

Lucent Technologies
Bell Labs Innovations



WaveLAN/EC-S

User's Guide



About this Book:

The product described in this book is a licensed product of Lucent Technologies Inc.

- WaveLAN, WavePOINT, WaveMANAGER, and WaveACCESS are trademarks of Lucent Technologies.
- Microsoft, Windows 95, Windows 98, Windows NT, Windows for Workgroups and MS-DOS are registered trademarks of Microsoft Corporation.
- Adobe Acrobat is a registered trademark of Adobe Systems Inc.
- All other brand and product names are trademarks or registered trademarks of their respective holders.

April, 1999

It is the policy of Lucent Technologies to improve products as new technology, components, software, and firmware become available. Lucent Technologies, therefore, reserves the right to change specifications without prior notice.

All features, functions, and operations described herein may not be marketed by Lucent Technologies in all parts of the world. In some instances, drawings are of equipment prototypes. Therefore, before using this document, consult your Lucent Technologies representative or Lucent Technologies office for information that is applicable and current.

Copyright ©1999 Lucent Technologies
All Rights Reserved

WaveLAN Technical Support

You can find the most recent software and user documentation for all WaveLAN products on our internet site.

Software and Documentation

World Wide Web	http://www.wavelan.com
FTP Server	ftp://ftp.wavelan.com/pub

If you encounter problems when installing or using this product, or would like information about our other WaveLAN products, please contact your local Authorized WaveLAN Reseller or regional Lucent Technologies Sales Office. Addresses of Resellers and Sales offices can be found on the WaveLAN website.

In case no local or regional support is available, you can reach us at the addresses or telephone numbers listed below.

WaveLAN Regional Support

U.S.A / Canada	usasupport@wavelan.com
Caribbean/ Latin America	calasupport@wavelan.com
Europe/ Middle-East/ Africa	emeasupport@wavelan.com
Asia/ Pacific	apasupport@wavelan.com

WaveLAN Global Support

U.S.A	Voice:	+1 800 WAVELAN
		+1 937 432-9729
	Fax:	+1 937 432-9730

When contacting WaveLAN Support, please complete the WaveLAN Problem Report form and include it with your email or fax. The form (report.txt) is available on the WaveLAN software diskette, and on the WaveLAN Support pages of the WaveLAN website.

Information to the User

Wireless Interoperability

The IEEE 802.11 WaveLAN products are designed to be inter-operable with any wireless LAN product that is based on Direct Sequence Spread Spectrum (DSSS) radio technology, and is compliant to the IEEE 802.11 Standard on Wireless LANs, as defined and approved by the Institute of Electrical and Electronics Engineers (IEEE).

WaveLAN and your Health

WaveLAN, like other radio devices, emits radio frequency electromagnetic energy. The level of energy emitted by WaveLAN devices however is far much less than the electromagnetic energy emitted by wireless devices like for example mobile phones.

Because WaveLAN operates within the guidelines found in radio frequency safety standards and recommendations, Lucent Technologies believes WaveLAN is safe for use by consumers. These standards and recommendations reflect the consensus of the scientific community and result from deliberations of panels and committees of scientists who continually review and interpret the extensive research literature.

In some situations or environments, the use of WaveLAN may be restricted by the proprietor of the building or responsible representatives of the organization. These situations may for example include:

- Using the WaveLAN equipment on board of airplanes, or
- In any other environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies on the use of wireless devices in a specific organization or environment (e.g. airports), you are encouraged to ask for authorization to use the WaveLAN device prior to turning on the equipment.

Table of Contents

1	Introduction	1-1
	About WaveLAN/EC-S	1-1
	Kit Contents	1-3
	■ About the WaveLAN/EC-S Device	1-4
	■ WaveLAN/EC-S Features	1-5
	Network Topologies	1-6
	■ Ethernet Port Topologies	1-6
	■ Serial Port Topologies	1-10
	■ Combining Ethernet and Serial Topologies	1-14
<hr/>		
2	Hardware Installation	2-1
	Installation Requirements	2-1
	Selecting a WaveLAN PC Card	2-2
	■ WaveLAN PC Card Types	2-2
	■ Version Compatibility	2-4
	Installing the WaveLAN Card	2-5
	■ Removing the Yoke	2-5
	■ Inserting the WaveLAN/IEEE PC Card	2-6
	Connecting the WaveLAN/EC-S	2-7
	■ Mounting the WaveLAN/EC-S Device	2-8

Table of Contents

3	Configuring WaveLAN/EC-S	3-1
	Introduction	3-1
	■ Install the WaveMANAGER/EC Program	3-2
	Running WaveMANAGER/EC	3-4
	■ Access the WaveLAN/EC-S Configuration	3-5
	Set the WaveLAN Parameters	3-6
	■ Basic WaveLAN Parameters	3-6
	■ Advanced WaveLAN Parameters	3-8
	Set the EC-S Specific Parameters	3-17
	■ Assign TCP/IP Parameters	3-18
	■ Perform File Operations	3-19
	■ Display Device Information	3-21
	■ Password Protect your Configuration	3-22

4	The Built-in Configurator	4-1
	Introduction	4-1
	■ Do I need to change the configuration?	4-2
	Access via a Telnet Session	4-3
	■ Access via Direct Telnet Connection	4-4
	■ Access via Remote Telnet Connection	4-5
	■ Open the Telnet Session	4-6
	Access via the Reset/Config Button	4-8
	Running the Built-in Configurator	4-10
	■ Navigating the Menus	4-11
	Set the WaveLAN Parameters	4-12
	■ Basic WaveLAN Parameters	4-12
	■ Advanced WaveLAN Parameters	4-16
	Saving the Configuration Changes	4-24
	Set the Serial Parameters	4-25
	■ About the Serial Parameters	4-26
	■ Hardware Parameters	4-27
	■ Software Parameters	4-27
	■ Flow Control	4-31
	■ I/O Control	4-32
	■ Tailor the Selected Protocol	4-34
	■ Network Bindings	4-37
	A Sample Scenario	4-42
	■ Special Station to Station Topologies	4-42
	Display Device Information	4-45
	Password Protect the Configuration	4-47

Table of Contents

5	Serial Port Specifications	5-1
	Introduction	5-1
	■ Protocol Specifications	5-1
	■ Passthrough	5-2
	■ Passthrough2	5-3
	■ Telnet	5-3
	■ LPD	5-4
	Serial Topologies	5-6
	■ Station to Station Topology	5-6
	■ Broadcast Topology	5-7
A	Technical Specifications	A-1
	Hardware Characteristics	A-1
	Regulatory Information	A-4
	■ WaveLAN/EC-S and Radio Regulations	A-5
B	Troubleshooting	B-1
	Introduction	B-1
	Performance Issues	B-2
	LED Activity	B-3
	Reset the WaveLAN/EC-S Device	B-5
	Error Messages	B-7

Table of Contents

W	Warranty Repair Card	W-1
	About Warranty and Repair	W-1
	Limited Warranty	W-2

Introduction

1

Contents

About WaveLAN/EC	1-1
Kit Contents	1-3
About the WaveLAN/EC Device	1-4
WaveLAN/EC Features	1-5
Network Topologies	1-6
Ethernet Port Topologies	1-6
■ Infrastructure Network	1-7
■ Independent Network	1-9

Introduction

1

About WaveLAN/EC-S

The WaveLAN Ethernet Converter (EC) device enables you to quickly transform wired computing devices, such as (desktop) computers and/or printers into wireless devices.

Replacing 10Base-T Ethernet and/or RS-232 cables with WaveLAN wireless technology allows you to:

- Expand or relocate existing wired networks within minutes, without additional costs for (re-)wiring and connecting computer terminals and/or printers to the network.
- Provide WaveLAN mobile connectivity to devices that once were “tied” onto their network cables.

The WaveLAN IEEE product family is based upon a standard PC Card that can be used in:

- Portable computing devices equipped with a Type II PCMCIA card socket.
- Desktop computers equipped with an ISA card bus (using the Lucent Technologies PC Card to ISA adapter).
- Lucent Technologies WavePOINT-II access points.

The WaveLAN/EC-S device complements the Lucent Technologies WaveLAN product line, offering a WaveLAN interface to devices that have a (factory-installed) Ethernet interface and/or

Introduction

About WaveLAN/EC-S

RS-232 interface, but can not accommodate the standard WaveLAN PC Card and/or ISA card solutions.

Two models of the WaveLAN/EC-S device are available:

- **WaveLAN/EC** (Ethernet Converter) - supports an Ethernet 10Base-T interface with RJ45 connector (twisted pair).
- **WaveLAN/EC-S** (Ethernet & Serial Converter) - supports both 10Base-T and an RS-232 serial interface.

This document describes the WaveLAN/EC-S device, a “Click & Connect” device that does not need any configuration for “out-of-the box” installation. Connecting the device to a WaveLAN IEEE Infrastructure (see page 1-6) is as easy as 1,2,3:

1. Insert a WaveLAN PC Card into the WaveLAN/EC-S device.
2. Connect the device using either the included serial cable or an Ethernet cable (not included).
3. Connect the power cords.



