed in a PC without another network connection, establishes a single-cell wireless network coverage area for all 802.11 devices in MU mode. Each MicroAP needs to have a unique ESS_ID. Cells can coexist as separate, individual networks at the same site without interference. The MicroAP does not roam, but it does support roaming. It has to operate in continuous aware mode in order to support *CAM* and *PSP* MUs. MUs can operate only within the cell established by WLAN adapter in this mode. The MicroAP mode supports up to 16 MUs. An Access Control List (ACL) containing the MU MAC addresses within the

established cell allows only the specified MUs (within the ACL) to associate with a MicroAP. Set the MicroAP and the MU to the appropriate data rates to communicate. Refer to the MicroAP Rate Control Table for the rates. The table below shows the compatible data rates. The adapter is configured to operate in the MicroAP mode through the Spectrum24 Network configuration dialog screen for Windows 95 and the Spectrum24 NT Installation dialog in Windows NT (refer to the Windows NT/95 installation section). Configure the adapters to operate in the MicroAP mode by setting several keywords (refer to Appendix C) in the NDIS (protocol.ini) or ODI (net.cfg) configuration files.

Table 2-1: MicroAP Rate Control Table

Mobile Unit	Micro AP (Rate Control)			
Supported Transmit Rates	Base Rate 1	Base Rate 1, Tx Rate 2 (Default)	Base Rate 1, Base Rate 2	Base Rate 2
1	1	1	N/A	N/A
1 & 2 (Default)	1	1 & 2	1 & 2	2
2	N/A	N/A	N/A	2

2.3 1 and 2 Mbps Operation

The Spectrum24 Wireless LAN Adapter can support 1 or 2 Mbps data rates when properly configured. See table below for configuration dependencies and refer to the software configuration sections in this document for setup. The adapter supports a dynamically switched 1 and 2 Mbps data rate (dynamic rate control) in a properly configured network environment. The MU and the Access Point need to be compatible (refer to the Spectrum24 Access Point User Guide for a detailed Access Point

configuration) to maintain network connectivity. The table below identifies the supported data rates of a properly configured MU and AP. The factors listed below 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.

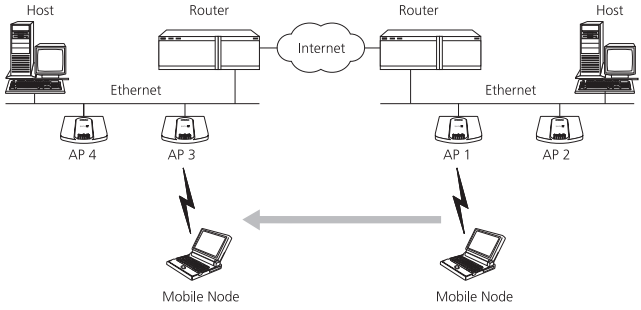
Table 2-2: AP Rate Control Table

Mobile Unit	Access Point (Rate Set)			
Supported Transmit Rates	1 only	1 Required, 2 Optional (Default)	1 and 2 Required	2 Only
1	1	1	N/A	N/A
1 & 2 Default	1	Dynamic Rate Control	Dynamic Rate Control	2
2	N/A	N/A	N/A	2

2.4 Mobile IP (roaming across routers) Description

The Spectrum24 WLAN supports Mobile IP (roaming across routers) when properly configured as an MU and configured to support Mobile IP (refer to appendix G for configuration and setup). Also configure an Access Point to properly pass through routing information. 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.



2.5 Power Management

The WLAN adapter provides two power-management operation modes: *Continuously Aware Mode (CAM)* requires the radio to remain on. Symbol does not recommend *CAM* for battery powered devices.

Note

A WLAN adapter operating in MicroAP mode functions in *CAM* only. The ISA adapter functions in *CAM* only.

Power Save Polling (PSP) mode allows the MU to conserve power by suspending communication while still associated with an AP. The AP saves data for the MU, which wakes at given intervals to check for data. The WLAN adapter drivers support dynamic power management, Algorithm 11 and 12 (refer to Appendix A for usage). 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.

2.6 Card and Socket Services

The Spectrum24 WLAN adapter supports Card and Socket services. In a DOS environment the WLAN adapter can use Spectrum24 automatic configuration, hot insertion, removal and power management features. Card and Socket Service software packages providing these features include SystemSoft, CardSoft or CardWizard (not included).

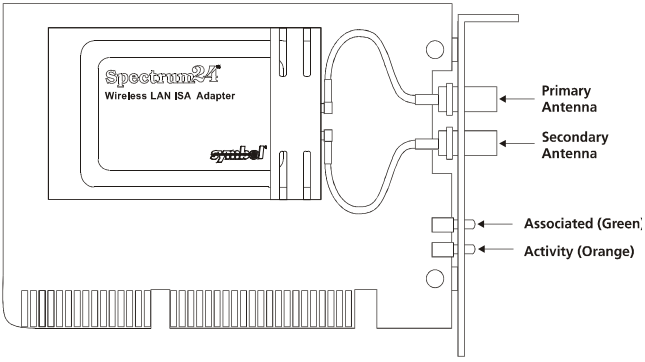
The WLAN adapter supports Card and Socket Services native to Microsoft Windows 95 but not in Windows NT.

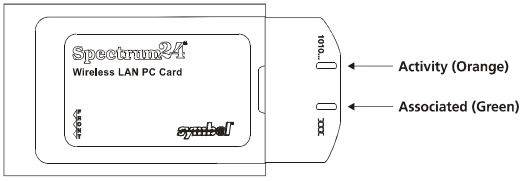
2.7 Plug and Play

The Spectrum24 WLAN card Model 3020(PC Card) and Model 3025 (ISA adapter) support Plug and Play systems. This allows the PC to automatically recognize the WLAN adapter, and configure the hardware interrupt, memory and I/O addresses. This feature requires less user interaction and minimizes hardware conflicts.

2.8 Spectrum24 Adapter LED Descriptions

The WLAN adapter LEDs illuminate during connection or data transfer to indicate the functional status of the WLAN adapter.





LEDs	Mode	LED Function
Associated	As MicroAP	The LED flashes to indicate a powered MicroAP accepting MUs.
	As MU	A solid LED indicates association with an AP.
Activity	As MicroAP	A solid LED indicates data traffic between the MicroAP and MU.
	As MU	A solid LED indicates communication with the AP.

Note

PC Cards without end-cap antennas lack LEDs.

Chapter 3 System Software Supported

Spectrum24 WLAN adapters include drivers and applications that support:

- Microsoft Windows 95
- Microsoft Windows NT 3.51 or 4.0
- DOS 3.3 or higher
- Microsoft Windows for Workgroups (v3.11)
- Novell Workplace v4.xx for DOS
- Novell Netware Client v2.x
- FTP PC/TCP v4.xx

Chapter 4 Hardware Installation

Physical installation for the PC Card and ISA versions differ for each system. Refer to the system manufacturer documentation for specific information. Software installation requires that the Installation and Utilities diskette accompany the user guide.

4.1 Preparation

Before beginning the installation verify the hardware package contains:

- Spectrum24 Wireless LAN Adapter
- plane antenna (for ISA adapter)
- end-cap antenna (for PC Card)
- installation diskette 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.

4.2 Installing the PC Card

The Spectrum24 WLAN Adapter requires the following:

- a PC with a Type II PC Card slot
- a 3.5 inch floppy drive
- an available interrupt (IRQ)
- an available I/O port address
- Spectrum24 Driver installation Disk

- 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
- a compatible Spectrum24 antenna
- 10 to 16Kb available conventional or upper memory space (terminate and stay resident driver only; does not include network protocol stack).


Note

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

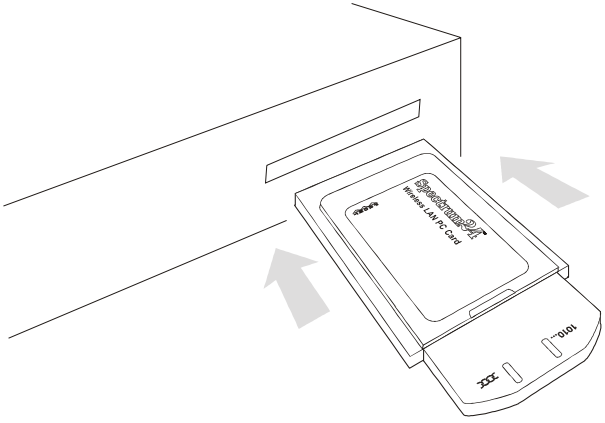

Caution

Avoid contact with liquids or abrasive materials.

1. Insert the PC Card into the PC slot. Arrows on the front of the PC Card indicate the insertion point to the slot. Slide it in until firmly seated.

Caution

Align the card properly when inserting. Forcing the card into the slot can damage the device or the card.



Caution

Keep the area around the end-cap antenna clear from materials that could block radio transmission (i.e. concrete, metals, and electrical systems). Inadequate coverage can reduce network performance.

Note

The end-cap antenna is available only for the PC Card Model.

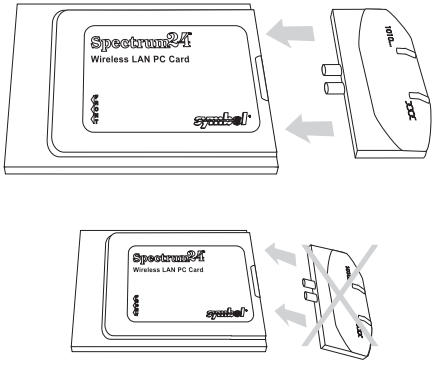
4.3 End-Cap Antenna Installation

To attach the end-cap antenna to the Spectrum24 PC Card, grasp the PC Card at its end nearest the antenna connector. Line up the antenna connectors with the PC Card connectors. Keep antenna in line with the PC Card.

Caution

Tilting the antenna while trying to install or remove it can cause the connectors to misalign and break.

Firmly press the antenna to the PC Card. A soft click indicates the connectors have connected. Verify the PC Card and antenna ends are flush.



4.4 End-Cap Antenna Removal

To remove the end-cap antenna, grasp the PC Card at its end nearest the antenna connector. Grasp the antenna at the end nearest the PC Card in the center above the connectors.

Do not press the buttons at the edges. They automatically open.

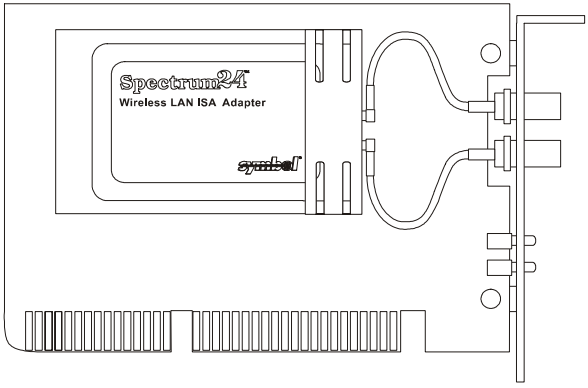
Firmly pull the antenna from the PC Card. Keep the end-cap in line with the PC Card.

Tilting the antenna while trying to install or remove it can cause the connectors to misalign and break.

To ensure a reliable connection, attach the end-cap antenna and PC Card connectors very securely. The antenna connection to the card is stronger than the PC Card connection in the host computer. Pulling the antenna removes the PC Card from the computer without disconnecting the antenna from the PC Card.

Flexing or tilting the antenna after attaching it to the PC Card can break the antenna and/or the PC Card connectors.

4.5 Installing the WLAN ISA Adapter



Caution

Use proper grounding for the environment when handling computer components.

Note

Symbol does not support this adapter yet under Windows NT. This card runs in *CAM* only.

1. Power off the computer before installing the adapter.
2. If the system already has a PCMCIA adapter installed, the WLAN adapter can function as a second controller. Set the socket number, and the Plug and Play option in the configuration file as required (refer to Plug and Play section for configuration).

Note

The WLAN adapter can exist only with systems using a Cirrus Logic 6710 or 6720 bus interface controller.

3. Remove the computer cover.
4. Locate an available ISA 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.

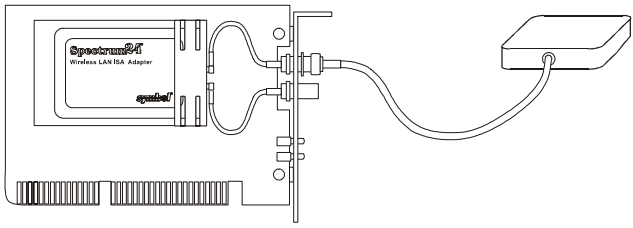
4.5.1 External Antenna Connection

The ISA version includes a plane antenna suitable for most environments.

Note

Install the plane antenna parallel to the ground for optimal performance.

1. Attach antenna to the BNC antenna connector as shown.



Note

If using only a single antenna, attach it to the PRIMARY antenna connector. Ensure the antenna is parallel to the ground.

2. Modify the DIVERSITY parameter in the appropriate configuration file as follows

Table 4-1: DOS Configuration/Parameters For Antennae

	NDIS	ODI
Single	Diversity = N	Diversity N
Dual	Diversity = Y	Diversity Y


Note

Obtain additional or higher performance antennas from Symbol. Contact a Symbol sales representative to order the following models:

additional plane antenna	ML-2499-PSA1-00
single high-performance antenna	ML-2499-HPA1-00
single rubber antenna	ML-2499-APA1-00


Note

Configure *Diversity* (for dual antennae) by selecting the *Diversity* check box from the *Spectrum24 NT Installation* properties sheet or from the *Symbol Spectrum24 Configuration* properties sheet in Windows95. Refer to the Windows 95/NT Driver Installation sections if necessary.

Chapter 5 Firmware Update

Occasionally the Spectrum24 PC Card and ISA adapter firmware require updating for new features or performance improvements. Firmware updates require:

- DOS (Version 3.3 or higher) bootable disk
- Spectrum24 PC Card Installation Disk.

To update the firmware:

1. Boot the machine from a DOS-bootable disk.
2. Remove the DOS-bootable disk and insert the *Spectrum24 ISA/PC Card Installation Disk 1*.
3. Change to the *\FIRMWARE* sub-directory.
4. Enter the command: `S_UPDATE` (follow the instructions).
5. Remove the disk and restart the machine after S_Update is complete.

If updating an ISA Plug and Play card, load SLAINIT.EXE before running S_Update. Refer to the Plug and Play section for SLAINIT.EXE installation. Symbol does not support this Plug and Play ISA configuration yet under Windows NT.

5.1 Verifying The Firmware Version

Load SLAINIT.EXE before installing ISA Plug and Play ISA adapter. Refer to the Plug and Play section if necessary.

1. Boot the system to a DOS prompt.

2. Insert the *Spectrum24 ISA/PC Card Installation Disk 1*.
3. From the DOS prompt change to the *\FIRMWARE* sub-directory.
4. Enter the command (refer to Appendix E for more information on *S_VER* use): `S_VER`.
5. Remove the disk and restart the machine if necessary when *S_VER* is complete.

Chapter 6 Windows 95/NT Driver Installations

6.1 Windows 95 Driver Introduction

The Spectrum24 NDIS 3.x Driver provides access to a Spectrum24 WLAN adapter under Windows 95. It supports all transport protocols (i.e. NetBEUI, IPX/SPX, TCP/IP) provided by Windows 95 on Spectrum24 PC Card, and Plug and Play ISA adapters.

The Windows 95 support includes the Spectrum24 driver, transport/API driver, driver extension service and the network card installation disk. Locate the files on the Spectrum24 ISA/PC Card Windows (32-bit) Installation disk in \WIN95, and \WINNT\I386 sub-directories. The distribution disk(s) contain the following files:

File Name	Driver Description
SLANT.SYS	Spectrum24 NDIS 3.x Driver Version 4.x.
NETSLA.INF	Spectrum24 NDIS 3.x Driver Installation Script.
S24EVMON.EXE	Spectrum24 Driver Extension Service.
S24TRANS.VXD	Spectrum24 Transport/API driver Version 4.x.
NETSLATR.INF	Spectrum24 Transport/API driver Installation Script.
INSTAL95.DOC	Installation Instructions (Microsoft Word 6.0/7.0).
INSTAL95.TXT	Installation Instructions (DOS Text - i.e. Microsoft Notepad).

6.2 New Features For v4.00

- supports IEEE 802.11 protocol
- supports 1 and 2 Mbps transfer rates
- supports Plug and Play ISA.

Refer to the Rate Control Table in the 1 and 2 Mbps operation section of this document in order to set up the adapter rate control.