NOTE:

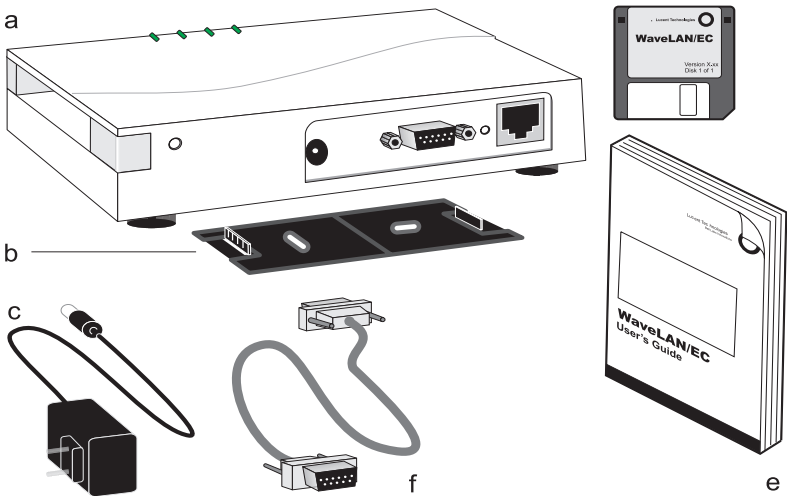
WaveLAN adapter cards are available in various versions with different pricing. To allow maximum flexibility in deciding what type of WaveLAN card you wish to use in combination with your WaveLAN/EC-S device, each WaveLAN/EC-S kit comes without WaveLAN card. To use the “Click & Connect” feature, first insert a WaveLAN card as described in Chapter 2 “Hardware Installation”.

Kit Contents

The WaveLAN/EC-S Kit includes the following components:

- a. WaveLAN/EC-S Ethernet Converter.
- b. Mounting Bracket with screws and adhesive pads.
- c. AC to DC power adaptor.
- d. 3.5" diskette containing WaveLAN/EC software.
- e. WaveLAN/EC-S User's Guide.
- f. RS-232 Serial Cable.

Figure 1-1 Kit Contents



NOTE:

If any of these items are missing or damaged, please contact your local Authorized WaveLAN Reseller or regional Lucent Technologies Sales Office.

About the WaveLAN/EC-S Device

The WaveLAN/EC-S Ethernet Converter is an adapter for indoor use to transform a standard 10Base-T Ethernet and/or RS-232 serial interface into a wireless LAN interface using WaveLAN/IEEE adapter cards.

WaveLAN/IEEE adapter cards use Direct Sequence Spread Spectrum (DSSS) radio technology for communications in the license-free 2.4 GHz radio band for Industrial, Scientific and Medical (ISM) applications, in compliance with FCC (USA/Canada), ETSI (Europe) and MPT (Japan) regulations.

The WaveLAN/EC-S supports a wide variety of configurations that can easily be changed to fit your application requirements. All configuration information is saved in non-volatile memory called Flash ROM.

The WaveLAN/EC-S is pre-loaded with firmware and software, which means that there is no configuration needed on the WaveLAN/EC-S or on client device to which it is attached.

It is policy of Lucent technologies to improve products as new technology, components, software and firmware become available. Examples of such improvements that can be expected in the near future for your WaveLAN/EC-S device are:

- Full Ethernet Equivalent speed support for WaveLAN/EC-S devices equipped with a WaveLAN IEEE Turbo PC Card.
- Wired Equivalent Privacy (WEP) data encryption for WaveLAN/EC-S devices equipped with a WaveLAN Silver Label PC Card.

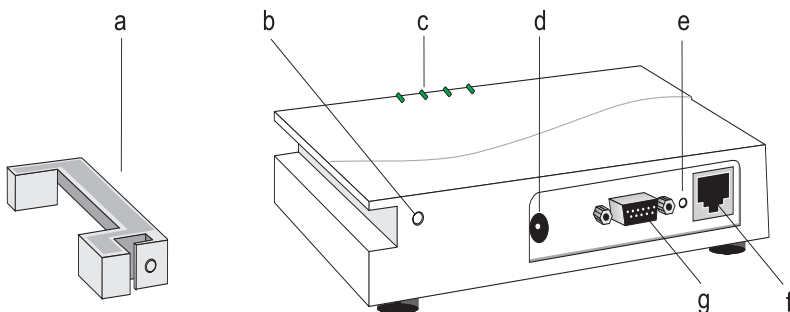
To download, or find more information about the latest drivers and software, you are advised to consult the WaveLAN website at regular intervals at: <http://www.wavelan.com>.

WaveLAN/EC-S Features

Looking at your WaveLAN/EC-S device, you can identify the following items as pictured in Figure 1-2.

- a. Yoke (to secure the WaveLAN PC card when inserted into the WaveLAN/EC device).
- b. Release button to remove the Yoke from the WaveLAN/EC device.
- c. LED's (see Appendix B for a description of LED activity).
- d. Connector for the power adaptor
- e. Reset/Config button, described in Chapter 4 and Appendix B.
- f. RJ45 Ethernet connector (twisted pair) supporting 10Mbps Ethernet data rates.
- g. RS-232 serial connector, supporting serial data rates from 112.5 up to 230,400 bps full duplex

Figure 1-2 WaveLAN/EC-S Components



The WaveLAN/EC-S device is shipped without a WaveLAN IEEE 802.11 PC Card. Please consult Chapter 2 "Hardware Installation" for instructions on how to insert a separately purchased WaveLAN PC Card into the WaveLAN/EC-S device.

Network Topologies

The following pages will introduce you to a number of standard configuration scenarios that may serve as an example and/or guideline for designing your wireless LAN solution.

Ethernet Port Topologies

- Infrastructure Network (see page 1-7).
- Independent Network (see page 1-9).

Serial Port Topologies

- Station-to-Station Topology (see page 1-11).
- Broadcast Topology (see page 1-12).
- Hybrid Topologies ((see page 1-13).

The default configuration of the WaveLAN/EC-S device is set to connect automatically to an Infrastructure network (a WaveLAN network that includes WavePOINT-II access points).

To view or modify the factory-set defaults your WaveLAN/EC-S device, please consult Chapter 3 "Configuring WaveLAN/EC-S" or Chapter 4 "The Built-in Configurator".

Ethernet Port Topologies

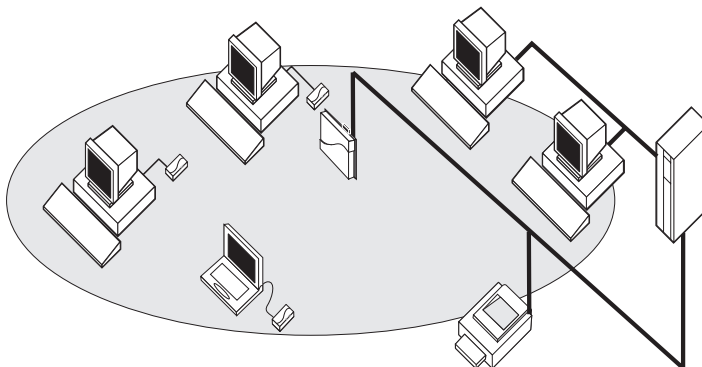
When connecting the WaveLAN/EC-S to the Ethernet interface of your computing device, you have the option to connect it to either:

- An Infrastructure Network (described on page 1-7), or
- An Independent Network (described on page 1-9).

Infrastructure Network

The most popular use of a WaveLAN/EC-S device is to connect client devices to an IEEE Infrastructure network as pictured in Figure 1-3 below.

Figure 1-3 Basic Infrastructure Topology

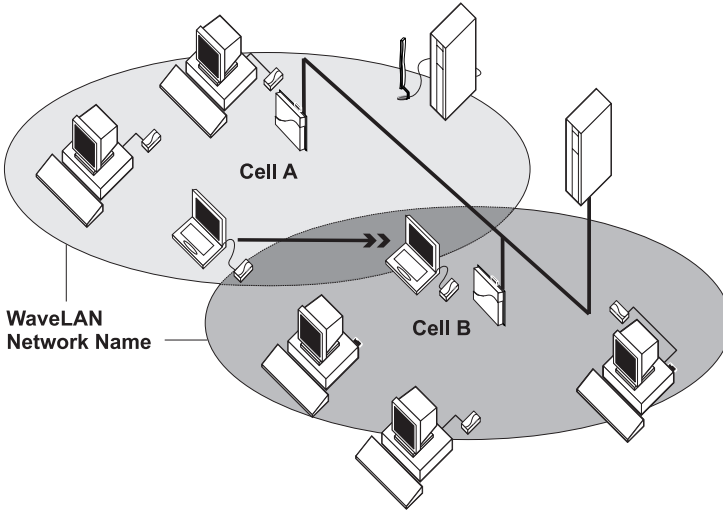


IEEE Infrastructures are network environments where wireless clients are serviced by one or more WavePOINT-II access points to allow communications between wireless and wired stations.