6.3 Current Features in Windows 95

- Support for Windows95.
- Support for all Windows 95 transport protocols (NetBEUI, IPX/SPX, TCP/IP, etc.) on both the Spectrum24 PC Card and ISA adapter.
- Symbol supports all Spectrum24 PC Card and ISA adapter firmware releases from Version 3.xx to Version 4.xx.
- Update adapter firmware (under DOS) for new features or performance improvements.
- Supports Symbol Spectrum24 (Spring) protocol.

6.4 Windows 95 Driver/Transport Updates

To update existing drivers, uninstall the previous Spectrum24 or transport driver and reinstall according to the Driver Installation and Transport Installation procedures.

Symbol supports the following procedure only for driver installations earlier than version 4.01. Using this procedure on version 4.01 can cause unpredictable behavior and even cause the operating system to fail. To remove the Spectrum24 Driver and/or transport driver, run the REMOVE.BAT file provided on the *previous release (version 4.00 or earlier)* of the driver installation disk (\WIN95\REMOVE.BAT). This removes the proper files from the hard disk

6.5 Windows 95 Driver And Transport Uninstall (Version 4.00 Or Earlier)

1. At the DOS prompt, enter:

   ```
   REMOVE <parameter>
   ```

   Where <parameter> is:

driver	Removes the driver only.
transport	Removes the transport only.
both	Remove both the transport and driver.

The *Network Control Panel* applet starts automatically, after running the Remove.Bat file.

2. To remove the driver, select the *Symbol Spectrum24 WLAN Adapter* and click *Remove*.
3. To remove the transport, select the *Symbol Spectrum24 WLAN Transport* and click *Remove*.
4. Click the *OK* button to exit and restart the system.

To update the drivers, follow the *Driver Installation* instructions.

6.6 Windows 95 Driver Installation

6.6.1 Preparation

Before installing a driver for Windows 95, verify or obtain the following:

- Previous Spectrum24 Adapter and Transport have been removed.
- PCMCIA support is enabled for non-Plug and Play adapters
- 200 KB available disk space
- Windows 95 installation media
- Spectrum24 network adapter installed
- Spectrum24 2Mb Driver and Utilities disk
- Install the Spectrum24 PC Card or ISA adapter (refer to hardware installation for instructions on installing the adapter).

For non Plug and Play adapters, enable Windows 95 PCMCIA support. Refer to Windows documentation for this if necessary.

6.7 Windows 95 Retail Version

1. Install the Spectrum24 ISA adapter or the Spectrum24 PC Card.
2. Power up and boot the system.

3. When Windows 95 recognizes the *Spectrum24 PC/ISA/Plug and Play Card*, the *New Hardware Found* dialog box appears requesting the device driver to install.
4. Place the *Spectrum24 installation disk* into the floppy disk drive.
5. Select *Driver from disk provided by hardware manufacturer* button, click the *OK* button.
6. When the *Install From Disk* dialog appears, (select the default entry A:\) click the *OK* button.
7. Continue with the Windows 95 driver installation instructions in this section.

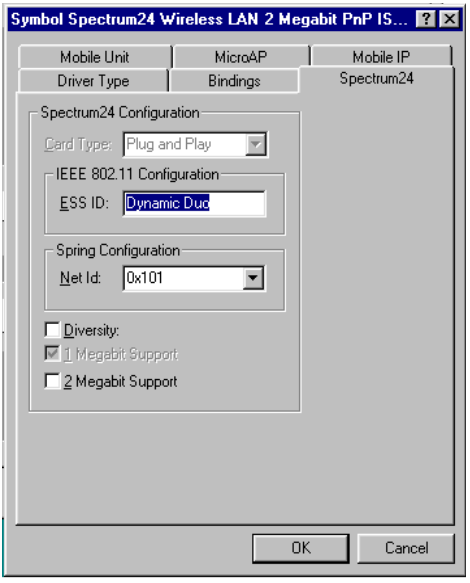
6.8 Windows 95 OSR2 Version

1. Install the Spectrum24 ISA adapter or the Spectrum24 PC Card.
2. Power up and boot the system.
3. When Windows 95 recognizes the *Spectrum24 PC/ISA/Plug and Play Card,* the *Update Device Driver Wizard* dialog box appears requesting the device driver to install. Select the *Next* button.
4. Place the *Spectrum24 installation disk* into the floppy disk drive.
5. The *Update Device Driver Wizard* dialog displays the device description. Click the *Finish* button to continue.
6. When Windows displays *"Windows found the following updated driver adapter device Symbol Spectrum24 WLAN Adapter"* click the *Finish* button to continue.
7. When Windows displays *"please insert the disk labeled 'Symbol Spectrum24 ISA/PC Card Installation Disk'"* click *OK*.

8. When the *Install From Disk* dialog appears, (select the default entry A:\) click the *OK* button.
9. When the *Symbol Spectrum24 Configuration* dialog box appears, select the *Property Page* that requires modification. To change the adapter settings, select the desired dialog. For the *IEEE 802.11* protocol, set the *ESS ID* to the desired network Access Point *ESS ID*. For the *Symbol Spring* protocol, change the *Net Id* to the desired network Access Point *Net Id*. When using a WPOS/ISA adapter, change the *Card Type* dialog item parameter to *WPOS/ISA*. This dialog item is not available to the Plug and Play installation as shown. Click the *OK* button to complete.
10. Insert the Windows 95 installation CD-ROM if requested by Windows 95. If the Windows 95 .cab files have been copied onto the hard disk, point the system to the directory that contains them. When a path has been entered to the Windows 95 installation files, click the *OK* button.
11. When the *System Settings Change* dialog appears, remove the Installation diskette from the floppy drive and select the *Yes* button to restart the computer.

6.9 Windows 95 Setup

1. When the *Symbol Spectrum24* Configuration dialog



box appears, select the *Property Page* that requires modification. To change the adapter settings, select the desired dialog . For the *IEEE 802.11* protocol, set the *ESS ID* to the desired network Access Point *ESS ID*. For the *Symbol Spring* protocol, change the *Net Id* to the desired network Access Point *Net Id*. When using a WPOS/ISA adapter, change the *Card Type* dialog item parameter to *WPOS/ISA*. This dialog item is not available to the Plug and Play installation as shown. Click the *OK* button to complete.

Select *Diversity* for dual antennae.

2. When the *System Settings Change* dialog appears, remove the Installation diskette from the floppy drive and select the *Yes* button to restart the computer.

6.10 Configuration

Modify the *ESS ID* or *Net ID* for the adapter so the network can recognize the Mobile Unit. The default values are *"101"* for the *IEEE 802.11 ESS ID* and 101 for the *Symbol Protocol Net ID*.

To reconfigure the driver/adapter:

1. Open the *Network* applet from the *Control Panel*.
2. Select the *Symbol Spectrum24 WLAN Adapter*, and select the *Properties* button.
3. When the *Symbol Spectrum24 Configuration* dialog appears, select the appropriate tab to change the adapter settings.

4. Select the dialog item to modify.
5. When all values have been changed, select the *OK* button to save and exit or *Cancel* to abort and exit.
6. Restart the system for changes to take effect.


Note

Refer to appendix A for the table containing a description of the parameters and the range of acceptable values.

6.11 Windows NT 4.0/3.51 Driver Introduction

The Spectrum24 NDIS 3.x Driver provides access to a Spectrum24 WLAN adapter under Windows NT 3.51/4.0 Workstation or Server. It supports all transport protocols (i.e. NetBEUI, IPX/SPX, TCP/IP) provided by Windows NT 3.51/4.0 on both the Spectrum24 PC Card and ISA adapters. Install the driver during primary Windows NT installation, or after Windows NT networking has been installed. Locate the files for Windows NT 3.51 and Windows NT 4.0 in the Root directory and \WINNT\I386 subdirectory. The distribution disk(s) include the following:

File Name	Driver Description
SLANT.SYS	Spectrum24 NDIS 3.x Driver Version 4.x
OEMSETUP.INF	Spectrum24 NDIS 3.x Driver Install Script for Windows NT 3.51/4.0.
OEMNXP24.INF	Spectrum24 NDIS 3.x Transport Install Script for Windows NT 3.51/4.0.
S24EVMON.EXE	Spectrum24 Driver Extension Service.
S24NT.DLL	Spectrum24 Installation DLL Version 3.x.
S24NT.HLP	Spectrum24 Installation DLL On-line Help text file Version 3.x.

INSTALNT.DOC	Installation instructions (Microsoft Word 6.0/7.0).
INSTALNT.TXT	Installation instructions (DOS Text - i.e. Microsoft Notepad).

Symbol recommends updating the Spectrum24 PC/ISA adapter to the latest firmware. Refer to the Firmware update section for instructions.

6.12 New Features For v4.00

- supports IEEE 802.11 protocol.
- supports 1 and 2 Mbps transfer rates.

6.13 Current Features For NT

- The driver installation supports Windows NT 3.51 and NT 4.0 Workstation and Server versions.
- Symbol supports all Windows NT transport protocols (NetBEUI, IPX/SPX, TCP/IP, etc.) on both the Spectrum24 PC Card and ISA adapter.
- Symbol fully supports all Spectrum24 PC Card and ISA adapter firmware releases from Version 3.xx to Version 4.xx are fully supported.
- Symbol fully supports all Spectrum24 diagnostic and configuration utilities are supported. These utilities are distributed on separate installation disks.
- Supports Symbol Spectrum24 protocol.

6.14 Current Limitations For NT

- Perform adapter firmware update and preinstallation PC/ISA card diagnostics (S24DIAG) under DOS. A graphical interface version of site survey that runs on Windows NT is available.
- Resource conflicts (i.e. Interrupt Number, I/O Base Address, Memory Base Address) are not detected during installation/configuration. Set up the configuration so that it does not conflict with other adapters.
- Installation disk does not support network card autodetection. Requires manual installation of the driver.
- Driver does not support Windows NT running on an IBM notebook computer.
- Symbol does not support ISA Plug and Play.

6.15 Workstation/Server Primary Installation

6.15.1 Preparation

When installing the networking components and Spectrum24 driver during Windows NT Workstation or Server primary installation, verify or obtain the following:

- If using Spectrum24 ISA adapter, install prior to enabling PCMCIA support.
- PCMCIA support is enabled (refer to Windows NT documentation).
- Install the Spectrum24 PC Card before or after PCMCIA support is enabled.
- 400 KB of available disk space.
- The Spectrum24 Windows 95/NT Installation disk.

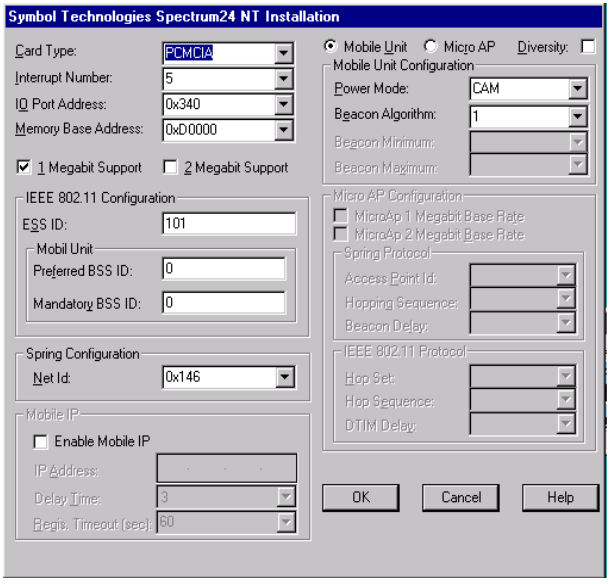
The driver installation disk does not include Spectrum24 utilities. S24INFO and S24UTIL are distributed separately.

6.16 Windows NT 4.0

1. Power up the system, when the *Windows NT Setup* dialog appears, click the *Select from list* button for *Network Adapters* selection.
2. *Select Network Adapter* dialog appears, click the *Have Disk* button.
3. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (*A:*) by clicking *OK*.
4. When the *Select OEM Option* dialog appears, select the *Symbol Technologies Spectrum24 Adapter* and click *OK*.
5. At the *Windows NT Setup* dialog, click *Next* to continue.
6. When the *Windows NT Setup* dialog appears for protocol installation, select the appropriate *Network Protocols* and *Network Services*. Click *Next*, and *Next* again to start the network installation.
7. Select *Next* to start the installed network configuration.
8. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, set the appropriate driver/adapter configuration parameters. For the *Symbol Spring* protocol, change the *Net Id* to the Access Point *Net Id*. For the *IEEE 802.11* protocol, change the ESS ID to the Access Point ESS ID. For the WPOS/ISA bus card, select the *WPOS/ISA Adapter Type*. Click *OK* when complete or *Cancel* to use default values.

Note

Interrupt Number, I/0 Port Address and *Memory Base Address* might need modification to fit system needs. Check the system resources for nonconflicting settings before proceeding with installation.



Note

Select *Diversity* for dual antennae.

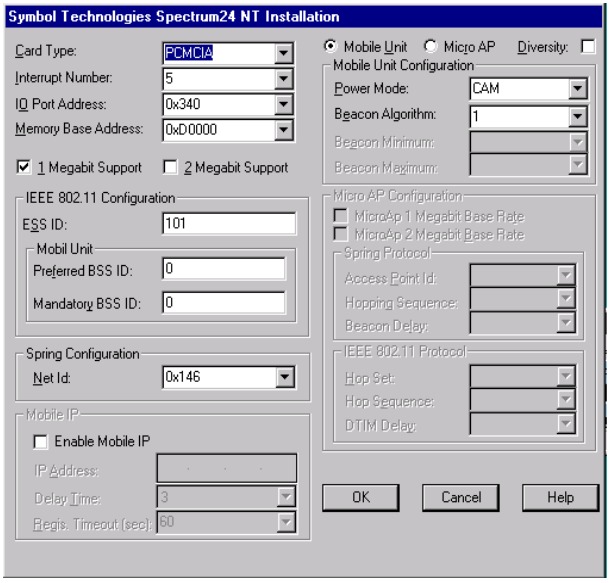
9. Modify any protocol specific parameters that Windows NT requires to continue.
10. At the *Windows NT Setup Wizard* dialog, select *Next* to continue.
11. Enter the *Computer Name, Workgroup* or *Domain* for this computer and select *Next*.

12. At the *Windows NT Setup Wizard* dialog , select *Finish* to complete the installation.
13. The *Windows NT Setup Wizard* continues to setup other operating system components.
14. At the *Reboot System* dialog, select *restart* to reboot the system.
15. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk.

6.17 Windows NT 3.51

1. Power up the system and when the *Network Adapter Card Detection* dialog appears, select *Continue* to manually install the driver. Select *Continue* when the secondary dialog appears.
2. *Add Network Adapter* dialog appears, select the drop down the selection box, proceed to the bottom of the list, and select *<Other> Requires disk from manufacturer* from the *Network Adapter Card list*, and select *Continue*.
3. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (A:\) by selecting the *OK* button.
4. *Select OEM Option* dialog appears, select *Symbol Technologies Spectrum24 Adapter* and select the *OK* to accept the selection.
5. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, set the appropriate driver/ adapter configuration parameters. For the *Symbol Spring* protocol, change the *Net Id* to the Access Point *Net Id*. For the *IEEE 802.11* protocol, change the ESS ID to the Access Point ESS ID. For the WPOS/ISA bus card, select the *WPOS/ISA Adapter Type*. Click *OK* when complete or *Cancel* to use default values.

6. *Interrupt Number, I/0 Port Address* and *Memory Base Address* might need modification to fit the system needs. Check the system resources for non-conflicting settings before proceeding with installation



Select *Diversity* for dual antennae.

7. Modify any protocol specific parameters that Windows NT requires to continue.
8. When the *Network Settings* dialog appears, select *OK* to accept the changes.
9. If a warning appears that the network could not start properly, select *OK* button. If a *Network Malfunction* warning message dialog appears, select *No*. The network starts up properly when the machine reboots.

10. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk and follow all remaining instructions.

6.18 First Time Network Installation


Note

If the networking components were not installed during the primary installation process, install them using the *Network Control Panel* applet. Users need Administrator group privileges to install network components.

6.19 Windows NT 4.0

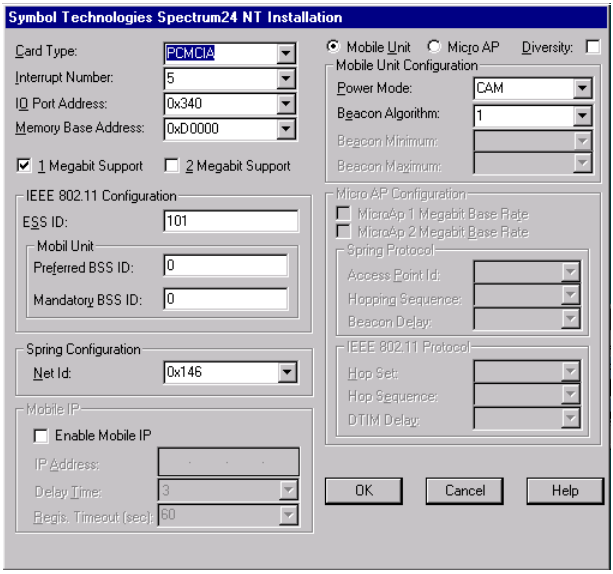
1. Boot and login to the system.
2. Open the *Network* applet from the *Control Panel*.
3. The *Network Configuration* dialog prompts for *Windows NT Networking installation*, click on the *Yes* button. Select the *Wired to the network* check box when the *Network Setup Wizard* dialog appears and click the *Next* button.
4. When the *Network Setup Wizard* dialog queries for a network installation, click the *Select from list…* button.
5. From the *Select Network Adapter* dialog, click the *Have Disk…* button.
6. Insert the Spectrum24 ISA/PC Windows 95/NT Installation into the floppy drive and select the default path to the driver files (A:) by clicking the *OK* button.
7. Select the *Symbol Technologies Spectrum24 WLAN adapter* and click the *OK* button.
8. When the *Network Setup Wizard* dialog returns, click the *Next* button to continue.
9. The *Network Setup Wizard* dialog displays protocol choices. Select all that apply, click the *Next* button

to continue. Click the *Next* button through the next two dialogs.

10. The *Network Setup Wizard* displays a dialog requesting some Windows NT files. Enter the full path to the Windows NT distribution files (i.e. A:\ for floppy based installation), and click the *Continue* button.
11. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, set the appropriate driver/adapter configuration parameters. For the *Symbol Spring* protocol, change the *Net Id* to the Access Point *Net Id*. For the *IEEE 802.11* protocol, change the ESS ID to the Access Point ESS ID. For the WPOS/ISA bus card, select the *WPOS/ISA Adapter Type*. Click *OK* when complete or *Cancel* to use default values.


Note

Select *Diversity* for dual antennae.



Interrupt Number, I/0 Port Address and *Memory Base Address* might need modification to fit the system needs. Check the system resources for non-conflicting settings before proceeding with installation

12. The *Network Setup Wizard* displays the *network binding* dialog and allows the user to change the binding to the various Windows NT services. Making modifications to this dialog is not necessary for a successful Spectrum24 installation. Click the *Next* button to continue.
13. The *Network Setup Wizard* displays the *Start Network* dialog. Click the *Back* button to return and modify previous dialogs. Otherwise, start the network by clicking the *Next* button.
14. The *Network Setup Wizard* displays the *Network Identification* dialog. Type the *Computer Name, Workgroup* or *Domain* for this computer and click the *Next* button.
15. The *Network Setup Wizard* displays the final setup dialog, click the *Finish* button to complete the setup procedure.
16. The *Network Settings Change* dialog displays and requests a system shutdown. Click the *Yes* button to reboot.
17. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk.

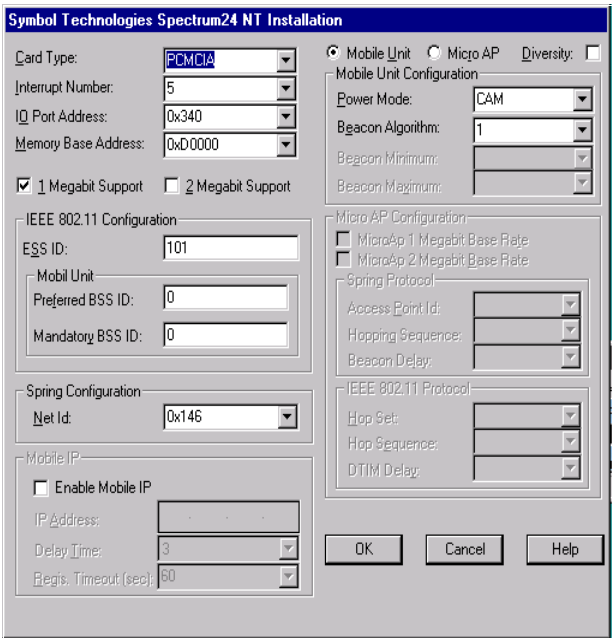
6.20 Windows NT 3.51

1. Boot and login to the system.
2. Open the *Network* applet from the *Control Panel*.

3. The *Network Settings* dialog prompts for *Windows NT Networking installation,* click the *Yes* button to continue. When prompted, enter the full path to the Windows NT distribution files (i.e. A:\ for floppy based installation), and click the *Continue* button.
4. When the *Network Adapter Card Detection* dialog appears, click the *Do Not Detect* button to manually install the driver. Click the *Continue* button when the next dialog appears.
5. At the bottom of the *Add Network Adapter* list box, click *<Other> Requires disk from manufacturer* from the *Network Adapter Card* list and click the *Continue* button. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (A:\) by clicking the *OK* button.
6. When the *Select OEM Option* dialog appears, select the *Symbol Technologies Spectrum24 WLAN Adapter* option. Click the *OK* button to continue.
7. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, set the appropriate driver/adapter configuration parameters. For the *Symbol Spring* protocol, change the *Net Id* to the Access Point *Net Id*. For the *IEEE 802.11* protocol, change the *ESS ID* to the Access Point *ESS ID*. For the WPOS/ISA bus card, select the *WPOS/ISA Adapter Type*. Click the *OK* button when complete or the *Cancel* button to use default values.


Note

Interrupt Number, I/0 Port Address, and Memory Base Address might need modification to fit the needs of the system. Check the system resources for nonconflicting settings before proceeding with the installation.



Note

Select *Diversity* for dual antennae.

8. From the *Windows NT Setup* dialog, select any applicable transport protocols. Click the *Continue* button to proceed.
9. When prompted for protocol specific configuration, click the *Symbol Spectrum24 Adapter* in the appropriate dialogs.
10. Dialogs displays based on any protocol selections made. Proceed by clicking the *Continue* button for each dialog encountered.
11. After the *Network Settings* dialog appears, click *Bindings* to view the current protocol bindings.

Use the *Enable/Disable* buttons to enable/disable the appropriate bindings, click the *OK* button when complete.

12. Click the *OK* button to exit the *Network Control Panel* applet.
13. A prompt requests configuration of the bound protocol stacks. Click the *Symbol Spectrum24 WLAN Adapter* from the *Adapter* list and enter appropriate values.
14. If a warning appears that *the network could not be started properly*, click the *OK* button to continue. The network starts after reboot. If a *Network Malfunction* warning message dialog appears, click the *No* button to continue. The network starts properly after rebooting the machine.
15. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk and follow all remaining instructions to complete the installation.

6.21 Existing Network Installation

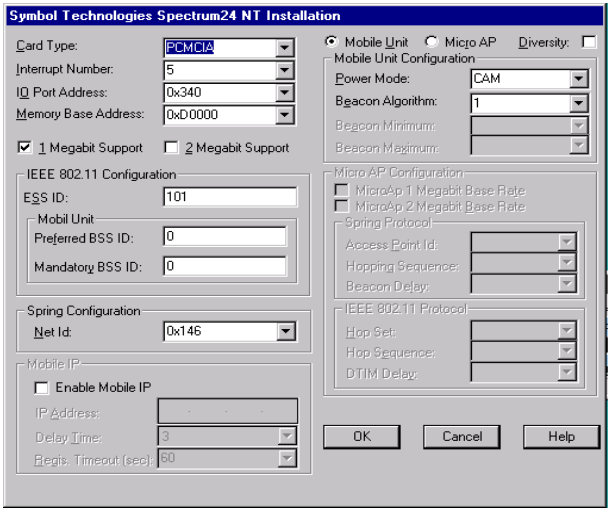
When using a previous driver version, remove the driver before installing the new one. Use the *Network Control Panel* applet *Remove* function to remove the driver and reboot the system. Follow the Driver Installation procedure below. Install only one Spectrum24 PC Card in a single machine. The Spectrum24 PC Card can coexist with a second non-Spectrum24 LAN adapter. Ensure proper protocol stack bindings (i.e. some stacks bind to both adapters but cannot function properly). Administrator group privileges are required to install network components.

6.22 Windows NT 4.00

1. Boot and log into the system.
2. Open the *Network* applet from the *Control Panel*.
3. Click *Adapters*, and click the *Add* button.
4. When the *Select Network Adapter* dialog appears, click the *Have disk…* button.
5. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (*A:*) by clicking the *OK* button.
6. Select the *Symbol Technologies Spectrum24 WLAN Adapter*, and click the *OK* button to continue.
7. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, set the appropriate driver/adapter configuration parameters.
   - For the *Symbol Spring* protocol, change the *Net Id* to the Access Point *Net Id*.
   - For the *IEEE 802.11* protocol, change the *ESS ID* to the Access Point *ESS ID*.
   - For the WPOS/ISA bus card, select the *WPOS/ISA Adapter Type*.
8. Click the *OK* button when complete or the *Cancel* button to use default values.

Note

Select *Diversity* for dual antennae. *Interrupt Number, I/0 Port Address,* and *Memory Base Address* might need modification to fit the system needs. Check the system resources for nonconflicting settings before proceeding with installation.



9. When the *Network* dialog box appears, click the *Protocols* tab.

Note

Verify that *Symbol Technologies Spectrum24 NDIS 3.0 Packet Driver* Appears under *Network* Protocols.

10. Select *Add*.
11. When the *Network Protocol* list box appears, select the desired protocol.
12. Click *OK*.

13. When Windows displays *"Setup Needs To Copy Some Windows NT files"*. Enter the full path to the Windows NT distribution files (i.e. A:\ for floppy based installation), and click the *Continue* button.
14. Click the *Bindings* button to view the current protocol stack bindings. Click the *Enable/Disable* buttons to enable or disable the appropriate bindings.
15. Click the *Close* button to exit the *Network* settings.
16. If prompted to configure the bound protocol stacks at this time, select the *Symbol Spectrum24 WLAN Adapter* from the *Adapter* list and enter appropriate values.
17. The *Network Settings Change* dialog displays and requests a system shutdown. Click the *Yes* button to reboot.
18. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk.

6.22.1 Windows NT 3.51

1. Boot and log into the system.
2. Open the *Network* applet from the *Control Panel*.
3. When the *Network Settings* dialog appears, click the *Add Adapter* button.
4. When the *Add Network Adapter* dialog appears, click *<Other> Requires disk from manufacturer* selection and click the *Continue* button.
5. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (*A:*) by clicking the *OK* button.
6. Select the *Symbol Technologies Spectrum24 WLAN Adapter* and click the *OK* button.

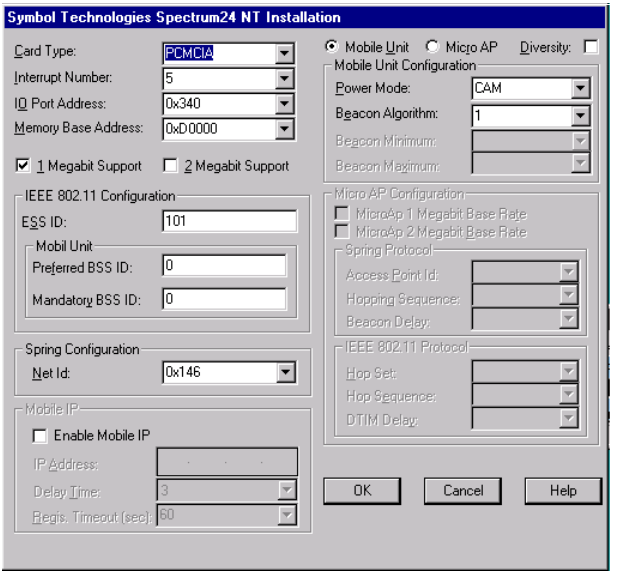
7. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, set the appropriate driver/adapter configuration parameters. For the *Symbol Spring* protocol, change the *Net Id* to the Access Point *Net Id*. For the *IEEE 802.11* protocol, change the *ESS ID* to the Access Point *ESS ID*. For the WPOS/ISA bus card, select the *WPOS/ISA Adapter Type*. click the *OK* button when complete or the *Cancel* button to use default values.

Verify in the *Installed Network Software* list that *Symbol Technologies Spectum24 NDIS* and *Spectrum24 Symbol Technologies WLAN* are present. If not restart installation

8. Click *Add Software* button.
9. *Add Network Software* dialog list appears.
10. Select the desired *Network Protocol*. Click *Continue*.
11. The Windows NT Setup dialog box requests Windows NT distribution files. Enter the full path to the location (i.e. E:\i386 for a CD Rom installation) of these files. Click *Continue*.

Note

Interrupt Number, I/0 Port Address, and *Memory Base Address* might need modification to fit the system needs. Check the system resources for nonconflicting settings before proceeding with installation.



Note

Verify that *Symbol Spectrum24 WLAN Adapter* is selected before updating bindings. Select *Diversity* for dual antennae.

12. Click *Bindings* to view the current protocol stack bindings. Use the Enable/Disable buttons to enable or disable the appropriate bindings (enabled bindings have a yellow light bulb next to them).
13. Click *OK* to exit the *Network Settings* dialog.

14. If prompted to configure the bound protocol stacks at this time, click the *Symbol Spectrum24 WLAN Adapter from the Adapter* list and enter appropriate values.
15. The *Network Settings Change* dialog displays and requests a system shutdown. Click the *Restart Now* to reboot.
16. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk.

6.23 Windows NT Driver Update


Note

Use the *Update* function in the *Network Control Panel* applet to update the *Spectrum24* files on the hard disk. The existing driver/adapter configuration does not change.

6.24 Windows NT 4.0

1. Boot and log into the system.
2. Open the *Network Control Panel* applet.
3. Select the *Adapters* tab.
4. Select the *Symbol Spectrum24 WLAN Adapter,* and click the *Update* button to continue.
5. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (*A:*) by clicking the *OK* button.
6. When prompted, remove the installation disk.
7. Click the *OK* button.
8. Click the *Close* button to exit the *Network* applet.
9. Click the *Yes* button to restart the system.

10. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk.

6.25 Windows NT 3.51

1. Boot and log into the system.
2. Open the *Network* icon from the *Control Panel*.
3. Select the *Symbol Spectrum24 WLAN Adapter,* and click the *Update* button to continue.
4. Insert the *Spectrum24 ISA/PC Windows 95/NT Installation* diskette into the floppy drive and select the default path to the driver files (*A:*) by clicking the *OK* button.
5. When prompted, remove the installation disk.
6. Click the *OK* button twice to exit the *Network* applet.
7. Click the *Restart Now* button to restart the system.
8. Remove the *Spectrum24 ISA/PC Windows 95/NT Installation* disk.

6.25.1 Network Adapter Configuration


Note

Modify the *Card Type* and *the ESS_ID* or *Net_ID*. If there are resource conflicts, change one or more of the following: *Interrupt Number, I/O Port Address,* and *Memory Base Address*. To reconfigure the driver/adapter do the following:

6.26 Windows NT 4.00

1. Boot and log into the system.
2. Open the *Network* icon from the *Control Panel*.
3. Select the *Symbol Spectrum24 WLAN Adapter*, and click the *Configure* button.

4. Select *Adapters*, select the *Symbol Spectrum24 WLAN Adapter* and click the *Properties* button.
5. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, select a field and use the *arrow* buttons to display a list of valid values or use the keyboard to enter a value.

Enter values with a leading '0x' representing hex-decimal numbers with leading '0x' when using keyboard entry.

6. When all values have been changed, click the *OK* button to save and exit. Click the *Cancel* button to abort and exit.

6.27 Windows NT 3.51

1. Boot and log into the system.
2. Open the *Network* icon from the *Control Panel*.
3. Select the *Symbol Spectrum24 WLAN Adapter,* and click the *Configure* button.
4. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, select a field and use the *arrow* buttons to display a list of valid values or use the keyboard to enter a value.

Enter values displayed with a leading '0x' representing hex-decimal numbers with the leading '0x' when using keyboard entry.

5. When all values have been changed, click the *OK* button to save and exit. Click the *Cancel* button to abort and exit.