Adding one or more WavePOINT-II access points, allows you to create a “roaming” environment, where (mobile) wireless devices can move between different locations within your facility, while maintaining their wireless connection to the network.

In roaming topologies as pictured in Figure 1-4, devices equipped with the WaveLAN/EC-S device (or other WaveLAN adapter) will automatically switch between access points that provide the best radio communications quality.

Figure 1-4 Roaming Infrastructure Topology



Looking at Figure 1-4, the mobile device in Cell A has been connected to the network using a WaveLAN/EC-S device.

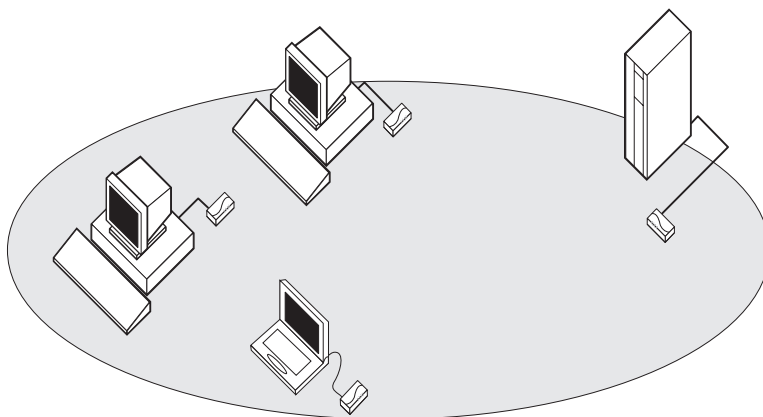
When this device is leaving the radio coverage area serviced by the WavePOINT-II in Cell A, it will automatically connect to the WavePOINT-II device located in Cell B as soon as the mobile system detects that this WavePOINT-II provides a better radio link quality to communicate with the network.

Independent Network

In Independent Networks, a limited number of wireless stations can exchange communications “peer-to-peer”, without intervention of a WavePOINT-II access point: i.e. typically this type of network does not include WavePOINT-II devices.

All devices within an Independent Network communicate directly with each other and are configured for “Ad-Hoc Demo” mode.

Figure 1-5 Independent Network with WaveLAN/EC-S



The WaveLAN/EC-S can be configured for “Ad-Hoc Demo” mode and associate with other WaveLAN IEEE devices in an Ad-Hoc network, as pictured in Figure 1-5.

In order to create an Ad-Hoc network, you will need to make some minor changes to the configuration of your WaveLAN/EC-S. Please refer to the “Introduction” on page 3-1 for the configuration requirements necessary to configure your WaveLAN/EC-S for “Ad-Hoc Demo” mode.

Serial Port Topologies

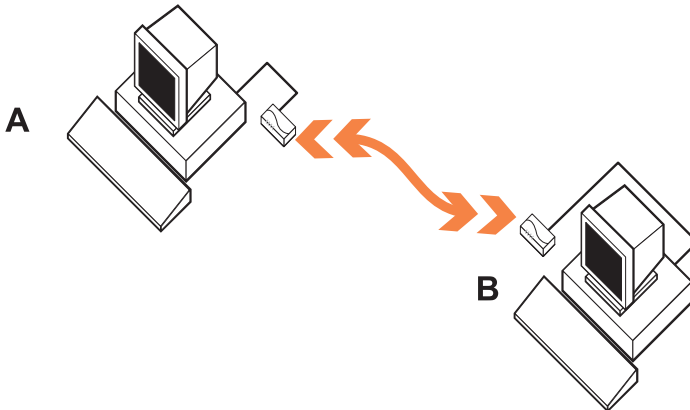
In addition to the Ethernet Port Topologies for the 10Base-T port of your WaveLAN/EC-S device (described in the previous pages), its RS-232 port enables you setup the device for a number of wireless serial network topologies as well.

Although many varieties of serial networks exist, all can be simplified into the three examples described on the following pages:

- Station-to-Station Topology (described below).
- Broadcast Topology (described on page 1-12).
- Hybrid Topologies (described on page 1-13).

If you would like to use both the Ethernet and RS-232 serial connections of the WaveLAN/EC-S, please refer to “Combining Ethernet and Serial Topologies” on page 1-14.

Figure 1-6 Station-to-Station Topology



Station-to-Station Topology

In a Station-to-Station topology, pairs of devices are configured to communicate with each other exclusively, using a WaveLAN/EC-S devices to replace the serial RS-232 cable connection.

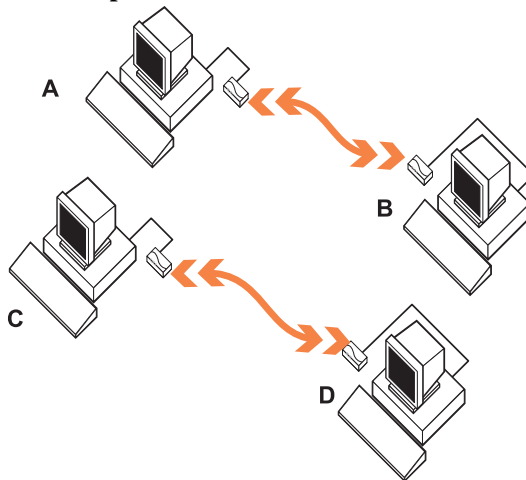
This type of configuration requires the TCP/IP network protocol, where you must assign a unique IP Address to each station. For example looking at Figure 1-6:

- Station A uses IP Address 10.10.10.128, and
- Station B uses IP Address 10.10.10.129.

To restrict wireless communication between 2 link partners only, you can "bind" the station to one specific IP Address, being the address of the link partner. Looking at Figure 1-6 again:

- Station A is bound to communicate with 10.10.10.129 only.
- Station B is bound to communicate with 10.10.10.128 only.

Figure 1-7 Multiple Station-to-Station Links



When you would add a second pair of stations like pictured in Figure 1-7 on page 1-11, these stations should be configured in a similar way, for example:

- Station C gets IP Address 10.10.10.131
- Station D gets IP Address 10.10.10.132

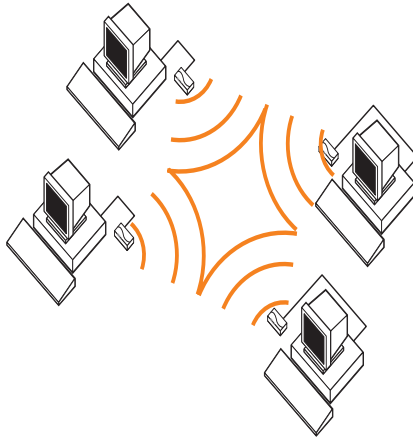
Each station should be "bound" to the IP Address of its Link Partner.

When exchanging messages, the stations A & B will filter out wireless traffic exchanged by the neighboring pair (C&D), and process only those messages as received from their own link partner.

Broadcast Topology

In broadcast topology (also described as "party-line" or "multiple-drop" topology), you assign the same broadcast address to multiple stations equipped with the WaveLAN/EC-S device.

Figure 1-8 Broadcast Topology



Whenever a broadcast message is sent from any unit in this group, all other units in the group that correctly receive the message send it out their serial port, as pictured In Figure 1-8.

As in Station-to-Station topology, the device that is transmitting a message forms a packet, however the packet specifies a broadcast address rather than a specific unit's port address.

Broadcast topology is generally used only when one device needs to send messages to multiple units, something that is usually not possible with conventional RS-232 communications.

Broadcast topology is not as common as Station-to-Station topology, because most existing software that use RS-232 communication are designed for communication with a single device on the other end of the serial line.

Hybrid Topologies

Although Station-to-Station and Broadcast topologies are the most common, the WaveLAN/EC-S device allows for a great variety of hybrid topologies.

A common type of hybrid topology is the client-server topology, where:

- The server is connected to a WavePOINT-II Access Point, and
- Wireless clients have been equipped with WaveLAN/EC-S devices, to connect to the server via the WavePOINT-II access point.

The WavePOINT-II can broadcast (allowing communication to all of the clients), but each of the client converter's are configured for Station-to-Station (allowing communication only to the server: the clients don't hear each other's messages).

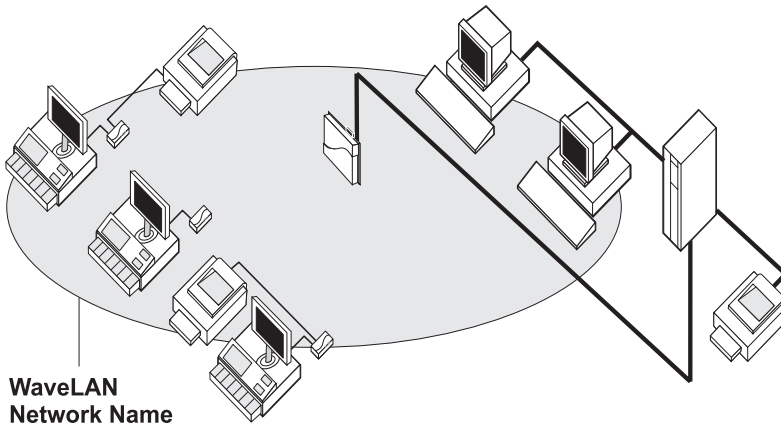
Combining Ethernet and Serial Topologies

WaveLAN/EC-S devices enable you to use both Ethernet and Serial interface simultaneously.