Refer to appendix B for the table containing a description of the parameters and the range of acceptable values.

Chapter 7 DOS/Windows For Workgroups Driver Installation

7.1 Preventing Memory Range Conflicts

The ISA Plug and Play WLAN card requires users to load SLAINIT.EXE prior to loading the driver or updating the firmware. Ensure the firmware is up to date. Refer to firmware update section for instructions on firmware version verification.

1. To prevent conflicts with other devices, use an extended memory manager (i.e., EMM386, etc.). Exclude the upper memory block where the adapter resides. Modify the memory manager device line in CONFIG.SYS, if the adapter has a memory location starting at 0xD000 operating in memory mode and EMM386 is being used.
   - For memory mode operation:

     ```
     [DEVICE]=[path]EMM386.EXE X=DØØØ-D7FF
     ```

   - For I/O mode operation:

     ```
     [DEVICE]=[path]EMM386.EXE X=DØØØ-DØFF
     ```

2. Modify the network configuration to include the memory range used by the WLAN adapter.
   - Exclude a 4 KB memory range for I/O Mode operation.

– Exclude a 32 KB memory range for memory mode operation.


Note

Refer to the Network Configuration for further details. Memory manager parameter settings vary. Refer to the memory manager software documentation

3. Reboot the system.


Note

Refer to Vendor docmentation for setup and installation of third-party network software and drivers.

7.2 Spectrum24 Automated Driver Installation

The installation program copies the ODI driver and configuration files for the *Novell Client* to the hard drive. The installation program can modify *AUTOEXC.BAT*. The automatic installation program assumes default settings. To control value selection, use the manual installation option.The installation program also includes diagnostics functions for testing the adapter. For additional information, refer to the README.TXT file provided on the DOS (16 bit) *Drivers and Utilities* diskette.

- For *ODI*, select *ODI Installation* from the *main menu*. This allows an automatic or manual driver installation and configuration.
- For *NDIS*, select *Driver Installation Instructions* from the *main menu*. For installation program overview, select *Help* from the main menu and select *Installation Overview*. To control value selection, use the *manual* installation.

A default installation is assumed for all driver installations. All references made are to default directories for all installations.

1. Power up the system to a DOS prompt.
2. Insert the *Drivers and Utilities Installation* Diskette into the floppy drive.
3. Change the drive and path to the location of the Drivers and Utilities diskette.
4. Press the *Enter* key.
5. Type `Install`.
6. Follow the instructions from the installation program. Reboot the system when prompted.

If the automatic installation program was not used, copy the files as needed *(LSL.COM, SLAINIT.EXE, SL8ODIPC.COM)* from the *Drivers and Utilities Installation diskette* to the appropriate directory on the hard disk.

7.3 NDIS Manual Installation

For *NDIS*, MUs require the radio device driver *SL8NDIS.EXE*. A protocol manager (e.g. *PROTMAN*) binds *NDIS* drivers to the protocol stack. A network bind (e.g. *NETBIND*) program binds all the network stack components. *NDIS* loads as a system block device driver *NDIS* drivers install in the *CONFIG.SYS*.

The *NDIS* driver supports network configurations compatible with the *NDIS* v2.01 specification *NDIS* configured systems require the following:

- *SL8NDIS.EXE* - The Spectrum24 radio device driver.
- *PROTMAN* - A protocol manager to bind NDIS drivers to the protocol stack.
- *NETBIND* - a network bind program for all network stack components.
- Other protocol drivers as required

Locate *NDIS* network parameters in *Protocol.ini*. Edit *Protocol.ini* using an ASCII text editor. The following example assumes a default installation of the third party network software. Refer to individual vendor documentation for setup of specific network software being used. [PATH] refers to the location of files on the hard drive. If the automatic installation program was not used, copy the files as needed (*PROTMAN.DOS, SL8NDIS.EXE, NETBIND.COM*) from the *Drivers and Utilities Installation* diskette to the appropriate directory on the hard disk.

7.4 Modifying Config.sys

Verify the following lines in *Config.sys* are present:

```
DEVICE=[PATH]\PROTMAN.DOS /C:\

DEVICE=[PATH]\SL8NDIS.exe
```

- other protocol drivers as required

7.5 Modifying Autoexec.bat

In *AUTOEXEC.BAT* verify the following:

```
[PATH]\NETBIND.COM
```

7.6 Modifying Protocol.ini

Modify *PRTOCOL.INI* to include:

```
[sample PROTOCOL.INI entry for SYMBOL NDIS driver]
[protman]
  DriverName=SYMBOL$
[SYMBOLNET]
  DRIVERNAME=SYMBOL$
  IOADDRESS=Øx3ØØ
  INT=5
  MEM=ØxDØØØ
  ESS_ID=1Ø1
  DIVERSITY=NO
```

- other Keywords as required from appendix D.

```
[Other protocol driver sections as required]
```

7.7 ODI Manual Installation

For ODI, MUs require a *Multiple Link Interface Driver (MLID)* called *SL8ODIPC.COM*. *SL8ODIPC.COM* is the radio device driver. The multiple stacks the MU uses (e.g. TCP/IP) are known as the *Multiple Protocol Interfaces (MPI)*. A *link support layer (LSL)* program provides the link between *MLID* and *MPI*. *ODI* loads as a *Terminate and Stay Resident (TSR)* program. *ODI* program files run from the command line or as part of a batch file.


Note

Edit *ODI* binding and configuration information stored in *NET.CFG* with an ASCII text editor using the appropriate keywords found in Appendix D. The following examples assume a default installation of third party network

programs. [PATH] refers to the location of files on the hard drive. If the automatic installation program was not used, copy the files as needed (LSL.COM, SL8ODIPC.COM,) from the *Drivers and Utilities Installation* diskette to the appropriate directory on the hard disk.

7.8 Modifying Autoexec.bat

Modify *AUTOEXEC.BAT* to include the following:

```
[PATH]\LSL

[PATH]\SLAINIT (If using an ISA card)

[PATH]\SL8ODIPC
```

- other protocol drivers as required.

7.9 Modifying Net.cfg

With an ASCII text editor, create NET.CFG in the network directory. Include the following statements:

```
LINK DRIVER SLAODI
  FRAME ETHERNET_II
  MODE IO
  IOADDRESS 3ØØ
  INTERRUPT 5
  ESS_ID 1Ø1
```

Verify the values do not conflict with other system interrupts, I/O and memory ranges. Refer to Appendix D for a detailed description of DOS keyword definitions.

7.10 Keyword usage

Certain keywords enable or disable features, modes and usage of the Spectrum24 adapter in different environments. Refer to Appendix D for a detailed definition of all DOS keywords.

7.11 Enabling Plug and Play

In both cases set the driver keyword *PNP* to *YES*. *Verify* that the keywords *Cardservices* and *Socketservices* are not present or are set to *NO*.

For ODI, in NET.CFG enter:

```
PNP YES
CARDSERVICES NO
SOCKETSERVICES NO
```

For NDIS, in PROTOCOL.INI enter:

```
PNP=YES
CARDSERVICES=NO
SOCKETSERVICES=NO
```

The ISA Plug and Play WLAN card requires users to load SLAINIT.EXE prior to loading the driver or updating the firmware. For *ODI*, from the command line or in a batch file load the following:

```
LSL.COM

SLAINIT.EXE

SL80DIPC.COM
```

- other protocol drivers as required.

For NDIS, in the config.sys file include:

```
[DEVICE]=[PATH]\PROTMAN.DOS

[DEVICE]=[PATH]\SLAINIT.EXE

[DEVICE]=[PATH]\SL8NDIS.EXE
```

- other protocol drivers as required.

7.12 Enabling CardServices

Load SLAINIT.EXE prior to loading the driver in order to use Card and Socket Services with the PCMCIA Adapter card. Using Card and Socket Services allows Hot Swapping the PCMCIA Adapter card. It also provides protection against resource conflicts.

For ODI, from the command line or in a batch file enter:

```
LSL.COM

SLAINIT.EXE

SL80DIPC.COM
```

- other protocol drivers as required.

For NDIS, in config.sys enter:

```
[DEVICE]=[PATH]\PROTMAN.DOS

[DEVICE]=[PATH]\SLAINIT.EXE

[DEVICE]=[PATH]\SL8NDIS.EXE
```

- other protocol drivers as required.

Ensure that the driver keywords *Cardservices* and *Socketservices* have been set to *Yes*. Verify that *PNP* is not present or has been set to *No*.

For ODI, in NET.CFG enter:

```
PNP NO

CARDSERVICES YES

SOCKETSERVICES YES
```

For NDIS, in PROTOCOL.INI enter:

```
PNP=NO

CARDSERVICES=YES

SOCKETSERVICES=YES
```

Modify the driver keywords *Memory and IOAddress* if desired. SL8INIT.EXE uses the values to request resources from Card Services. Card Services provides values if they are unavailable. If the SL8INIT.EXE keyword *DynamicResources* is set to *Yes*, SL8INIT.EXE accepts these values and passes them to the driver.

7.13 Windows for Workgroups (v3.11)

7.13.0.1 Preparation.

Before installing the driver for Windows for Workgroups, verify or obtain the following:

- Spectrum24 network adapter installed
- WFW v3.11 installation media
- the Spectrum24 driver disk.

If a previous Spectrum24 driver was installed, remove it before installing the new Spectrum24 driver.

7.14 Installing The Driver

1. After Windows starts, from *Program Manager* open the group *MAIN*.

2. Double click on the *Windows setup* applet.
3. Open the *Options* menu. Click *Change Network Settings*.
4. Select *WFW network* or *windows support for another network*.
5. Select *Drivers*.
6. Select *Symbol Spectrum24 LAN Adapter* and click *Remove*.
7. Click *Close*, click *OK*.
8. Select *Unlisted* or *Updated Network Adapter*.
9. Enter the new *OEMSETUP.INF* file location.
10. Select the *new Spectrum24 802.11 adapter* from the list. Click *OK*.
11. From the Network Drivers dialog box, select *Setup*.
12. Set the parameters in this box.
13. Select *Advanced*.
14. Enter the ESS_ID number (Use double-quotes when entering the number). Click *OK*.
15. Click *OK* in the adapter settings dialog box.
16. At the *Network Drivers* dialog box, continue following the WFW instructions.
17. When the prompt *Files for Symbol Spectrum24 802.11 LAN Adapter are currently installed, do you want to replace them?* appears, click *YES*.
18. Enter the path where the new OEMSETUP.INF file is located
19. Complete the WFW installation instructions on the screen.
20. Remove the installation disk.
21. Restart System for changes to take effect.

After restarting the system, the Spectrum24 802.11 adapter driver parameters remain active and present under setup in WFW network settings. The Spring parameters remain present under network settings in WFW. This does not indicate any abnormalities with the new Spectrum24 802.11 driver.

Appendix A Windows 95 Network Configuration Properties

Parameters For PSP	Description	Range and Default
Beacon Algorithm	the algorithm used to determine how often the adapter wakes up to check for data in the associated access point. A lower number means that the adapter wakes up more frequently. Algorithm 11 means that the adapter adapts to the traffic load.	Range: 1 - 11 Default: 1
Beacon Maximum	specifies the highest number used (in *PSP* mode only) when the *Beacon Algorithm* is set to 11.	Range: 1 - 10 Default: 10
Beacon Minimum	specifies the lowest number used when the *Beacon Algorithm* is set to 11.	Range: 1 - 10 Default: 1
Power Mode	selects Continuously Aware Mode (*CAM*) or Power Saving Protocol (*PSP*) mode.	Range: *CAM, PSP* Default: *CAM*

Parameters For MicroAP	Description	Range and Default
MicroAP 1 Megabit Base rate.	indicates 1 Mbps base rate supported.	Range: No, Yes Default: None
Hop Sequence	frequency hopping sequence selection (MicroAP only).	Range: 1 - 79, 255 = auto-select Default: 255 - auto-select
Hop Set	frequency hopping set selection (MicroAP only).	Range: 1 - 3 Default: 1
Access Point Id	*Access Point Id* setting (MicroAP and Symbol protocol only).	Range: 0x0 - 0x7F, <Auto> = auto-select Default: <Auto>
Beacon Delay	frequency 'hops' between broadcast 'DTIM' transmissions (MicroAP only).	Range: 1 - 10 Default: 1
Beacon Delay	frequency 'hops' between broadcast 'beacon' transmissions (MicroAP and Symbol protocol only).	Range: 1 - 10 Default: 10

Other Parameters	Description	Range and Default
IP Address	Mobile IP Home TCP/IP Address.	Range: Any Valid IEEE TCP/IP address. Default: none
Delay Time	Mobile IP Delay Time.	Range: 1 - 120 Default: 60
Registration Timeout	Mobile IP Registration timeout.	Range: 1 - 10 Default: 3
Mandatory BSS ID	specifies a BSS ID address (IEEE address) of an Access Point with which this unit associates.	Range: Any valid IEEE address. Default: 0 (none)
Preferred BSS ID	specifies a BSS ID address (IEEE address) for an Access Point with which this unit should associate.	Range: Any valid IEEE address Default: 0 (none)
1 Megabit Support	indicates how 1 Mbps data rate is supported.	Range: No, Yes Default: Yes
2 Megabit Support	indicates how 2 Mbps data rate is supported.	Range: No, Yes Default: Yes

Other Parameters	Description	Range and Default
Card Type	identifies the physical form factor and bus type for the Spectrum24 adapter.	Range: PCMCIA, WPOS/ISA, Plug and Play Default: PCMCIA
Diversity	enables/disables secondary antenna.	Range: Yes-Dual, No-Single Default: No
ESS ID	identifies the ESS (Extended Service Set) ID for the network with which the adapter associates.	Range: any displayable ASCII character string up to 32 characters long. Default: "101"
Hop Sequence	frequency hopping sequence selection (MicroAP and Symbol protocol only).	Range: 1 - 22, <Auto> = auto-select Default: <Auto>
Net_ID	AP or MicroAP Network IDentifier (*Net_ID* Symbol protocol only).	Range: any string of displayable ASCII characters up to 32 characters long. Default: 0x101
Mobile IP	enable Mobile IP.	Range: Enabled, Disabled Default: Disabled

Appendix B Windows NT Network Configuration Parameters

Parameters For PSP	Description	Range and Default
Beacon Algorithm	the algorithm used to determine how often the adapter wakes up to check for data in the associated Access Point. A lower number means that the adapter wakes up more frequently. Algorithm 11 means that the adapter adapts to the traffic load.	Range: 1 - 11 Default: 1
Beacon Maximum	specifies the highest number used (in *PSP* mode only) when the *Beacon Algorithm* is set to 11.	Range: 1 - 10 Default: 10
Beacon Minimum	specifies the lowest number used when the *Beacon Algorithm* is set to 11.	Range:1 - 10 Default: 1

Power Mode	selects Continuously Aware Mode (*CAM*) or Power Saving Protocol (*PSP*) mode.	Range: *CAM, PSP* Default: *CAM*
Parameters For MicroAP	**Description**	**Range and Default**
802.11 Beacon Delay	frequency hops between broadcast DTIM transmissions (MicroAP only).	Range: 1 - 10 Default: 1
802.11 Hop Sequence	frequency hopping sequence selection (MicroAP only).	Range: 1 - 79, 255 = auto-select Default: 255 - auto-select
802.11Hop Set	frequency hopping set selection (MicroAP only).	Range: 1 - 3 Default: 1
MicroAP	enables/disables *MicroAP* operation mode.	Range: Yes, No Default: No
MicroAP AP_ID	MAP MAC address.	Default: <Auto>
MicroAP Beacon Delay	frequency 'hops' between broadcast 'beacon' transmissions (MicroAP and Symbol protocol only).	Range: 1 - 10 Default: 10
MicroAP Hop Sequence	frequency hopping sequence selection (MicroAP and Symbol protocol only).	Range: 1 - 22, <Auto> = auto-select Default: <Auto>

Parameters for Rate Control	Description	Range And Default
1 Megabit Support	indicates how 1 Mbps data rate is supported.	Range: No, Yes, Mandatory Default: Yes
2 Megabit Support	indicates how 2 Mbps data rate is supported.	Range: No, Yes, Mandatory Default: Yes

Other Parameters	Description	Range And Default
Card Type	identifies the physical form factor and bus type for the Spectrum24 adapter.	Range: PCMCIA, WPOS/ISA Default: PCMCIA
Diversity	enables/disables secondary antenna.	Range: Yes-Dual, No-Single Default: No
ESS_ID	identifies the ESS (Extended Service Set) ID for the network with which the adapter associates.	Range: any displayable ASCII character string up to 32 characters long. Default: "101"
Net_ID	AP or MicroAP network identifier (*Net_ID* Symbol protocol only).	Range: any string of displayable ASCII characters up to 32 characters long. Default: 0x101

802.11 Mandatory BSS ID	specifies a BSS ID (IEEE address) for an Access Point with which this unit associates.	Range: Any valid IEEE address. Default: 0 (none)
802.11 Preferred BSS ID	specifies a BSS ID address (IEEE address) for an Access Point with which this unit associates.	Range: Any valid IEEE address. Default: 0 (none)

Appendix C Windows NT/95 Utilities Setup

C.1 Windows NT 4.0 and Windows 95 S24INFO

C.1.1 Preparation.