A common application for combining Ethernet and Serial is shown in Figure 1-9. In this scenario, Point-of-Sale (POS) terminals are connected to a server (via the WavePOINT-II) via the Ethernet port, while simultaneously connecting printers to the serial port.

In this example, the server can access not only every POS terminal, but also all of the printers, even if the terminals are powered off.

Figure 1-9 Combined Topology



Hardware Installation

2

Contents

Installation Requirements	2-1
Selecting a WaveLAN PC Card	2-2
WaveLAN PC Card Types	2-2
Version Compatibility	2-4
Installing the WaveLAN Card	2-5
Removing the Yoke	2-5
Inserting the WaveLAN/IEEE PC Card	2-6
Connecting the WaveLAN/EC	2-7
Mounting the WaveLAN/EC Device	2-8

Hardware Installation

2

Installation Requirements

To start using your WaveLAN/EC-S device, you will need the following items:

- One WaveLAN/EC-S kit.
- An Ethernet 10Base-T and/or Serial RS-232 cable.
- One WaveLAN IEEE 802.11 PC Card kit, and
- A computer terminal with Ethernet 10Base-T or serial RS-232 connector to connect to the WaveLAN/EC-S device.

In its factory-set configuration, the WaveLAN/EC-S device is programmed to connect to “ANY” WaveLAN Infrastructure (see page 1-7) in its vicinity, provided that such network includes one or more WavePOINT-II Access Point(s).

Alternatively you can change this factory-set configuration to:

- Connect to one specific Infrastructure Network only, which is identified by a unique WaveLAN Network Name, or
- Connect to an Independent Network that does not include WavePOINT-II access points. This option allows you to connect the device to an “Ad-hoc” wireless workgroup (see page 1-9).

To view or modify the factory-set defaults, please consult either Chapter 3 or Chapter 4 “The Built-in Configurator” or Chapter 4.

Selecting a WaveLAN PC Card

The WaveLAN IEEE 802.11 PC Card is sold separately from the WaveLAN/EC-S Ethernet converter. As various versions of the WaveLAN IEEE 802.11 PC Card exist today, you may need to check whether the card that you wish to use in combination with your WaveLAN/EC-S device is fully compatible with the device. The compatibility check applies to the type of hardware, and version of the embedded software loaded into the card.

WaveLAN PC Card Types

Your WaveLAN/EC-S device is compatible with the following types of WaveLAN IEEE 802.11 PC Cards:

- Standard WaveLAN IEEE 802.11 PC Cards.
- WaveLAN IEEE Turbo PC Cards.
- Fixed Wireless PC Cards.

The Standard WaveLAN IEEE 802.11 PC Cards, are network interface cards that comply with the IEEE 802.11 standard on wireless LANs. This card supports two data speeds (Standard & Low) with a maximum of 2 Mbit/s.

The WaveLAN IEEE Turbo PC Cards are network interface cards that support four different data speeds, in the range of Low, Standard, Medium and High (Ethernet Equivalent speed).

Both card types are available in two variants¹:

- Bronze Label
- Silver Label

1 Previously released versions of the Standard WaveLAN IEEE 802.11 PC Card, were characterized by a white label. The white label cards, support the same features and functionalities as the Bronze Label cards.

Hardware Installation

Selecting a WaveLAN PC Card

Bronze Label cards, are standard WaveLAN cards that are characterized by:

- Interoperability with other IEEE 802.11 compliant Direct Sequence radio devices.
- Standard data transmission speeds (auto transmit-rate selection between 2Mbit/s and 1Mbit/s)
- Frequency Channel selection (2.4 GHz)
- Roaming over multiple channels.

Silver Label cards support the same functionality as the Bronze Label cards. Additional feature of the Silver Label product is that it has a dedicated hardware design to prepare it for “Wired Equivalent Privacy” (WEP) data encryption.



NOTE:

Support for WEP encryption for Silver cards is not yet included with the shipped product. It will be made available as an *update* to the embedded software of both your WaveLAN/EC-S device and WaveLAN IEEE Silver Card(s) via the WaveLAN website in a future release.

The Fixed Wireless PC Card is a special WaveLAN PC Card for outdoor antenna installations that is marketed in Europe only. It can be recognized from the distinct red color of the extended part of the PC Card.

The Fixed Wireless PC Card supports the same networking capabilities as the other WaveLAN cards, but has different radio specifications to comply with radio regulations for outdoor antenna installations as defined by the European Telecommunications Standards Institute.

Hardware Installation

Selecting a WaveLAN PC Card

Version Compatibility

It is policy of Lucent Technologies to improve products as new technology, components, software and firmware become available. In some cases, this may lead to situations where the version level of previously purchased products, may not be compatible with the latest product deliveries.

To allow proper operation of the WaveLAN/EC-S device, the WaveLAN/IEEE PC Card must be loaded with “WaveLAN/IEEE STA functions firmware” v1.28 or higher.

To determine the version level of the factory-loaded “WaveLAN/IEEE STA functions firmware”, please consult the **readme.txt** file on the diskette(s) that was shipped with your WaveLAN/IEEE WaveLAN PC Card.

If your card does not meet the criteria mentioned above, you can download WaveLAN software/firmware updates from the WaveLAN website at **<http://www.wavelan.com>**.

Installing the WaveLAN Card

Prior to powering up the WaveLAN/EC-S, you will need to insert a WaveLAN IEEE PC Card into the device. The procedure to insert the card is summarized as follows:

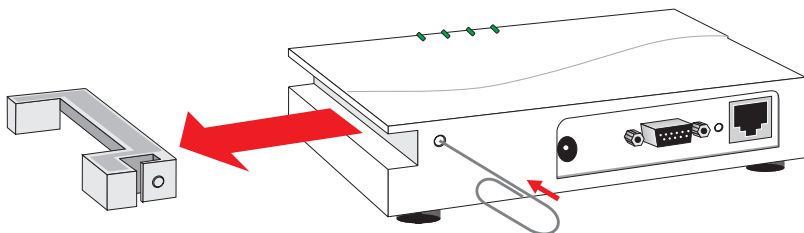
1. Remove the PC Card yoke from the WaveLAN/EC-S device.
2. Place the Yoke over the WaveLAN PC Card
3. Reinsert the Yoke and PC card into the WaveLAN/EC-S device.

Removing the Yoke

To remove the PC Card yoke from the WaveLAN/EC-S, proceed as follows:

1. Disconnect the WaveLAN/EC-S from the power adapter and all cables.
2. With the thumb and forefinger on your left hand, grab the corners of the yoke.
3. With a pointed object, such as a pen or metal paperclip, press the release button while pulling gently on the yoke.
4. Gently slide the yoke (and PC Card, if applicable) out of the WaveLAN/EC-S, as shown in Figure 2-1.

Figure 2-1 Removing the Yoke

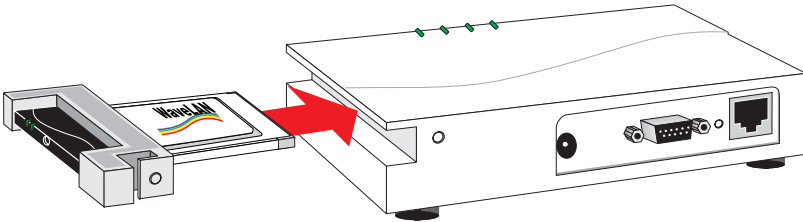


Inserting the WaveLAN/IEEE PC Card

To insert the PC Card into the WaveLAN/EC-S, proceed as follows:

1. Place the yoke on the PC Card, so that the yoke wraps around the antenna of the PC Card.
2. Slide the PC Card/yoke combination into the PC Card slot of the WaveLAN/EC-S, as shown in Figure 2-2.
3. The yoke and PC Card should snap into place once they are properly seated.

Figure 2-2 Inserting the Yoke and PC Card



Connecting the WaveLAN/EC-S

To connect the WaveLAN/EC-S device to a computer terminal or printer, proceed as follows:

1. Verify that you have all items required to install the WaveLAN/EC-S device:
 - WaveLAN/EC-S device and its DC power supply
 - Ethernet cable (not included) and/or serial cable as provided in the kit.
 - WaveLAN IEEE 802.11 PC Card (inserted into the WaveLAN/EC-S device as described on page 2-5).
2. Attach the Ethernet cable or the serial cable to the WaveLAN/EC-S device.
3. Next, attach the opposite end of the cable to the corresponding port of the computer terminal.

When you wish to connect both a computer terminal and a wireless peripheral device to the WaveLAN/EC-S (as described on page 1-14), you will typically:

- Use the Ethernet cable to connect the WaveLAN/EC-S device to the computer terminal.
 - Use the serial cable to connect the WaveLAN/EC-S device to the computer peripheral device, such as a printer.
4. Insert the connector of the power cord into the WaveLAN/EC-S power jack and plug the power supply into an AC outlet.



WARNING:

Use only the power supply provided with your WaveLAN/EC-S device. Connecting the device to another power supply, may cause damage to your equipment and will void the warranty.

Hardware Installation

Connecting the WaveLAN/EC-S

Having completed step 4, the Power LED of the WaveLAN/EC-S device should light continuously green, indicating that the device is ready to connect to any WaveLAN IEEE802.3 Infrastructure network using the factory-set default configuration settings.

- To view or modify the factory-set default configuration, consult either Chapter 3 or Chapter 4.
- If the Power LED turns Red, or does not light at all, please consult Appendix B "Troubleshooting".

Mounting the WaveLAN/EC-S Device

The WaveLAN/EC-S Ethernet Converter can be positioned in one of the following methods:

- Placed on its rubber feet on a flat surface, such as a table top, or on top of a filing cabinet.
- Mounted to a wall or post, using the mounting bracket included with the kit.

To fix the mounting bracket, you can either use the screws, or adhesive pads provided. The adhesive pads can be applied on any smooth surface for which you do not wish to use the mounting screws.



CAUTION:

Many computer monitors today support a degauss option, that can either be enabled manually by the user, but is often also enabled automatically whenever you turn on the monitor. The electromagnetic discharge that may occur when degaussing the monitor may cause damage to the WaveLAN equipment.

To avoid damage to your sensitive WaveLAN equipment, do not place the WaveLAN/EC-S device on top of, or too close to computer monitors.

To mount the WaveLAN/EC-S, proceed as follows:

1. Determine a position for the WaveLAN/EC-S device that:
 - Is close enough to both the power outlet and computing device to prevent strain on the cable and power cord attached to the device.
 - Allows the integrated antenna of the WaveLAN IEEE PC Card to radiate freely, to ensure optimal transmission and receiving quality.
2. Secure the mounting bracket to the desired mounting surface using either the mounting screws or the adhesive pads provided.
3. Snap the WaveLAN/EC-S onto mounting bracket.
4. Follow the installation instructions on Chapter 3 to complete the installation of the WaveLAN/EC-S to your terminal device.

Configuring WaveLAN/EC

3

Contents

Introduction	3-1
Install the WaveMANAGER/EC Program	3-2
Running WaveMANAGER/EC	3-4
Access the WaveLAN/EC Configuration	3-5
Set the WaveLAN Parameters	3-6
Basic WaveLAN Parameters	3-6
■ Station Name	3-7
■ Network Type	3-7
■ Network Name	3-7
Advanced WaveLAN Parameters	3-8
■ MAC Address	3-9
■ AP Density	3-11
■ Transmit Rate	3-12
■ Medium Reservation	3-14
Set the EC Specific Parameters	3-17
Assign TCP/IP Parameters	3-18
Perform File Operations	3-19
■ Save a configuration to file	3-19
■ Load a configuration from file	3-20

■ Update the Embedded Software	3-20
Display Device Information	3-21
Password Protect your Configuration	3-22
■ Secure Networks	3-23

Configuring WaveLAN/EC-S

3

Introduction

The WaveLAN/EC-S has been designed to instantly connect your client device to “ANY” WaveLAN IEEE Infrastructure within the vicinity of the WaveLAN/EC-S device. network. However, there may be situations in which you may wish to change the factory-set default configuration to:

- Assign a unique “station name” to the WaveLAN/EC-S device (default is “Ethernet Converter”).
- Assign a unique WaveLAN Network Name to the network, and loading this name into WaveLAN/EC-S device.

Changing the default value “ANY” to a unique WaveLAN Network Name will avoid that your WaveLAN/EC-S device(s) might unintentionally connect to a neighboring network.

- Assign a unique IP address to the WaveLAN/EC-S device.
- Update the embedded software of the WaveLAN/EC-S device.

This chapter describes how to use the WaveMANAGER/EC program to configure:

- A WaveLAN/EC-S device directly connected to your computer via the Ethernet 10Base-T interface.
- Any remote WaveLAN/EC-S device connected to a terminal located on the same LAN segment.



NOTE:

The WaveMANAGER/EC program is not capable of accessing remote WaveLAN/EC devices located “beyond” a router or gateway.


For initial configuration, you are advised to connect the units directly to the Ethernet 10Base-T port of a computer that runs the Microsoft Windows 95/98 or Windows NT (v4.0) operating system.

If your computer runs another operating system, please consult Chapter 4, which describes how to configure the device using the built-in configuration program of the WaveLAN/EC-S device.

For devices connected via the serial port, you should use the “Main Menu”, as described in “Running the Built-in Configurator” on page 4-10.

Install the WaveMANAGER/EC Program

To install the WaveMANAGER/EC program, do the following:

1. Insert the disk labelled “WaveMANAGER/EC Installation Disk”.
If you downloaded the software from the WaveLAN website, please refer to the installation instructions found on the website.
2. Click the  button on the Windows Task bar.
3. Select “Run” and type the path to the installation program.
Example: **A:\setup.exe**
Alternatively click the “Browse” button, navigate to the disk drive and directory that contains the WaveLAN/EC software, and double-click the “**setup.exe**” program.
4. Click OK to confirm and start the WaveMANAGER/EC installation.
5. Follow the instructions as they are displayed on your screen.


The installation program will:

- Create a “WaveMANAGER” folder on the hard-disk drive of your computer (**c:\program files\wavelan\wavemanager\ec**).
- Copy the WaveMANAGER/EC program with the associated on-line help files this folder, and
- Create an icon on the “Programs” menu.

When the installation program detects a previously installed version of the WaveMANAGER/EC program, it will overwrite the previous installation, except (if applicable) the back-up configuration files that were created by the user.

Running WaveMANAGER/EC

To start the WaveMANAGER/EC program proceed as follows:

1. Click the  Start button on the Windows Task bar.
2. Select “Programs”, and then the “WaveLAN” folder.
3. Click the “WaveMANAGER/EC” icon to open the program.

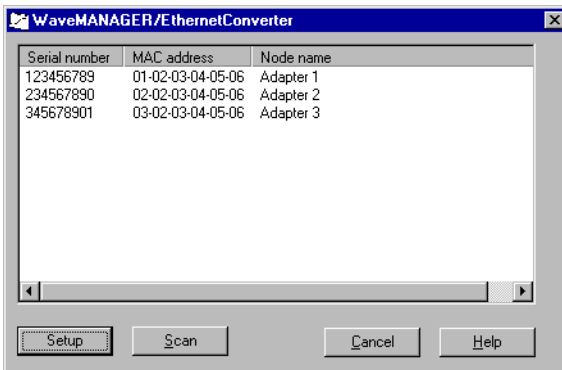
The WaveMANAGER/EC will automatically detect and display the WaveLAN radio devices connected to the same network as this station, as pictured in Figure 3-1 below.



NOTE:

The WaveMANAGER/EC program will only display WaveLAN/EC-S devices within the same subnet as the station that initiated the scan. It can not access remote devices located “beyond” a router or gateway.

Figure 3-1 WaveMANAGER/EC Main Window



To refresh the list of detected WaveLAN/EC-S devices, click the “Scan” button.

Access the WaveLAN/EC-S Configuration

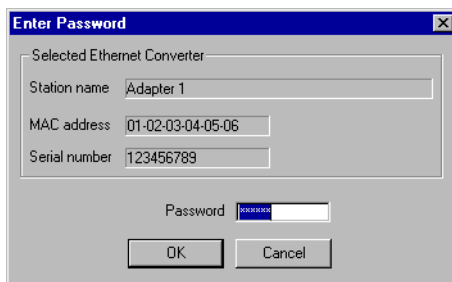
If your WaveMANAGER/EC program displays one or more WaveLAN/EC-S devices the devices will be identified by their unique MAC Address and Serial number.

To avoid tampering with the configuration of the device, the configuration parameters are password protected.

To display the configuration of a WaveLAN/EC-S device:

1. Select the device of your choice, and click the “Setup” button.
2. Click the “Configure” button to open the “Enter Password” window pictured in Figure 3-2.
3. Enter the password for this device and click OK.
The default password value is “public”

Figure 3-2 Enter WaveMANAGER/EC-S Password



This will open the “Setup Ethernet Converter” screen as pictured in Figure 3-3 on page 3-6.

- To set the generic WaveLAN parameters, proceed with “Set the WaveLAN Parameters” on page 3-6
- To set the specific parameters for this WaveLAN/EC-S device, proceed with “Set the EC-S Specific Parameters” on page 3-17.