Before installing S24INFO on NT 4.0 or Windows 95 systems, verify or obtain the following:

- The system is running Windows NT 4.0 or Windows 95.
- A Spectrum24 driver is installed and configured.
- A Spectrum24 transport is installed.
- A Spectrum24 card is installed.
- Ten megabytes of available disk space.
- S24INFO utility software.

Install S24INFO utility after successfully installing the Spectrum24 adapter on the computer.

C.1.2 Installing S24INFO

1. Insert the S24INFO installation disk #1 into the floppy drive.
2. Click the *Start* Button. Select *Run*.
3. Enter `A:setup` in the Run Dialog text box. Enter the correct drive and path for location of setup program, if location differs from the example. Click *OK*.
4. Continue to follow the SETUP program through the S24INFO installation process.

C.1.3 Starting S24INFO

1. Click *Start*.
2. Click *Programs*.
3. Click *Symbol Technologies*
4. Open *S24INFO*.

If a shortcut to S24INFO was placed on the desktop during installation, double-click shortcut to start S24INFO.

C.1.4 Uninstalling S24INFO

1. Open *Control Panel*.
2. Open the *Add/Remove Programs* applet.
3. Click on *item* in list.
4. Continue to follow the S24INFO uninstall program.

C.2 Windows NT 3.51 S24INFO

C.2.1 Preparation.

Before installing S24INFO on NT 3.51 verify or obtain the following:

- The system is running Windows NT 3.51.
- A Spectrum24 Driver is installed and configured.
- A Spectrum24 Transport is installed.
- A Spectrum24 card is installed.
- Ten megabytes available hard-disk space.
- S24INFO utility software.

Install S24INFO utility after successfully installing the Spectrum24 adapter on the computer.

C.2.2 Installing S24INFO

1. Insert the S24INFO installation disk #1 into the floppy drive.
2. Open *Program Manager*.
3. Click *File* from the file menu bar.
4. Click *Run,* enter `A:setup` Enter the correct drive and path for the location of setup program, if location differs from the example. Click *OK*.
5. Continue to follow the SETUP program through the installation process (additional diskettes can be required).

C.2.3 Starting S24INFO

1. Open the *Program Manager*.
2. Open the *Symbol Technologies Program Group*.
3. Open the *S24INFO* applet.

C.2.4 Uninstalling S24INFO

1. Open the *Program Manager*.
2. Open *Symbol Technologies* folder.
3. Open the *Uninstall S24INFO* applet and follow through with all the uninstall procedures.

C.3 Windows NT 4.0 and Windows 95 S24UTIL

C.3.1 Preparation.

Before installing S24UTIL on NT 4.0 or Windows 95 systems verify or obtain the following:

- The system is running Windows NT 4.0 or Windows 95.
- A Spectrum24 Driver is installed and configured.
- A Spectrum24 Transport is installed.
- A Spectrum24 card is installed.
- S24UTIL Utility software.

Install S24UTIL after successfully installing the Spectrum24 adapter on the computer.

C.3.2 Installing S24UTIL

1. Insert the S24UTIL installation disk 1 into the floppy drive.
2. Click the *Start* Button. Select *Run*.
3. Enter `A:setup` in the *Run* Dialog box. Click *OK* (enter the correct drive and path for location of setup program, if location is different than the example).
4. Continue to follow the SETUP program through the S24UTIL installation process (additional diskettes can be required).

C.3.3 Starting S24UTIL

1. Click *Start*.
2. Click *Programs*.
3. Click *Symbol Technologies*.

4. Open *S24UTIL*.

If a shortcut to S24UTIL was placed on the desktop during installation, double-click shortcut to start S24UTIL.

C.3.4 Uninstalling S24UTIL

1. Open *Control Panel*.
2. Open the Add/Remove Programs applet.
3. Click on item in list.
4. Continue to follow the S24UTIL uninstall program.
5. Windows NT 3.51 S24UTIL.

C.4 Windows NT 3.51 S24UTIL

C.4.1 Preparation.

Before installing S24UTIL on NT 3.51 systems verify or obtain the following:

- The system is running Windows NT 3.51.
- A Spectrum24 Driver is installed and configured.
- A Spectrum24 Transport is installed.
- A Spectrum24 card is installed.
- Ten megabytes available hard-disk space.
- S24 Utility software.

Install S24UTIL after the successfully installing the Spectrum24 adapter driver and Spectrum24 transport.

C.4.2 Installing S24UTIL

1. Insert the S24UTIL installation disk #1 into the floppy drive.
2. Open *Program Manager*.
3. Click *File* from the file menu bar and click *Run*.
4. Enter `A:setup` click *OK*.
5. Continue to follow the SETUP program through the installation process (additional diskettes can be required).

C.4.3 Starting S24UTIL

1. Open the Symbol Technologies Program Group.
2. Open the *S24UTIL* applet.

C.4.4 Uninstalling S24UTIL

1. Open *Program Manager*.
2. Open *Symbol Technologies* folder.
3. Open the *Uninstall* applet and follow uninstall procedures.

C.5 Reinstalling S24UTIL or S24INFO

Unless the driver or transport layer has been removed or reinstalled, reconfiguring these drivers is necessary. To install S24UTIL or S24INFO on a computer that already has a copy running, follow the installation instructions above. The installation program finds the installed copy and uses its location as the default location for reinstalling. A backup copy of previously installed files generates.

C.5.1 Conversion

When converting from an existing 32-bit installation to new driver and transport versions, uninstall the old version. Use the update option for installing the new driver, and install the new transport.

C.6 Windows Utilities Description

The installation media contains utilities to diagnose a radio or network problem for use in Windows NT and Windows 95. The operating environment the radio runs should not affect radio performance, for example range, RF error rates, roaming, etc. The 32-bit Spectrum24 utilities are: S24UTIL and S24INFO.

- S24INFO is a status utility similar in function to the DOS S_INFO tool. The S24INFO utility monitors a Spectrum24 adapter and displays adapter activity. Configure to display variables. The S24INFO utility provides access to a Spectrum24 WLAN adapter using a Windows NT 3.51/4.0 Workstation or Server or Windows 95. S24INFO supports both the Spectrum24 PC Card adapter and ISA adapters in standard Mobile Unit (MU) configurations.
- S24UTIL is a configuration utility very similar to S_UTIL.

C.7 Monitor Spectrum24 MU Mode

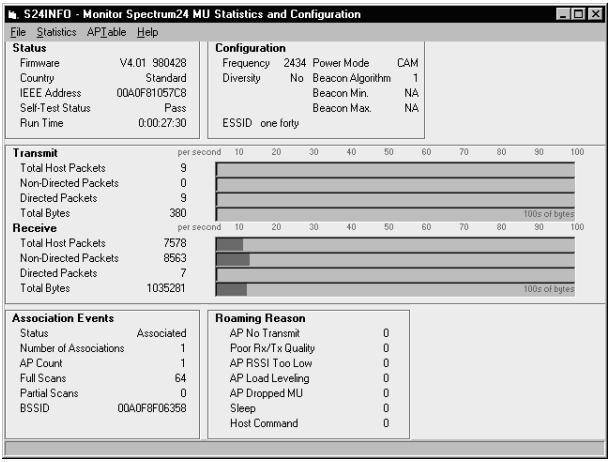


Figure 7-1: Monitor Spectrum24 Main Window (MU mode).

C.8 Using S24INFO

The S24INFO Monitor Spectrum24 MU window has four menu bar items.

- Click *File* and select *Exit* to close S24INFO.
- Click *Statistics* to view additional tables on the main window. Available tables include *Transmit, Receive* and *Miscellaneous*.
- Click *APTable*. The *APTable* provides statistics about individual Access Points (AP). The *APTable* appears beside the *Transmit* and *Receive* table.

- The *Help* menu provides access to the *Help* contents menu item and an *About* dialog that identifies the S24INFO version plus Spectrum24 drivers recognized in the system. Additional help appears when the cursor passes over a component on the screen, by displaying informative messages in the status bar.

Note

S24INFO can run in either Monitor Spectrum24 MU mode for a MobileUnit or Monitor Spectrum24 MAP for Micro Access Point mode depending on the internal configuration of the Spectrum24 adapter.

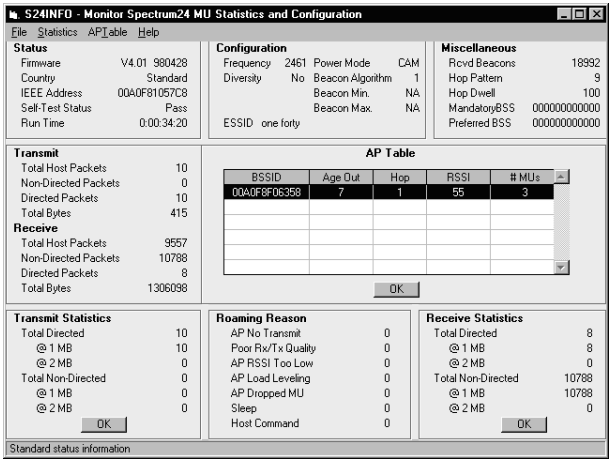


Figure 7-2: Monitor Spectrum24 Main Window with statistics.(MU mode)

- *Transmit Statistics* replaces the *Association Events* table located in the bottom left on the main window.
- *Receive Statistics* appears in the bottom right of the window when activated.
- *Miscellaneous* locates in the upper right when activated.

- Click the associated *OK* button to close the *Transmit* and *Receive* Statistics tables or select the checked *Transmit* or *Receive* items from the *Statistics* menu to close *Transmit* and *Receive* Statistics tables.
- Select the checked *Miscellaneous* line, from the *Statistics* menu to close the *Miscellaneous* table. Refer to Statistics and Configuration Screen descriptions In MU Mode in this appendix for a detailed description of these tables.

Tables Update twice per second. Graphs update once per second.

C.9 Statistics and Configuration Screen Descriptions In MU Mode

Status

Firmware	adapter firmware version and date.
Country	adapter country code. Standard indicates the standard hop set. This field displays Japan, Korea, France, Spain, Israel or Belgium, as appropriate.
IEEE Address	indicates the Spectrum24 adapter MAC address.
Self Test Status	verifies that the Spectrum24 adapter functions correctly.
Run Time	elapsed time since adapter was started. This counter rolls over at approximately 36 hours.

Transmit

Total Host Packets	the packet quantity transmitted by the Spectrum24 adapter.
Non-Directed Packets	broadcast packets transmitted to APs without a specified recipient.
Directed Packets	packets transmitted to a specified recipient.
Total Bytes	total bytes transmitted. The bar graph reflects hundreds of bytes per second.

Receive

Total Host Packets	the packet quantity received by the Spectrum24 adapter.
Non-Directed Packets	broadcast packets received by the adapter.
Directed Packets	packets received for a specified address.
Total Bytes	total bytes received. The bar graph reflects hundreds of bytes per second.

Counters go from 0 to a maximum value, and wrap back to zero.

Association Events

Status	indicates if the Spectrum24 adapter is associated or unassociated with an AP (out of range).
Number of Associations	indicates how many times the Spectrum24 adapter has established or reestablished AP communication.
AP Count	shows how many different APs the Spectrum24 adapter has available for association.
Full Scans	the complete scans used to determine communication quality. Even when not accessed a full scan occurs once each second.
Partial Scans	the partial scans used to determine communication quality.
AP ID	the identifier assigned to the AP.
BSSID	displays the Basic Service Set IDentification number.


Note

Counters go from 0 to a maximum value, and wrap back to zero.

Configuration

Frequency	displays the current Spectrum24 adapter frequency.
Diversity	If a second antenna is enabled diversity reads Yes. If not, diversity reads No.

Net ID	the AP network identifier. *Net ID* or *ESSID* display depending on the internal protocol used by the Spectrum24 adapter.
ESSID	the Extended Service Set Identifier displays the proper ID as returned by the Spectrum 24 adapter internal protocol. *ESSID* display depends on the internal protocol used by the Spectrum24 adapter.
Power Mode	indicates Power Save Polling (*PSP*). Continuous Aware Mode (*CAM*) indicates the adapter constantly monitors activity.
Beacon Algorithm	controls how often the mobile unit awakes. Only valid when using *PSP Power Mode*.
Beacon Minimum	the minimum time lapse between beacon wake ups when using algorithm 11. The adapter uses algorithm 12 in *PSP* mode. When not using *PSP* Power mode with *Beacon Algorithm* 11 or 12 NA displays.
Beacon Maximum	the maximum time lapse between beacon wake ups when using algorithm 11. The adapter uses algorithm 12 in *PSP* mode. When not using *PSP* Power mode with *Beacon Algorithm* 11 or 12 NA displays.

Roaming Reason	
AP No Transmit	no AP transmissions received over a specified time period.
Poor Rx/Tx Quality	poor transmission quality. The adapter uses internal diagnostics to determine transmission quality. It passes the rating to the S24INFO utility.
AP RSSI Too Low	the adapter Received Signal Strength Indicator (*RSSI*) was weak.
AP Load Leveling	the AP changed the MUs carried, and balanced the MUs across the network.
AP Dropped MU	the AP quit serving the MU.
Power Mode Change	the Mobile Unit has changed modes (from *PSP* to *CAM*, or *CAM* to *PSP*) and should reassociate.
Sleep	the MU awakened and had to reassociate.
Host Command	the times a *Host Command* caused a reassociation.

Transmit Statistics

Total Directed	the information packets transmitted to a specific recipient.
@1 MB	shows transmission statistics for a 1 Mbps network.
@2 MB	shows transmission statistics for a 2 Mbps network. If 2 Mbps is not supported by or not enabled for the adapter, NA displays in the 2 Mbps section.
Total Non-Directed	the information packets transmitted without a specified recipient.
@1 MB	shows transmission statistics for a 1 Mbps network when no recipient is specified.
@2 MB	shows transmission statistics for a 2 Mbps network. If 2 Mbps is not supported by or not enabled for the adapter, NA displays in the 2 Mbps section.

Counters go from 0 to a maximum value, and wrap back to zero.

Receive Statistics

Total Directed	the information packets sent expressly to the adapter.
@1 MB	the information packets sent expressly to the adapter at a 1 Mbps rate.
@2 MB	the information packets sent expressly to the adapter at a 2 Mbps rate. If 2 Mbps is not supported by or is not enabled for the adapter, NA displays in the 2 Mbps section.
Total Non-Directed	total information packets received without a specified recipient.
@1 MB	the information packets received by the adapter at a 1 Mbps rate.
@2 MB	the information packets received by the adapter at a 2 Mbps rate. If 2 Mbps is not supported by or not enabled for the adapter, NA displays in the 2 Mbps section.

Counters go from 0 to a maximum value, and wrap back to zero.

Miscellaneous

Rcvd Beacons	AP beacons received by the Spectrum24 adapter.
Hop Pattern	specifies one of several frequency sequences.
Hop Dwell	specifies how long to stay on a given frequency before switching to another frequency.
Mandatory BSS	specifies the only MAC AP address where the MU can associate.
Preferred BSS	the AP MAC address where the MU prefers to associate. The MU associates with another address when it cannot locate the preferred address.


Note

Hop Pattern, Hop Dwell, Mandatory BSS and *Preferred BSS* display depending on the internal protocol used by the Spectrum24 adapter. Counters go from 0 to a maximum value, and wrap back to zero.

AP Table

IEEE Address Or BSSID	the AP MAC address.
Age Out	sets to maximum value on signal receipt. The adapter sends an acknowledgment signal. If verification does not return before the value counts down to zero, the AP deletes from the table.
Net ID	the Network IDentification assigned to the AP.
AP ID	provides the AP IDentifier assigned to the AP.
Hop	the hop sequence the AP uses.
RSSI	the Received Signal Strength Indicator signal quality evaluation comes from the adapter.
# MUs	MUs associated with the AP.

The AP Table displays information about APs accessible to the adapter. If the adapter associates with an AP in the AP table, the appropriate adapter line highlights. *Net ID* and *AP ID* display depending on the internal protocol used by the Spectrum24 adapter.

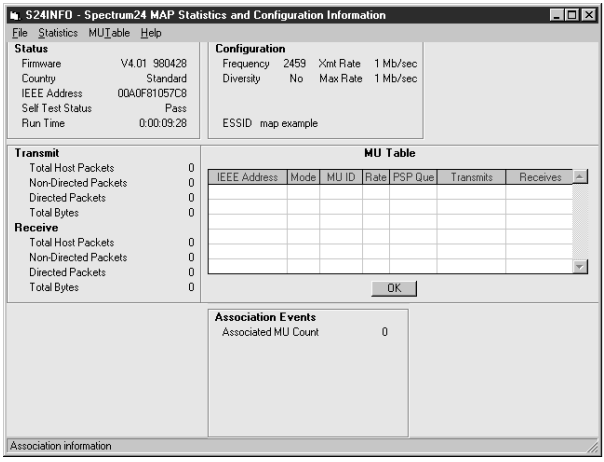


Figure 7-3: Monitor Spectrum24 Main Window (MAP mode).

S24INFO can run in either Monitor Spectrum24 MU mode for a Mobile Unit or Monitor Spectrum24 MAP for Micro Access Point mode depending on the internal configuration of the Spectrum24 adapter.

The S24INFO Monitor Spectrum24 MAP window has four menu bar items.

- Click *File* and select *Exit* to close S24INFO.
- Click *Statistics* to view additional tables. Available tables include *Transmit, Receive,* and *Miscellaneous*.
- Click *MU Table*. The *MU Table* provides statistics about individual Mobile Units (MU). The *MU Table* appears beside the *Transmit* and *Receive* tables.

- The *Help* menu provides access to the *Help* contents menu item and an *About* dialog that identifies the version of S24INFO plus Spectrum24 drivers recognized in the system. Additional help appears when the cursor passes over a component on the screen, by displaying informative messages in the status bar.

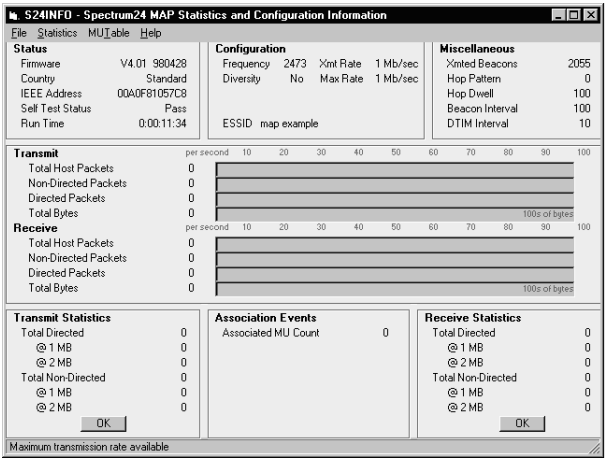


Figure 7-4: Monitor Spectrum24 Main Window with statistics (MAP mode).

C.10 Statistics and Configuration Screen Descriptions In MAP Mode

Status

Firmware	adapter firmware version and date.
Country	adapter country code. Standard indicates the standard hop set. This field displays Japan, Korea, France, Spain, Israel, or Belgium, as appropriate.

IEEE Address	indicates the Spectrum24 adapter MAC address.
Self Test Status	verifies that the Spectrum24 adapter is functioning correctly.
Run Time	elapsed time since adapter was started. This counter rolls over at approximately 36 hours.

Transmit

Total Host Packets	the packet quantity transmitted by the Spectrum24 adapter.
Non-Directed Packets	broadcast transmitted to APs without a specified recipient.
Directed Packets	packets transmitted to a specified recipient.
Total Bytes	total bytes transmitted. The bar graph reflects hundreds of bytes per second.

Receive

Total Host Packets	the packet quantity received by the Spectrum24 adapter.
Non-Directed Packets	broadcast packets received by the adapter.
Directed Packets	packets received for a specified address.
Total Bytes	total bytes received. The bar graph reflects hundreds of byte per second.

Counters go from 0 to a maximum value, and wrap back to zero. The associated bar graph shows activity over the last second.

Association Events

Associated MU Count the Mobile Units (MUs) associated with this MAP.

Counters go from 0 to a maximum value, and wrap back to zero.

Configuration

Frequency	displays the current Spectrum24 adapter frequency.
Diversity	If a second antenna is enabled *Diversity* reads Yes. If not, *Diversity* reads No.
Net ID	the AP Network Identifier. *Net ID* and *ESSID* display depending on the internal protocol used by the Spectrum24 adapter.
ESSID	The Extended Service Set IDentifier displays the proper ID as returned by the Spectrum 24 adapter internal protocol. *ESSID* displays depending on the internal protocol used by the Spectrum24 adapter.
Power Mode	*PSP* indicates Power Save Polling. Continuous Aware Mode (*CAM*) indicates the adapter constantly monitors activity.
Xmt Rate	current transmission rate.
Max Rate	maximum transmission rate available.

Transmit Statistics

Total Directed	the information packets transmitted to a specific recipient.
@1 MB	shows transmission statistics for a 1 Mbps network.
@2 MB	shows transmission statistics for a 2 Mbps network. If 2 Mbps is not supported by or is not enabled for the adapter, NA displays in the 2 Mbps section.
Total Non-Directed	the information packets transmitted without a specified recipient.
@1 MB	shows transmission statistics for a 1 Mbps network when no recipient is specified.
@2 MB	shows transmission statistics for a 2 Mbps network. If 2 Mbps is not supported by or is not enabled for the adapter, NA displays in the 2 Mbps section.

Counters go from 0 to a maximum value, and wrap back to zero.

Receive Statistics

Total Directed	the information packets sent expressly to the adapter.
@1 MB	the information packets sent expressly to the adapter at a 1 Mbps rate.
@2 MB	the information packets sent expressly to the adapter at a 2 Mbps rate. If 2 Mbps is not supported by or is not enabled for the adapter, NA displays in the 2 Mbps section.
Total Non-Directed	total information packets received without a specified recipient.
@1 MB	the information packets received by the adapter at a 1 Mbps rate.
@2 MB	the information packets received by the adapter at a 2 Mbps rate. If 2 Mbps is not supported by or is not enabled for the adapter, NA displays in the 2 Mbps section.

Counters go from 0 to a maximum value, and wrap back to zero.

Miscellaneous Statistics

Rcvd Beacons	AP beacons received by the Spectrum24 adapter.
Hop Pattern	specifies one of several frequency sequences.
Hop Dwell	specifies how long to stay on a given frequency before switching to another frequency.
Beacon Interval	the time between beacon packets.
DTIM	the frequency of DTIM packets as a multiple of beacon packets.

Counters go from 0 to a maximum value, and wrap back to zero. *Hop Pattern, Hop Dwell, Beacon Interval,* and *DTIM Interval* display depending on the internal protocol used by the Spectrum24 adapter.

MU Table

IEEE Address	the MU MAC address.
Mode	the operating power mode of the Mobile Unit.
PSP MU ID or MU ID	the assigned identification number for the Mobile Unit when in PSP mode.
PSP or PSP Que	The transmit buffers pending Mbps. The queue for this MU when in PSP mode.
Rate	The transmit rate available for this MU.
Transmits	The messages sent by the MU.
Receives	The messages received by the MU.

MU Table displays information about MUs associated with the adapter.

PSP MU ID, MU ID, PSP, PSP Que, and *Rate* display depending on the internal protocol used by the Spectrum24 adapter.

C.11 S24INFO Troubleshooting Hints

C.11.1 Symptom: Adapter not communicating

The Spectrum24 PCMCIA or ISA adapter does not communicate. Check the following:

- Ensure the PCMCIA adapter seats firmly in the PCMCIA slot.
- Ensure the ISA adapter seats firmly in the ISA slot.
- Verify the installation of the Spectrum24 Adapter and Driver.
- Ensure the Spectrum24 Adapter is selected.
- Check the NET_ID or ESS_ID of the adapter to verify the correct setting.
- If running TCP/IP protocol, use a valid IP Address.
- Verify TCP/IP protocol is bound to the adapter.
- In Windows 95, check device manager for IO Address and IRQ conflicts.
- In Windows NT, select a different interrupt.

C.11.2 Symptom: Adapter associated but not communicating

The Spectrum24 adapter attaches to the AP, but does not communicate. Check the following:

- In Windows 95, check device manager for IO Address and IRQ conflicts.
- In Windows NT, select a different interrupt.

C.11.3 Symptom: Out of Memory Error

S24INFO or S24UTIL do not run or produce *Out of Memory Errors*. Verify the following:

- Ensure the Transport is installed and bound to the Spectrum24 adapter.

C.12 Using S24UTIL

S24UTIL allows the user to get information from the Spectrum24 adapter, and temporarily change some settings in the Spectrum24 Driver.

S24UTIL main menu contains two items.

- Click *File* and select *Exit* to close S24UTIL or click *Exit*.

- The Help menu provides access to the *Help* contents and *About* dialog that identifies the version of S24UTIL plus Spectrum24 Drivers recognized in the system. Additional help appears when the cursor passes over a component on the screen by displaying informative messages in the status bar.

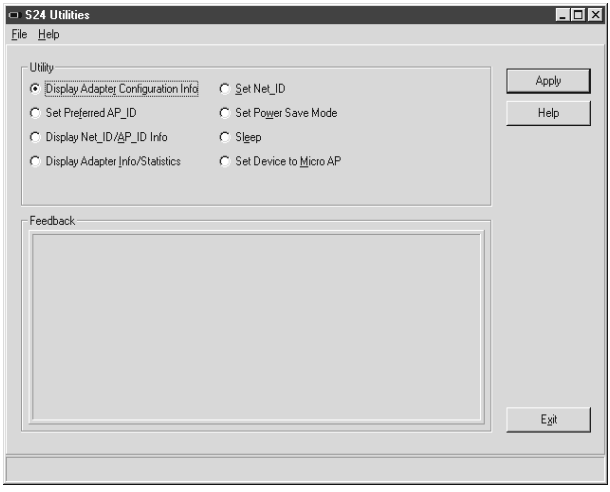


Figure 7-5: S24UTIL Main Window

- The S24UTIL window consists of two frames.
- The top frame contains option buttons. Select the appropriate button for the desired utility.
- Clicking *Apply* executes the utility selected and displays relevant information in the *Feedback* frame.

C.13 Utility Frame

The *Display Adapter Configuration Info* option button displays basic configuration information about the Spectrum24 WLAN Adapter. The table below lists the information displayed after clicking the *Apply* button.

Adapter Association	indicates if the adapter is associated or not associated.
IRQ	shows the IRQ used by the adapter.
I/O Address	displays the Spectrum24 I/O address.
Memory Address	displays the Spectrum24 adapter base memory address.
Net ID	the hexadecimal address of the network where the adapter associated. The decimal value appears in parenthesis. This parameter displays only if the Spectrum24 adapter is using the Spring Protocol.
ESSID	the Extended Service Set Identifier. This parameter displays only if the Spectrum24 adapter is using the 802.11 protocol. The symbols > and < delimit the *ESSID*.
Firmware	displays the version and date of the Spectrum24 adapter firmware.
Driver Version	displays the version of the Spectrum24 adapter driver installed in the system.

Country Code	adapter country code. Standard indicates the standard hop set. This field displays Japan, Korea, France, Spain, Israel or Belgium as appropriate.
IEEE Address	indicates the Spectrum24 adapter IEEE MAC address.

Click the *Set Preferred AP_ID* (Spring Protocol) Option button to set the *Preferred AP_ID for the adapter*. When selected a *Roaming Type* radio button group appears under the *Help* button.

Roaming Types

Normal	the Feedback frame acknowledges the roaming setting.
Preferred	asks for the hexadecimal ID of the desired AP association. See a network administrator for information about AP ID.
Exclusive	asks for the hexadecimal ID of the desired AP association. Association limits to the specified AP. See the network administrator for information about AP ID.

Click the *Set Preferred BSSID* (802.11 Protocol) option button to set the adapter *Preferred BSSID*. When selected, a *Preferred BSSID* dialog box and *Mandatory BSSID* dialog box appear under the *Help* button.

Enter the IEEE MAC address for the *Preferred* and *Mandatory* Access Points. Entering zeros tells the Spectrum24 Adapter it is OK to associate with any Access Point.

The *Display Net_ID/AP_ID Info* (Spring Protocol) option button displays information about AP association status and Net_ID. The following information displays for *Net_ID/AP_ID Info*:

Adapter Association	indicates if the adapter is associated or not associated.
Net ID	the hexadecimal address of the network where the adapter associated. The decimal address displays in parenthesis.
AP ID	the hexadecimal address of the AP where the adapter associated. The decimal address displays in parenthesis.
Preferred AP ID	the desired AP ID if set, otherwise 0.
AP IEEE Address	indicates the AP IEEE MAC address.

The *Display ESSID/BSSID Info* (802.11 Protocol) option button displays information about AP association status and ESSID. The following information displays for *ESSID/ BSSID* Info:

ESSID	The Extended Server Set IDentifier (up to 32 characters).
BSSID	the IEEE MAC address of the AP where the adapter is associated.
Preferred BSSID	the desired BSSID if set, otherwise 00 00 00 00 00 00.

Mandatory BSSID	the mandatory BSSID if set, otherwise 00 00 00 00 00 00.

The *Display Adapter Info/Statistics* displays statistical information kept by the adapter. Click *Apply* to display the following information:

Adapter Association	indicates if the adapter is associated or not associated.
Power Mode	designates whether Spectrum24 is operating in *CAM* (Continuous Aware Mode) or *PSP* (Power Saving Poll) mode.
Beacon Algorithm	the *PSP* mode *Beacon Algorithm* determines how often the adapter wakes up to check for data. Setting this to 1 wakes more often. Setting this to 10 wakes less often.
Transmitter Status (Tx)	the transmitter is either Enabled or Disabled.
Net ID	the hexadecimal address of the network where the adapter associated. The decimal address displays in parenthesis. This parameter displays only when using Spring Protocol.
AP ID	the hexadecimal address of the AP where the adapter associated. The decimal address displays in parenthesis. This parameter displays only when using Spring Protocol.

ESSID	the Extended Service Set Identifier. Up to 32 characters. This parameter displays only when using 802.11 protocol.
BSSID	the IEEE MAC address of the AP where the adapter is associated. This parameter displays only when using 802.11 protocol.
Association ID	displays the AP ID where the Spectrum24 adapter associated.
Radio	shows the radio version the Spectrum24 adapter uses. Version 1 notes as X, version 2 through 4 note as A.
AP Count	the APs listed in the Spectrum24 AP table.
Full Scans	full scans performed by the Spectrum24 adapter.
Partial Scans	partial scans performed by the Spectrum24 adapter.

Click the *Set Net_ID* (Spring Protocol) option button to enter a new *Net_ID* for the Spectrum24 adapter in the dialog box provided. Valid Net_IDs range from 0 to 255 decimal (0 to FF hex). Click *Apply* to set the *Net_ID*. The feedback should be as follows:

Request Accepted	verifies the computer received the new ID.
The Net ID has been set to xxx (xxx).	states the present Net ID setting.

Click the *Set ESSID* (802.11 Protocol) option button to enter a *New ESSID* for the Spectrum24 adapter in the dialog box provided. Valid ESSIDs can be any character, and can be up to 32 characters long. Click *Apply* to set the *ESSID*. The feedback should be as follows:

Request Accepted	verifies the computer received the new ID.
The ESSID has been set to >xxx<.	states the present ESSID setting.

Click the *Set Power Save Mode* option button to change the adapter power parameters. A *Power Mode* option button group appears below the *Help* button. Select the appropriate power mode parameter. Allows entering the *Beacon Algorithm, Min* and *Max* values for *PSP* timers in the dialog boxs provided.

PSP	Power Save Polling mode-This setting allows the adapter to sleep between checking for network activity. A sleeping adapter saves power. Also allows entering the Beacon Algorithm, Min and Max values for PSP timers.
CAM	Continuous Aware Mode-This setting tells the adapter to continually check for network activity. This mode uses the most power.

Symbol Technologies recommends PSP mode for battery powered devices. PSP Mode coupled with *Beacon Algorithm* 11, Min 1, Max 10 are good power saving parameter settings.