Set the WaveLAN Parameters

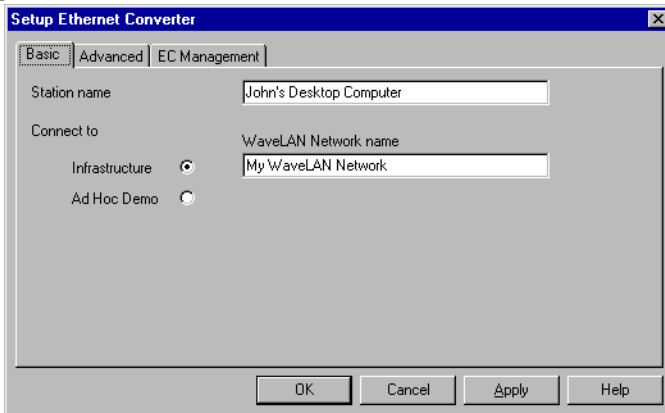
The WaveMANAGER/EC-S allows you to set two sets of WaveLAN parameters:

- **Basic WaveLAN Parameters** - A set of mandatory parameters that should be set on every WaveLAN/EC-S device.
- **Advanced WaveLAN Parameters** - A set of optional radio parameters. In most networking environments you do not need to modify these parameters, as their defaults settings will prove most efficient for normal network communications.

Basic WaveLAN Parameters

The Basic WaveLAN parameters identify the unique identifiers of your WaveLAN/EC-S device and the network to which it should be connected.

Figure 3-3 Basic WaveLAN Parameters



Station Name

Use this field to enter a unique descriptive name for the device, such as the user's name or the location of the device within the building.

This name will be used to identify your WaveLAN/EC-S device when running the standard WaveLAN diagnostic tools.

Valid values are any string of alphanumeric characters in the range of "a-z" A-Z" and "0-9" with a maximum of 32 characters. Default value is "Ethernet Converter".

Network Type

Use the "Connect To" field to identify the type of network to which you would like to connect your WaveLAN/EC-S device.

- Select Infrastructure to connect it to a network infrastructure that includes WavePOINT-II access points (see "Infrastructure Network" on page 1-7).
- Select "Ad-hoc Demo" to connect it to an independent wireless workgroup that does not include WavePOINT-II access points ("Independent Network" on page 1-9).

Network Name

When you select to connect your WaveLAN/EC-S device to an infrastructure network, you will also need to identify the name of the WaveLAN IEEE Infrastructure:

- Use the default value "ANY" (all upper-case!) to allow your WaveLAN/EC-S device to connect to the first WavePOINT-II device that it can find in its vicinity.
- Use a unique WaveLAN Network Name value when you would like to connect your device to one specific WaveLAN Network only.

Configuring WaveLAN/EC-S

Set the WaveLAN Parameters

Using a unique WaveLAN Network Name value will avoid that your device might unintentionally attempt to establish a connection with a neighboring network.

Valid values are any string of alphanumeric characters in the range of "a-z", "A-Z" and "0-9" with a maximum of 32 characters (default value is "ANY").

The WaveLAN Network Name must be the same for all WaveLAN devices and WavePOINT-II devices in the network. Consult your LAN Administrator for the WaveLAN Network Name value that applies in your network.



NOTE:

In IEEE 802.11 networks that include Lucent Technologies WavePOINT-II access points, the LAN Administrators may have "closed" the network to wireless stations that use the network name "ANY" to avoid unintentional connections as described above.

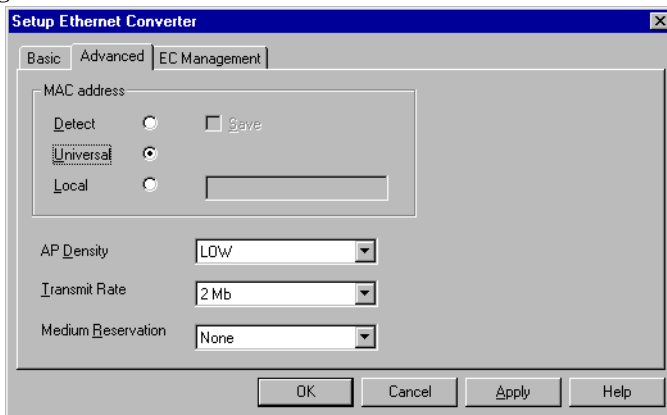
For Ad-hoc workgroups, you do not need to identify a WaveLAN Network Name. In Ad-hoc Demo mode, your WaveLAN/EC-S device will be able to communicate peer-to-peer with any wireless station in its vicinity that is operating in Ad-hoc Demo mode too.

Advanced WaveLAN Parameters

The "Advanced" tab enables you to set a number of radio parameters of your WaveLAN/EC-S device.

In most networking environments you do not need to modify these parameters, as their default settings will prove most efficient for normal network communications.

Figure 3-4 Advanced WaveLAN Parameters



MAC Address

In networking environments a MAC Address value is a standard designator that is used to identify the different devices connected to the network. By default, each networking device has a factory-loaded (Universal) MAC Address that can not be changed.

When connecting the WaveLAN/EC-S device to the Ethernet port of a computer terminal, the combination of the devices actually has two MAC Addresses:

- The Universal MAC Address of the Ethernet interface on your computer.
- The Universal MAC Address of the WaveLAN IEEE PC Card inserted into the WaveLAN/EC-S device.

This MAC Address value is printed on the label on the back of your WaveLAN card.

To avoid confusion in network communications, you can configure the WaveLAN/EC-S device to “adopt” one of the two MAC Address values.

Configuring WaveLAN/EC-S

Set the WaveLAN Parameters

- Select the option “detect” to have your WaveLAN/EC-S device retrieve the MAC Address of the Ethernet interface from the connected computer terminal or peripheral device.

The “detect” mode, will prompt the device to retrieve the MAC Address (again), each time when the WaveLAN/EC-S device and/or the connected computer or peripheral device is powered up.

Subject to the volume of network traffic passing from/to the Ethernet port, this may take a few of seconds.

- With the “Save” option enabled, the WaveLAN/EC-S device will remember this MAC Address, allowing it to start operation immediately after the computer is powered-up, or re-activated from sleep-mode.
This is the preferred option if you do not intend to swap the WaveLAN/EC-S device between multiple computers.
- If you plan to swap the WaveLAN/EC-S device frequently between multiple devices that require a network connection, you are advised to clear the “Save” check-box. Although the recurring detection process may cause a minor delay when powering up the device, this setting will avoid errors resulting from a MAC Address mismatch between the WaveLAN/EC-S and its host device.
- To set the WaveLAN/EC-S device to use the MAC Address value of the WaveLAN/IEEE PC Card inserted into the WaveLAN/EC-S device, set this parameter to “Universal”.



CAUTION:

Selecting Universal MAC Address may disrupt regular LAN communication to any device connected via the 10Base-T port of your WaveLAN/EC-S device.

Use this option only in situations where you intend to connect a single computing device via the Serial RS-232 port only (i.e. you will not use the 10Base-T port of the WaveLAN/EC-S).

Configuring WaveLAN/EC-S

Set the WaveLAN Parameters

When you are running a network operating system that requires you to assign dedicated MAC Address values to networking devices, you can use the option “Local MAC Address” values to assign a user-defined MAC Address value.

The Local MAC address value will override, not overwrite, the Universal MAC Address value. Consult your LAN Administrator for the settings/value that applies in your networking environment.

AP Density

The Access Point Density parameter controls the roaming sensitivity of your wireless station. This parameter should be set according to match:

- The density of the WavePOINT-II access points that have been installed throughout the wireless network area, and
- The setting of this parameter in the configuration of the access points.

Consult your LAN Administrator for the appropriate values that apply to your network. Valid values are:

- Low (default)
- Medium
- High



CAUTION:

Using non-matching values may seriously affect wireless performance of your wireless station.

Transmit Rate

The actual data transmission speed of your WaveLAN device is subject to the following criteria:

- The type of WaveLAN IEEE cards at both ends of the wireless link, being:
 - The card inserted into your WaveLAN/EC-S device, and
 - The card inserted into the WavePOINT-II or, the peer-to-peer partner in an Ad-hoc network.
- The communications quality of the wireless link.
- The user-defined preference for the data Transmit Rate.

In most networking scenarios, you will see that the factory-set default “Auto” will prove the most efficient. Whenever your computer communicates via the wireless medium the WaveLAN interface will:

- Sense the maximum transmit rate as supported by both communication partners, and switch to that Transmit Rate.
- Determine if the communication quality allows for communicating at this data rate.

Transmissions at lower data speeds are usually more reliable. Therefore when the communications quality drops beneath a certain level, the WaveLAN cards will automatically switch to a lower data rate.

When the communications quality improves again, both WaveLAN cards will gradually increase the data rate again, until they have reached the highest available Transmit Rate as supported by both cards.

Optionally, you can select to disable the Auto-Transmit Rate Select mechanism, by “fixing” the Transmit Rate to a selected user-defined preference.

If you wish to balance speed versus reliability, you can also select a user-defined preference from the following four options:

- High fixed
- Medium fixed
- Standard fixed
- Low fixed

You are advised however to do so only in special circumstances, typically upon advice of a WaveLAN IEEE expert or WaveLAN Technical Support representative.

- Use **High-Fixed** data rate only in networking environments where:
 - You are certain that all wireless devices can communicate at the highest Transmit Rate, and
 - Where performance appears to slow down as a result of many retransmissions, even though the wireless coverage provides an “Excellent Radio Connection”.