Click *Apply*, the feedback frame displays:

```
Request accepted.



The following change is now in effect:

Power Save Mode: Continuously Aware Mode

           or



Power Save Mode: Power Saving Polling Mode
Beacon Algorithm: 11
Beacon Minimum:    1
Beacon Maximum:    1Ø
```

The *Sleep* option button puts the adapter in to sleep mode. *Resume* awakens the adapter. Click *Apply* to set the adapter sleep state.

The *Set Device to MicroAP / MU* radio button sets the Spectrum24 adapter into either MicroAP mode where it acts as a Micro Access Point, or into MU mode where it acts as a Mobile Unit. The *Net ID* or *ESSID* can be altered prior to clicking the *Apply* button.

Appendix D Spectrum24 DOS Keywords

Keywords For Power Saving Mode	Description
Beacon_Alg	selects the beacon algorithm (1-12) for every nth beacon. Beacons broadcast every 100 ms, 1 selects 10 polls per second. Selecting 1 provides the best performance while 10 provides the highest power saving. Selecting 11 selects a dynamic algorithm that varies from the *Beacon_Maximum* to the *Beacon_Minimum*. Algorithm 11 uses *Beacon_Minimum* with network traffic for the unit and extends to Beacon_Maximum without traffic. Selecting 12 selects an algorithm where the WLAN adapter switches from *PSP*-11 to *CAM* automatically depending on data traffic (*PSP* only). Also recognizes Beacon_Algorithm for backward compatibility.
Beacon_Minimum	programs the minimum beacon interval for the dynamic algorithms. Default is 1. (*PSP*, Algorithm 11/12 only)
Beacon_Maximum	programs the maximum beacon interval for the dynamic algorithms. Default is 10. (*PSP*, Algorithm 11/12 only)

Keywords For Power Saving Mode	Description
Powermgmt	sets power management option. The default is 'No' for *CAM*. 'Yes' sets the card to *PSP* mode.

Keywords For MicroAP Mode Only	Description
MicroAP	enables Micro AP operation when set to 'Yes'. If enabled, the PowerMgmt keyword is ignored and the meaning of the Tx_Rate and Ess_ID keywords change.
MicroAP_Hop_Set	specifies the Hop Set used by the Micro AP.
MicroAP_Hop_Seq	specifies the Hop Sequence used by the Micro AP.
MicroAP_BDelay	specifies the delay for broadcast packets being transmitted from the MAP.
Base_Rate	(MAP Only) set to 1 or 2 to require associating MUs to operate at 1 Mbps or 2 Mbps. This keyword can be used multiple time to require multiple data rates. If the MU is not capable of the required data rate(s), it cannot associate with this MAP.

Keywords for CSS and Plug and Play Clients	Description
Cardservices	enables card services installation if no parameter is present or if the parameter is *Yes*. Requires I/O mode 'No' disables. Plug and Play keyword cannot be present or set to No.
Socketservices	enables socket services installation if no parameter or if the parameter is 'Yes' (requires I/O mode). 'No' disables *PNP* keyword cannot be present or set to 'No'.
PNP	sets the driver to require the presence of slainit.exe. Default is 'No' if slainit.exe is not loaded, preventing the driver from loading. This keyword forces Mode to IO and ignores the *Interrupt, IOAddress* and *Memory* keywords.

Keywords In MicroAP Or MU Mode	Description
Interrupt	designates the port hardware interrupt (3 to 15). Default is 5. In protocol.ini the keyword *Int* is supported.
IOAddress	I/O address (0x240 to 0x380) for the adapter. Default is 0x300. Also recognizes IOADDRESS for backward compatibility. This is a hex number.

Keywords In MicroAP Or MU Mode	Description
Memory	resource memory location (0xC000 to 0xE800). Default is 0xD000. Memory mode uses the 32Kb block; I/O Mode uses the 4Kb block. Verify the designated memory block is reserved using an extended memory manager (e.g. EMM386.EXE with the 'x= option for DOS). In protocol.ini, the keyword *Mem* is also supported. This is a hex number.
Tx_Rate	set to 1 or 2 to enable operation at 1 Mbps or 2 Mbps. Use this keyword multiple time to enable multiple data rates. If the Adapter is not capable of the requested data rate, the entry is ignored. If this keyword is not entered, the Adapter operates at all data rates it can. If the Adapter is setup to be a MAP, this entry means that the associating MUs can optionally use this data rate.
Mode	Add Mode to the file to set I/O mode. If Mode is not in file, the PCMCIA interface is set to memory mode (default). I/O mode requires 16 bytes of I/O space, 4Kb of attribute memory. Memory mode requires 16 bytes of I/O space, 32Kb of memory (4Kb attribute or 32Kb common memory). In memory mode the attribute and common memory start at the same segment address. Only 8-bit I/O is supported.

Keywords In MicroAP Or MU Mode	Description
ESS_ID	sets the ESS_ID. Default is "101". The ESS_ID is a 32-character, case sensitive string. In net.cfg, quotes are not required unless spaces are needed in the ESS_ID. In protocol.ini quotes are required. Symbol recommends using quotes. The ESS_ID string "BRDCST" is reserved and places the Adapter into the broadcast ESS_ID mode. In this mode the Adapter adopts the ESS_ID of the first AP that it finds, and continues to roam with that ESS_ID until rebooted. If in the MAP mode, this value is used as the ESS_ID of the MAP. Symbol supports the following alternate keywords for backward compatibility: *DOMAIN, RF_NETWORK_ID, NET_ID*.
PCMCIA_IO	sets alternate *PCMCIA* controller I/O address. The default is 3E0. Other possibilities are 3000 and FCFC. This is a hex number.
Unittype	for ISA adapter, set to 2000. Not applicable for PC Card or the ISA Plug and Play adapter.

Keyword Format In PROTOCOL.INI	Description
KEYWORD=YES	in protocol.ini all arguments to a keyword require an '=' between the keyword and the argument.
KEYWORD=0x3E0	in protocol.ini prefix all hex numbers with an '0x'.

Keyword Format In NET.CF	Description
KEYWORD YES	in net.cfg only a space is required.
KEYWORD 3E0	in net.cfg this is not required, but a hex number has to be used where expected and a decimal point used elsewhere.


Note

Neither file is case sensitive. Use of case is by preference. The only exception is the ESS_ID argument, which is case sensitive.

Appendix E Spectrum24 DOS Utilities

The flash utility programs included on the diskette are compatible with PCs using an Intel/Cirrus (PCIC) compatible PCMCIA interface. S_WFA, S_INFO and do not require a specific PCMCIA interface.

For information on the 32-bit Windows utilities, refer to 32-Bit Spectrum24 Utilities in Appendix C. Load Slainit.exe before running utilities. ISA Plug and Play adapter requires Slainit.exe loaded to function.

E.1 S_WFA

This utility functions in MU mode only. In some situations, the S_WFA utility provides a short waiting period after running the driver and before attaching to the network. The utility waits for the MU to associate with an AP before continuing.

At the DOS prompt, enter:

```
s_wfa
```

The system displays:

```
S_WFA Version 4.xx
SLAAPI found at 096E
Waiting for MU Association
Type any key to abort..
  Firmware: V4.xx   Date: xxxxxx
   Country: Standard
    ESS_ID: S24NET
  MAC Adrs: 00 A0 F8 21 56 3D
Searching. Adapter is associated:
      Mode: CAM
     Scans: 0
   AP IEEE: 00 A0 F8 3D 21 56
```

E.2 S_UTIL

S_UTIL is a DOS-utility program that can configure the adapter and obtain statistics. S_UTIL runs only after the driver has been installed.

The program provides a list of available commands in the absence of a command line parameter. Each command requires a one-letter code to display current configuration parameters or statistics. Some commands allow optional parameters to change driver/firmware settings only for the current session.

At the DOS prompt, enter:

```
s_util <func> [parms]:
```

where *func* and parms:

A	displays LAN adapter configuration including interrupt, I/O address, memory address, ESS_ID, firmware version, IEEE table number (country code) and IEEE MAC address.
B	displays the BSS_IDs of the associated AP, preferred AP and mandatory AP.
B [hh hh hh hh hh hh]	sets the preferred AP BSS_ID for the adapter to associate. The BSS_ID represents the AP MAC address.
C	sets the unit to *CAM*. The P parameter sets it to *PSP.* (MU mode only).
E <ESS_ID String>	sets the 32-character ESS_ID for the adapter.

I <all>	displays association status, power mode, beacon algorithm and transmit status. This also displays the ESS_ID, station ID and radio type. The last line shows the APs in the AP table and the number of scans. The all option displays additional transmit and receive statistics. S_INFO also provides this information.
J [hh hh hh hh hh hh]	sets the mandatory AP BSS_ID for the adapter to associate. The BSS_ID represents the AP MAC address.
L <value>	get/set options that apply only to Symbol radio terminals. The value 40 selects no power down in Symbol terminals, and the value 20 automatically powers down the terminals in a cradle.
O <option>	sets the firmware option for the adapter.
P	sets the unit to *PSP* mode. The C parameter sets it to *CAM*. (MU mode only)
T <u> [v] [w]	get/set beacon parameters. The u parameter indicates the algorithm. The v parameter indicates the minimum beacon interval. The w parameter indicates the maximum beacon interval. (MU mode only)

Used In MicroAP Only

W	displays the MicroAP ACL.
X<hh hh hh hh hh hh>	adds a MAC address to the ACL. The ACL allows a maximum of 16 entries. Duplicate ACL entries are not detected.
Y<hh hh hh hh hh hh>	removes a MAC address from the ACL.
Z	clears the ACL of all entries.

E.3 Examples

With no parameters, S_UTIL displays:

```
Spectrum24 API Utility V1.06a
Usage: S_UTIL <function code> [<optional parameters>,,,]
Function codes and [optional] parameters:
  A - Display Adapter Configuration info
  B - Display ESS_ID/BSS_ID info
  B <BSS_ID> - Set Preferred BSS_ID.  B X to clear
  C - Set Continuous Power Mode (CAM)
  E <ESS_ID String> - Set ESS_ID
  I - Display Adapter Info/Statistics
  J <BSS_ID> - Set Mandatory BSS_ID.  J X to clear
  L - Get/Set SYMBOL_OPTIONS (L <value> to set)
  O <option> - Set Firmware Option
  P - Set Power Save Mode (PSP)
  T - Display Beacon/PSP Parameters
  T [<Algorithm> [<min> [<max>]]] - Set Beacon parameters
  The following apply to the MicroAP -
  W - Display Access Control List (ACL)
  X <IEEE address> - Add ACL Entry
  Y <IEEE address> - Delete ACL Entry
  Z - Clear ACL
```

For example, to view current adapter parameters from the DOS prompt, enter:

```
s_util A
```

To set the ESS_ID to Department 1, from the DOS prompt, enter:

```
s_util E “Department 1”
```

To set the beacon algorithm to 11 with a minimum of 2 and a maximum of 10, from the DOS prompt, enter:

```
s_util T 11 2 10
```

The '2' and the '10' are optional.

To change the power mode to *PSP*, from the DOS prompt, enter:

```
s_util P
```

E.4 S_INFO

S_INFO provides a dynamic, full screen display of selected firmware statistics and configuration variables. It obtains the data through the driver extension get_adapterinfo and get_statistics functions, and it periodically refreshes the display with updated information. This utility can identify if the MU communicates properly.

At the DOS prompt, enter:

```
s_info
```

In MicroAP mode, the system displays:

```
**********SPECTRUM24 ADAPTER STATISTICS - MAP **********  V4.25  09/16/98 ***
Address 00A0F8-161CA8| Fw Ver    V4.28 | Tx Rate  1 Mb/Sec | Freq         2461
Country          STD | Selftest   PASS | Max Rate 1 Mb/Sec | Ass'd MUs       1
SSID          s24net | Diversity   OFF | Hop Pattern     0 | Bcn Interval  100
RunTime  00:00:00:00 |                 | Hop Dwell     100 | DTIM Interval  5
********** TX Statistics ************************ RX Statistics *************
  Tx Host         1   B/Sec         0  |  Rx Host         2   B/Sec         0
  Tx NDir         3   Tx Bcn      960  |  Rx NDir         0
  Tx Dir          0                    |  Rx Dir          2
****************************** Associated MUs ****************************** #
Mode Adrs  ID Rat Fifo TxDir                RxDir
 1 CAM 10461C  1   1    0     0                    3
 2 CAM 105623  2   2    0     0                    2
 3
 4
 5
 6
 7
 8
 9
10
11
12
F10|q = exit program
```

In MU Mode, the system displays:

```
***********  SPECTRUM24 ADAPTER STATISTICS - MU **********  V4.25  09/16/98 ***
Address 00A0F8-161CA8| Fw Ver    V4.28 | Tx Rate  1 Mb/Sec | Freq         2421
Country          STD | Selftest   PASS | Max Rate 1 Mb/Sec | Status    ASSOC'D
SSID           s24net| Diversity   OFF | Hop Pattern    27 | Station ID      1
RunTime  00:00:00:54 |                  | Hop Dwell     100 | Power Mode    CAM
*********** TX Statistics ************************ RX Statistics************  Tx
Host       163   B/Sec         0  |  Rx Host       168   B/Sec         0
Tx NDir         2                    |  Rx NDir        12   Rx Bcn      517
Tx Dir       161                   |  Rx Dir        162
********************************** AP Table ********************************** #
St AG BSSID   RS #MU Hp             | # St AG BSSID  RS #MU Hp
1*CE 0F 73DA7F 65   1  27            |11
2                                    |12
3                                    |13
4                                    |14
5                                    |15
6                                    |16
7                                    |17
8                                    |18
9                                    |19
10                                   |20
F10|q = exit program
```

To return to DOS, press *ESC* or *ENTER*.

The display includes configuration and status information, transmit statistics, receive statistics, roaming statistics, optional additional statistics and the known AP table.

E.5 Configuration/Status

S_INFO displays the standard information about the MicroAP or MU. A brief description of the display content follows.

Address	device MAC address.
Country	the adapter country code. *STD* indicates the standard hop set for the adapter. In certain countries, this field displays *Japan, Korea, France, Spain, Mexico, Belgium* or *Israel*, as appropriate.
SS ID	the ESS_ID.
Runtime	the elapsed time since the adapter initialized.
Fw Ver	the adapter firmware version and date.
Selftest	indicates adapter self-tests. A resulting *PASS* indicates no problem no problems were found. The positional bits below indicate each failed test.

Bit (hex)	Corresponding test.
001	code checksum
002	received first-in-first-out *(Rx FIFO)*
004	transmitted first-in-first-out (*Tx FIFO*)
008	received direct memory access (*Rx DMA*)
010	transmitted direct memory access (*Tx DMA*)
020	radio configuration
040	radio loopback
080	real-time clock
100	CPU clock

	200 host interface
	400 radio interface
	800 random access memory (*RAM*)
Diversity	indicates *YES* for diversity enabled or *NO* for single antenna selected.
Tx Rate	displays the transmission data rate used by the adapter in Mbps.
Max Rate	displays the maximum transmit rate available for use by the adapter in Mbps.
Hop Pattern	each hop set has a selection of hop patterns available. The field displays the hop pattern used by the AP that associates with the MU.
Hop Dwell	displays the time between hops in K-μs units.
Freq	displays the current communication frequency for the adapter.
Status (MU mode only)	displays the status for the MU.
Station ID (MU mode only)	indicates the station ID number assigned to the MU during its last association.
Power Mode (MU mode only)	displays *CAM* or *PSP*
Ass'd MUs (MicroAP mode only)	displays the total associated MUs.
Bcn Interval (MicroAP mode only)	displays the time between beacon packets in 100 K-μs units.

DTIM Interval (MicroAP mode only)	displays the frequency of DTIM packets as a multiple of beacon packets. This indicates how many beacons equal one DTIM cycle.

E.5.1 Transmit Statistics

Transmit statistics indicate activity over the last second. This display is useful if background operations such as pings occur. Locate counters on the left side of the display.

Tx Host	the packets passed to the driver. An interrupt conflict in the driver installation can occur when these fields equal *0 (zero)*.
Tx NDir	the Nondirected packets transmitted.
Tx Dir	the Directed packets transmitted.
B/Sec	approximates the bytes per second sent.
Tx Bcn (MicroAP mode only)	the total beacons transmitted.

E.5.1.1 Receive Statistics

Receive statistics indicate activity over the last second. This display is useful if background operations such as Pings occur. Locate counters on the right side of the display.