This situation may occur in exceptional cases where for example Microwave ovens in the WaveLAN Signal path interfere with WaveLAN data communication.
- Use **“Low - Fixed”** only in networking environments where range of the wireless connection is more important than speed.

This setting will “instruct” your WaveLAN adapter to conserve resources by not attempting to (re-)transmit data at higher data rates.



NOTE:

Your WaveLAN/EC-S device does not yet support the recently released WaveLAN IEEE Turbo cards. Support for these cards that support Ethernet equivalent transmit rates, will require an update of the embedded software of your WaveLAN/EC-S device. This update will be made available via the WaveLAN websites in a future release.

Medium Reservation

It is normal behavior for WaveLAN stations to defer transmissions automatically when they sense that another WaveLAN device is using the wireless medium.

This behavior also referred to as the Carrier Sense Multiple Access/Collision Avoidance protocol (CSMA/CA) will avoid that wireless messages would collide in situations where two or more stations would start transmissions at the same time.

The Medium Reservation mechanism enables you to improve wireless performance in network environments where the CSMA/CA protocol would fail due to the “hidden station” problem as pictured in Figure 3-5 on page 3-15.

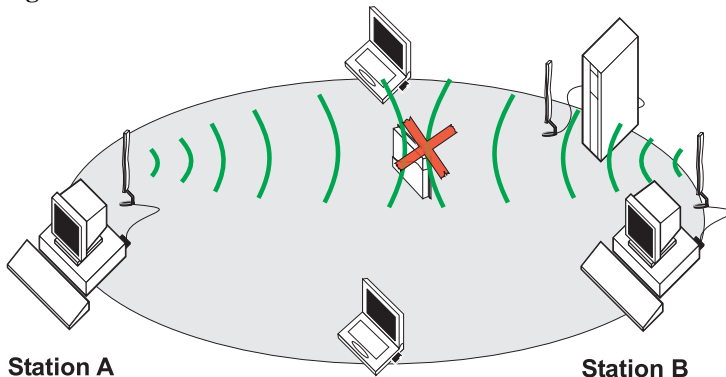
Medium Reservation may provide a solution for networks where:

- The density of WaveLAN stations and WavePOINT-II access points is very low.
- You witness poor network performance due to excessive frame collisions at the WavePOINT-II access points.

A hidden station problem may occur in a situation where two stations are within range of the same WavePOINT-II, but are not within range of each other.

Figure 3-5 illustrates an example of the “Hidden Station” problem. Both Station A and Station B are within range of the WavePOINT-II access point however, Station B cannot “hear” Station A, therefore Station A is a “hidden station” for Station B.

Figure 3-5 The Hidden Station Problem



When Station B starts to communicate with the WavePOINT-II access point, it might not notice that Station A is already using the wireless medium. When Station A and Station B send messages at the same time, they might collide when arriving simultaneously at the WavePOINT-II access point. The collision will most certainly result in a loss of messages for both stations.

In situations as pictured in Figure 3-5, Medium Reservation may provide a solution to prevent message collisions by handing over transmission control to the WavePOINT-II access point.

Troubleshooting a “Hidden Station” problem usually provides the best results when it is performed on the suspected WaveLAN Client stations that suffer from errors as a result of the “hidden station” problem.

When configuring the WaveLAN card parameters (in the PC Card properties window) you can set the Medium Reservation parameter to either:

- “Hidden Station”, or
- “Off”

Configuring WaveLAN/EC-S

Set the WaveLAN Parameters

You can enable Medium Reservation on individual stations, i.e. the setting of this parameter does not have to be the same for all WaveLAN devices in your network.

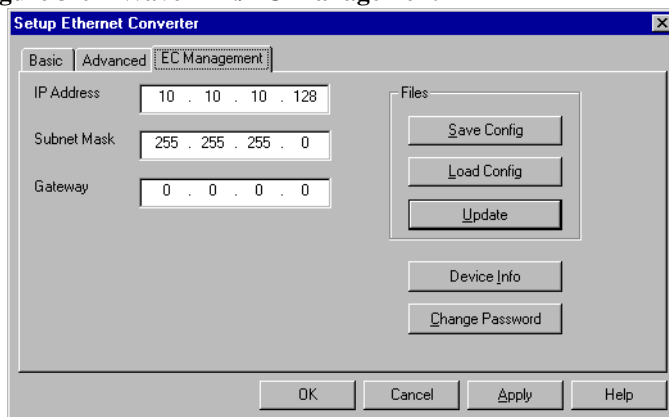
For more detailed information on these advanced settings, please consult the on-line help file, or refer to the User's Guide that was shipped with your WaveLAN IEEE 802.11 PC Card.

Set the EC-S Specific Parameters

The EC Management tab allows you to set the parameters for this specific WaveLAN/EC device. For most network configurations you will not need to change any of the parameters listed on this tab, unless you wish to perform one of the following actions:

- Assign TCP/IP Parameters to your WaveLAN/EC-S device (described on page 3-18).
- Save, import or replicate standard configuration files (described on page 3-19).
- Display Device Information (described on page 3-21).
- Change the password that provides access to the configuration information of your WaveLAN/EC-S device (described on page 3-21).

Figure 3-6 WaveLAN/EC Management



Assign TCP/IP Parameters

This section of the EC Management tab is relevant only, when you wish to use a remote computing system to view/modify the configuration of WaveLAN/EC-S devices in your network. This could for example be a LAN Administrator station located at a central location within a large building.

Assigning a unique IP Address value to the WaveLAN/EC-S will allow you to access the device using a terminal emulation program, or Telnet via the TCP/IP protocol, even if that device would be located beyond a Router or Gateway (consult Chapter 4 "The Built-in Configurator" for more information.



NOTE:

The IP Address for the WaveLAN/EC-S device mentioned above is a separate IP Address, that is used only to allow remote management of the WaveLAN/EC-S device only.

For networking systems where (wireless) clients need to use the TCP/IP protocol and a unique IP Address value, this (second) IP Address for the computer terminal should be set in the "Network Properties" for the Ethernet interface of your computing device.

If you do not wish to use the remote configuration option, you can ignore the values in this field and turn to the next section of the EC Management tab "Perform File Operations" on page 3-19.

To allow remote configuration, proceed as follows:

1. In the IP Address field, change the default value 10.10.10.128 to a unique IP Address value from the range assigned to your organization.
2. In the Subnet Mask field enter the IP subnet mask for the LAN segment to which you will connect the WaveLAN/EC device.

The subnet mask value you select should be the same for all WaveLAN and WavePOINT-II devices in your network.



NOTE:

To allow roaming operation for WaveLAN IEEE devices, all WaveLAN devices and WavePOINT-II access points should logically be connected to the same IP subnet. WaveLAN devices can not roam “over routers”.

3. In the Gateway field, enter the IP Address of the Gateway, that provides access to other LAN segments.

Perform File Operations

The “Files” section of the EC Management tab, allows you to:

- Save a configuration to file.
- Load a configuration from file.
- Update the Embedded Software.

Save a configuration to file

You can use the “Save Config” option to save the current configuration settings of the device to a file (*.cnf) on diskette or hard disk drive, for example to:

- Create a back-up copy of the configuration of each WaveLAN/EC-S device.
- Create a sample configuration file that you can use as a template to replicate the configuration when preparing large-volume roll-out installations.

When saving the file to disk, make sure you select a file name that allows for easy recognition in the future (e.g. **template.cnf** or **EC_lobby.cnf**).

Load a configuration from file

You can use the “Load Config” option to import a previously saved configuration file (*.cnf) from diskette or hard disk drive, for example to:

- Restore the original configuration when recovering from a system crash, or replacing a device.
- Import a template file containing the “common” parameters that should be the same for all WaveLAN/EC-S devices in your network.

This might be a convenient way to replicate the standard configuration when preparing large-volume roll-out installations.



NOTE:

When importing a template file, make sure to change the unique identifiers for the WaveLAN/EC-S device to avoid management errors. These unique identifiers are:

- “Station Name” described on page 3-7, and
- The unique “IP Address” value described on page 3-18.

Update the Embedded Software

It is policy of Lucent Technologies to improve products as new technology, software and hardware become available.

To enhance (wireless) performance of your WaveLAN/EC-S device and WaveLAN/IEEE cards, future *updates* will be made available via the WaveLAN website. Examples of such *updates* that will be released soon are:

- WaveLAN/EC-S support for WaveLAN IEEE Turbo cards, or
- WEP encryption for Silver Label cards.

Configuring WaveLAN/EC-S

Set the EC-S Specific Parameters

Whenever an update becomes available, you will be able to download the latest WaveLAN/EC-S software from the WaveLAN website, and use the “Update” option of the EC Management tab to load the latest embedded software (*.rmu) into your WaveLAN/EC-S device.

Once finished, disconnect power from the WaveLAN/EC-S device and reconnect it again to have the unit restart again using the updated software.