Rx Host	the packets passed from the driver. If these fields equal *0 (zero)*, an interrupt conflict in the driver installation can occur.
Rx NDir	the Nondirected packets received.
Rx Dir	the Directed packets received.
B/Sec	approximates the bytes per second received.

Rx Bcn (MU mode only) the total beacons received.

E.5.2 AP Table (MU Mode only)

The lower section is the AP table. The AP table contains the AP status, BSS_ID, hop sequence, RSSI and MU load information for all known APs.

St the status byte. Sign bit indicates MU association with the AP.

AG the AP table entry age-out counter. An age-out counter of 0 through 8 maintains each AP table entry. Value 8 indicates an AP acknowledgment of an MU scan. A decreased value indicates non-acknowledgment. The MU removes an AP entry from the table when the age-out counter value decrements to 0.

BSS_ID the last 3 hexadecimal fields of the AP MAC address.

RS the AP RSSI value as measured by the MU.

#MU the MUs associated with the AP. The load information helps the MU determine when to roam. The number is always 0 (zero) if the MU associates with a MicroAP.

Hp the hop sequence used by the AP.

Press PgUp and PgDn to display the second block of APs.

E.5.3 Associated MU Table (MicroAP Mode only)

The lower section is the associated MU table. The table contains the MU status, the ID assigned by the MicroAP, and transmit and receive statistics.

Mode displays the MU power-operating mode.

Adrs the MU MAC address.

ID	the station ID assigned by the AP at association.
Rat	displays the current transmit rate available for the MU in Mbps.
FIFO	the transmits buffers pending for this MU.
TxDir	the fragments transmitted to this MU.
RxDir	the fragments received to this MU.

Press PgUp and PgDn to display the second block of MUs.

E.5.4 Transmit And Receive Statistics Table

The transmit and receive statistics and graphs indicate activity over the last second. Use this display if background operations such as Pings occur. Counters locate on the left side of the display. The horizontal bar graph shows activity over the last second.

Tx_Host and Rx_Host	the packets passed to and from the driver. If these fields register *0 (zero)*, an interrupt conflict in the driver installation can exist.
NDir_U and Dir_U	the Nondirected and Directed packets.
Byte/sec	approximates the bytes per second sent and received.

E.6 S_VER

S_VER displays the version/date of the installed firmware. It also displays the *Diversity* mode status.

At the DOS prompt, enter:

```
s_ver
```

The system displays:

```
Spectrum24 LAN Adapter Version Display Utility, V4.xx
(C) Copyright 1996 Symbol Technologies, All Rights Reserved.
Card in slot 1

FIRMWARE: IEEE Addr: hh hh hh hh hh hh
                Ver: V4.xx
               Date: xxxxxx
            Country: United States (1)
          Diversity: ON
```

If using s_ver to display the CIS parameters, at the DOS prompt, enter:

```
s_ver -x
```

The system displays:

```
Spectrum24 LAN Adapter Version Display Utility, V4.xx
(C) Copyright 1996 Symbol Technologies, All Rights Reserved.
Card in slot 1

FIRMWARE: IEEE Addr: hh hh hh hh hh hh
                Ver: V4.xx
               Date: xxxxxx
            Country: United States (1)
            Diversity: ON

CIS:              Ver: Vx.xx
               Serial: 00032123
            Mfg Date: 00080896
           Dest Code: FW: USA
            Mfg Info: TSW:none
                Power: 500
                CkSum: CAE3
```

E.7 S_UPDATE

S_UPDATE updates the flash image with a new firmware file. The standard firmware file is SLA_FW.BIN. This program does not change the IEEE address or the country code. Locate S_UPDATE and the latest firmware file in the FIRMWARE directory on the Installation and Utilities diskette.

Do not run S_UPDATE after driver installation. Uninstall and reinstall the driver. The ISA Plug and Play WLAN card requires users to load SLAINIT.EXE prior to loading the driver or updating the firmware.

S_UPDATE requires an Intel compatible PCMCIA controller (Intel, Vadem, Cirrus or Ricoh), or card and socket services and SLAINIT. If using EMM386, reserve the memory location at D000-D0FF (X=D000-D0FF).

To update the adapter firmware:

At the DOS prompt, enter:

```
s_update
```

The system displays:

```
Spectrum24 LAN Adapter FLASH Update Utility, Vx.xx

Reading the firmware binary file (SLA_FW.BIN)...

Press any key to continue, CTRL-C to abort

Press any key. The system displays:

FIRMWARE: IEEE Addr: 00 A0 F8 00 04 D2

                Ver: 'V2.00'

               Date: '960320'

(AMD) Erasing flash... Operation successful

Programming Flash... ..............................
```

When the program completes, it displays:

```
Programming operation successful

Update Operation completed
```

To display other program options for S_UPDATE, enter:

```
s_update -?
```

Appendix F WLAN Adapter Specifications

PC Card Physical

Dimensions (less antenna)	3.3 inches x 2.1 in. x 0.2inches (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 54 °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

ISA Adapter Physical

Dimensions	6.2 in. x 4.2 in. (16 cm x 11 cm)
Weight	4.3 oz. (122 g)
Operating Temperature	32 to 100 °F (0 to 40 °C)
Storage Temperature	-15 to 140 °F (-40 to 60 °C)

ISA Adapter Physical

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
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
Frequency Hopping	*hops*
	79 in US, Canada and Europe
	35 in france and Israel
	27 in Spain
	23 in Japan and Korea
	20 in belgium
	27 in Mexico
Hop Rate	10 hops/sec
Hop Sequences	66
Radio Data Rate	2 Mbps per channel
Radio Power Output	500 or 100 mW versions
Power Management	receive @ 5V
	500mW=300mA

Radio

	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
	Europe: ETS 300 320
	Japan: RCR STD-33

Appendix G Roaming Across Routers/ Mobile IP Setup

G.1 Roaming Across Routers And Mobile IP Configuration

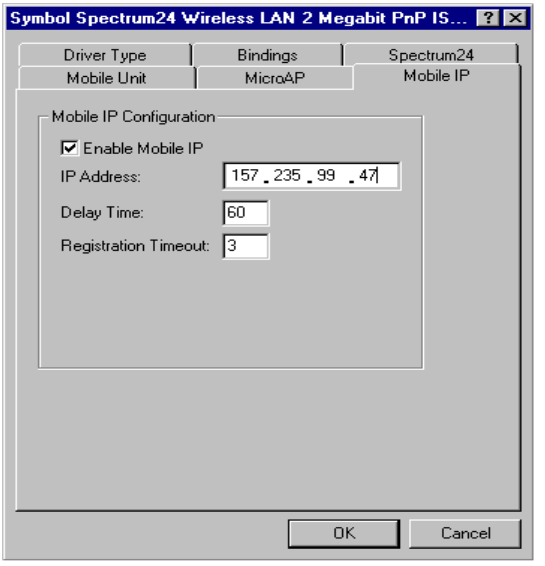
The Spectrum24 WLAN supports Mobile IP (roaming across routers) when APs on the network are properly configured.

Refer to the *Spectrum24 Access Point Model AP3020* User Documentation for details on the Access Point (AP) Mobile IP support of MUs.

G.2 Configuring the Adapter For Mobile IP in Windows 95

1. Open the *Network* applet from the *Control Panel*.
2. Select the *Symbol Spectrum24 WLAN Adapter*, and select the *Properties* button.

3. When the *Symbol Spectrum24 Configuration* dialog appears, select the appropriate tab for *Mobile IP.*



4. When all values have been changed in the *Mobile IP* properties dialog, select the *OK* button to save and exit or *Cancel* to abort and exit.
5. Restart the system for changes to take effect.

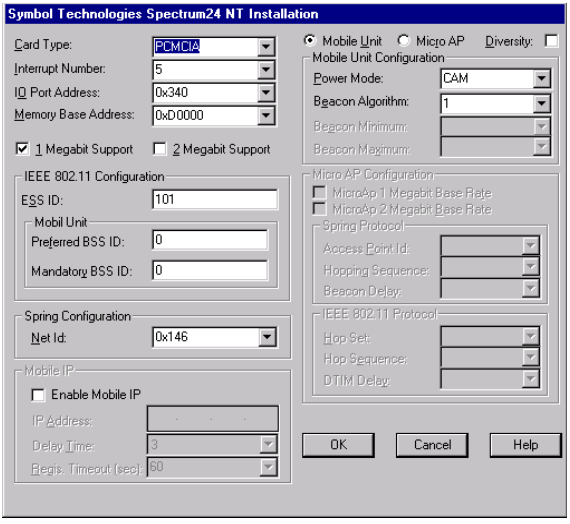
Note

Refer to appendix A for the table containing a description of the parameters and the acceptable values.

G.3 Configuring the Adapter For Mobile IP In Windows NT 4.0/3.51

1. Open the *Network* applet from the *Control Panel.*
2. Select the *Symbol Spectrum24 WLAN Adapter* and click the *Configure* button.

3. Select *Adapters*, select the *Symbol Spectrum24 WLAN Adapter* and click the *Properties* button.
4. When the *Symbol Technologies Spectrum24 NT Installation* dialog appears, Select *Enable* Mobile IP. Configure all values in the *Mobile IP* frame. When all values have been changed click the *OK* button to save and exit, click the *Cancel* button to abort and exit.



G.4 Configuring the Adapter For Mobile IP In DOS

G.4.1 Preparation

Before beginning Mobile IP set up verify or obtain the following:

- Spectrum24 installation disk
- an ASCII text editor
- home network IP address, home agent IP address, subnet mask

Copy files MIP.CFG and SLAMIP.COM from the installation disk to the driver directory. The file MIP.CFG contains configuration parameters for the Spectrum24 roaming across routers support. Edit the file before executing SLAMIP.COM.

The home_address, ha_address, and subnet_mask are required. The reg_interval is optional. If omitted, the default value is 60. The maximum value is 1800. An example of a MIP.CFG file without user configurable parameters follows:

MIP.CFG example	Usage
`home_address = xxx.xxx.xxx.xxx`	MU's IP address
`ha_address = xxx.xxx.xxx.xxx`	Default home agent's IP address, used if powered up at a foreign network
`subnet_mask = .xxx.xxx.xxx.xxx`	
`reg_interval = xxxx`	Registration time between renewals time is in seconds

For ODI, from the command line or in a batch file load the drivers in the following order:

If the automatic installation program was not used, copy the files as needed (LSL.COM, SL8ODIPC.COM) from the *Drivers and Utilities Installation* diskette to the appropriate driver directory on the hard disk.

```
LSL.COM

SL8ODIPC.COM

SLAMIP.COM
```

Refer to the *Spectrum24 Access Point Model AP3020* User Documentation for details on the Access Point (AP) Mobile IP support of MUs.

Appendix H Troubleshooting

H.1 Windows 95 Troubleshooting Tips

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

- Windows 95 does not recognize the Spectrum24 PC/ISA card when installed.
  - Verify that Windows 95 PCMCIA support is installed.
  - The computer might not have Plug and Play BIOS or a Spectrum24 ISA adapter in use. The Spectrum24 ISA adapter is not a Plug and Play device, it requires manual loading of the PCMCIA support. Double click on the *PC Card (PCMCIA)* applet in the *Control Panel* to install PCMCIA support.
- The driver fails to load.
  - A resource conflict could exists. Use the *Device Manager* to help 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 that the adapter *ESS ID* or *Net ID* settings match the *ESS ID* or *Net ID* of the Access Point. 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).

- A degraded performance from the Spectrum24 card.
  - Verify a secure connection to *Antenna 1* on the PC Card or *Primary Antenna* on the WPOS adapter.
  - Verify two antennas remain attached to the PC or ISA adapter if *Diversity* is selected.
- Network drive mappings disappear when the laptop suspends or the adapter is removed then reinserted. Windows 95 does not restore Netware network drive mappings under these conditions.
  - Log out and log in again, or restart the machine to restore the connections.
- Non-functioning WPOS/ISA adapter LEDs.
  - Verify the *Card Type* parameter is set to *WPOS/ISA*.
  - Verify that the adapter *ESS ID* or *Net ID* setting matches the *ESS ID* or *Net ID* of the Access Point.

H.2 Windows NT 4.0/3.51 Troubleshooting

Make use of the tools provided by Windows NT, the Spectrum24 DOS/Windows utilities, and LAN analyzers (i.e. FTP Software LANWATCH, 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* for hints on where to look for the conflicts (Windows NT 3.51).

- Check *Service Monitor* entries in the *System Log* for hints on where to look for the conflicts (Windows NT 4.0).
  - Use the *Windows NT Diagnostics* program to locate a free resource (Windows NT 4.0). Use the *Network Control Panel* applet *Configure* option to modify the appropriate key value.


Note

Resource conflicts can exist without an entry in the *event log*, when another adapter failed to register its resources. When no *event log* entries appear and the *Net_ID* is set appropriately, attempt different settings with the *Memory Base Address, Interrupt Number,* and *IO Port Address* parameters.

- No resource conflicts were detected, but the system will not attach to the network.
  - When using the *Symbol* protocol, verify the *Net_ID* of the Spectrum24 card matches the *Net_ID* of the *Access Point*. Use the *Network Control Panel* applet *Configure* option to modify the *Net_ID* setting.
  - When using the *IEEE 802.11* protocol, verify the *ESS_ID* of the Spectrum24 card matches the *ESS_ID* of the Access Point. Use the *Network Control Panel applet Configure* option to modify the *ESS_ID* setting.
  - When using the *IEEE 802.11* protocol, verify the *Mandatory BSS_ID* setting of the Spectrum24 card is set to 0 or matches the *BSS_ID* of the Access Point. Use the *Network Control Panel* applet *Configure* option to modify the *Mandatory BSS_ID* setting.

  - Verify that the adapter *Data Rate* is configured properly for the AP (refer to the *AP Rate Control Table* in this document).

- A degraded performance from the Spectrum24 card.
  - Verify a secure connection to *Antenna 1* on the PC Card or *Primary Antenna* on the WPOS adapter.
  - Verify two antennas remain attached to the PC Card or the ISA adapter when *Diversity* is selected.
- Non-functioning WPOS/ISA adapter LEDs.
  - Verify that the WPOS/ISA adapter type is selected in the *Card Type* field.
  - Verify that the adapter *ESS ID* or *Net ID* setting matches the *ESS ID* or *Net ID* of the Access Point.

H.2.1 Useful tools

Windows NT Provides other tools for analyzing the network installation and performance. These include:

PCMCIA.CPL	A Control Panel utility that comes with Windows NT 4.0 or the Windows NT 3.51 Resource Kit. This utility shows information about the installed PCMCIA card (or WPOS adapter). If the card is installed, but does not show in the display it is probably bad.
Performance Monitor	A Windows NT 3.51 utility (*Administrative Tools* group). Configure this utility to monitor and display protocol activity to/from the workstation. Various counters reflect current activity levels, maintained by the driver and protocol stacks. Refer to the Windows NT 3.51/4.0 Workstation/Server documentation for details.

H.3 Windows NT ERRORS

Errors during driver loading appear in the *System Log*. Use the *Event Viewer* program from the *Administrative Tools* group to view the *System Log*. For *Windows NT 3.51*, find the entries where the *Source* field indicates the *SLANT* driver. In *Windows NT 4.0* find *SLANT* or *Service Monitor* entries. If the driver fails to load one of the following messages will appear 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 ISA adapter. Possible problems include:
  - The Spectrum24 PC Card or ISA adapter firmware may have been corrupted. Use the DOS-based firmware update utilities to re-install the firmware (under DOS).
  - The Spectrum24 PC Card or ISA adapter might have a hardware problem.
  - The PCMCIA controller or host bus adapter is having a problem. Use an alternate PCMCIA socket or ISA bus slot.
  - Windows NT 3.51 may not support the PCMCIA controller in the machine.

```
SLANTn: Could not find an adapter.
```

- The driver could not locate a Spectrum24 PC Card in any PCMCIA socket or a Spectrum24 ISA adapter in any ISA bus slot.
  - Verify that the Spectrum24 PC Card or ISA adapter is firmly seated in a PCMCIA socket or ISA bus 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 *Configure* function of the *Network Control Panel* applet to view the driver configuration. Make sure values appear in each data entry field (MicroAP parameters will only appear if the MicroAP check box has been selected). 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 *Configure* function of the *Network Control Panel* applet to view the driver configuration. Make sure values appear in each data entry field (MicroAP parameters will only appear if the MicroAP check box has been selected). If a value is missing, key in or use the associated list box to select an appropriate value.

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