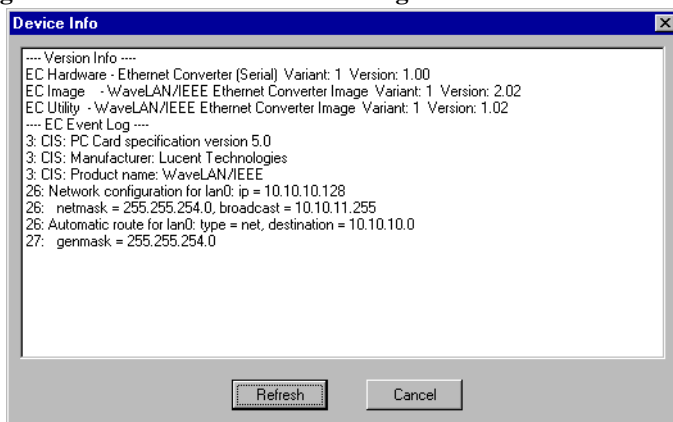
You are advised to visit the WaveLAN website at regular intervals to check if newer versions are available for your product.

Display Device Information

The “Device Info” option, allows you to display:

- The current versions of various WaveLAN/EC-S settings.
- Error messages that are registered during operation of your WaveLAN/EC-S device.

Figure 3-7 WaveLAN/EC Event Log



Configuring WaveLAN/EC-S

Set the EC-S Specific Parameters

You can use the WaveLAN/EC-S Device Information to:

- Compare the versions loaded into the WaveLAN/EC-S device with software available on the WaveLAN website to determine if you need to update any of the items listed on this screen.
- Provide more details about your installed product(s) when contacting WaveLAN Technical Support.
- Check if the device lists any error messages, that you can use as a reference to finding the right solution when consulting Appendix B "Troubleshooting".

Password Protect your Configuration

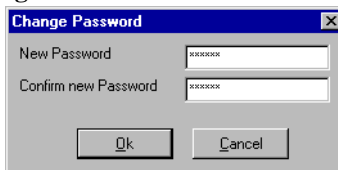
The configuration of the WaveLAN/EC-S is password protected to prevent unauthorized changes to the parameter settings. The default password for "out-of-the-box" WaveLAN/EC-S devices is "public".



NOTE:

You are advised to change this default value, to avoid tampering with the configuration settings of your WaveLAN/EC-S device. Especially when you wish to allow remote configuration of the WaveLAN/EC-S device via TCP/IP, changing the default password is "good practice" for managing your network.

Figure 3-8 Change Password



To change the default password proceed as follows:

1. Open the EC Management tab.
2. Click the button “Change Password” to display the window pictured in Figure 3-8 on page 3-22.
3. Enter the new password in the “New Password” field.
4. Enter the same password in the “Confirm Password” field.
5. Click OK to save the new password.
6. (Optional) Create a back-up file of the modified configuration parameters as described on page 3-19.

Secure Networks

An advantage of WaveLAN networking products is that you can secure network environments and data communications from unauthorized access, by implementing one or more of the following security measures:

- Wired Equivalency Privacy (WEP) data encryption.
- Closing WaveLAN networks to stations that have been configured with a non-matching WaveLAN Network Name or the value “ANY”.
- Static MAC Address filtering.



NOTE:

WEP will be available with future releases. Consult the WaveLAN website for the latest information about WEP.

The last two bullets are security measures that are typically implemented at the WavePOINT-II access points by the LAN Administrator of the WaveLAN IEEE Infrastructure.

For more information about these security measures, please consult the WaveMANAGER IEEE User’s Guide that is shipped with each WavePOINT-II access point.

The Built-in Configurator

4

Contents

Introduction	4-1
Do I need to change the configuration?	4-2
Access via a Telnet Session	4-3
Access via Direct Telnet Connection	4-4
Access via Remote Telnet Connection	4-5
Open the Telnet Session	4-6
Access via the Reset/Config Button	4-8
Running the Built-in Configurator	4-10
Navigating the Menus	4-11
Set the WaveLAN Parameters	4-12
Basic WaveLAN Parameters	4-12
■ Network Name	4-14
■ Station Name	4-15
■ Network Operation	4-15
Advanced WaveLAN Parameters	4-16
■ MAC Address	4-16
■ AP Density	4-18

■ Transmit Rate	4-19
■ Medium Reservation	4-21
■ IP Parameters	4-22
Saving the Configuration Changes	4-24
■ Resume Operation	4-24
■ Reset the WaveLAN/EC-S	4-24
Set the Serial Parameters	4-25
About the Serial Parameters	4-26
Hardware Parameters	4-27
Software Parameters	4-27
Flow Control	4-31
I/O Control	4-32
Tailor the Selected Protocol	4-34
Network Bindings	4-37
A Sample Scenario	4-42
Special Station to Station Topologies	4-42
Display Device Information	4-45
■ View Configuration For Capture	4-45
■ View System Event Log	4-46
■ Clear System Event Log	4-46
Password Protect the Configuration	4-47
■ Secure Networks	4-48

The Built-in Configurator

4

Introduction

If you wish to change the factory-set default configuration, the easiest way to do so, is using the WaveMANAGER/EC program as described in Chapter 3 "Configuring WaveLAN/EC-S".

As an alternative to the WaveMANAGER/EC program, the WaveLAN/EC-S device also has a built-in configuration program, that you can use when:

- You do not have a computer running the Microsoft Windows 9x and/or Windows NT v4.0 operating system (required to install and run the WaveMANAGER/EC program).
- The WaveLAN/EC-S device is connected to your computer via a serial cable, using the RS-232 interface.
- You wish to set specific RS-232 serial link parameters, which can not be managed using WaveMANAGER/EC.
- You wish to manage and configure the WaveLAN/EC-S device from a remote computer.

You can start the built-in configuration program using a Telnet or similar program as described on page 4-3, or by pressing the Reset/Config button of the device (as described on page 4-8) to display the built-in configuration program via a terminal emulation program.

Do I need to change the configuration?

The WaveLAN/EC-S has been designed to instantly connect your client device to “ANY” WaveLAN IEEE Infrastructure within the vicinity of the WaveLAN/EC-S device.

Neither is configuration required if you are planning to use a WaveLAN/EC-S as an alternative to RS-232 serial cables. For example when you’d like to use the device in a configuration as described in “Serial Port Topologies” on page 1-10, the devices will automatically associate with on another.

Situations that might require you to (re-)configure the WaveLAN/EC-S device could be when you would like to:

- **Change the WaveLAN Network Name** - for example when the WaveLAN network has been “closed” to devices that use the value “ANY” (see “Secure Networks” on page 3-23).
- **Assign unique IP Addresses** - for example to allow remote management via TCP/IP.
- **Customize Serial Port communication** - for example to:
 - Select any of the special protocols described in Chapter 5 “Serial Port Specifications”
 - Tailor parameters such as Baud Rate, bit count, parity to improve the efficiency of communications as exchanged by the applications using the wireless interface.

Access via a Telnet Session

When you use a program such as Telnet, you can access the configuration of your WaveLAN/EC-S from either:

- A computer terminal connected directly to the WaveLAN/EC-S device via the Ethernet 10Base-T interface (see page 4-4).
- A remote computer terminal via the WaveLAN interface of the WaveLAN/EC-S device (see page 4-5).

In the second scenario, the remote computer could either be a wired or wireless terminal, as long as it can access the WaveLAN/EC-S device via a WavePOINT-II access point.

The Telnet application is a standard program that is shipped with most operating systems. It uses the Internet standard TCP/IP networking protocol to connect to your WaveLAN/EC-S device. To allow remote access to the device, each WaveLAN/EC-S device must be assigned a unique IP Address.



NOTE:

The IP Address to access the built-in configuration tool is a different IP Address value than the one normally used for communication between computing devices in networking environments that use the TCP/IP protocol.

For example if your network uses TCP/IP for standard network operation, you will see that stations connected to WaveLAN/EC-S devices may need two IP Address values:

- One IP Address assigned to the Ethernet interface of the computer (either assigned manually, or automatically by DHCP or BootP servers).
- One IP Address assigned to the WaveLAN/EC-S device (typically assigned manually by the LAN Administrator installing the WaveLAN/EC-S device).

Access via Direct Telnet Connection

If this is the first time you are installing a WaveLAN/EC-S device, you may need to perform a number of preparatory steps:

1. Does your computer have the TCP/IP protocol, and the Telnet program installed?
 - If Yes, proceed with step 2.
 - If No, follow the instructions of the user documentation that came with your computer and/or operating system to install the TCP/IP protocol and Telnet software.
2. Ensure that your computer is set to use a unique IP Address value in a subnet range that matches the current configuration of the WaveLAN/EC-S device.
 - For “out-of-the-box” WaveLAN/EC-S devices which use IP Address 10.10.10.128, change the IP Address of your computer to the value 10.10.10.130.
 - When trying to access a previously configured device, set the IP Address of your computer to a unique IP Address value in the same subnet range as the one assigned to the WaveLAN/EC-S device.

If you do not know the current IP Address value of the WaveLAN/EC-S device press the Reset/Config button for 5 seconds to reset the unit to its factory-set defaults, and proceed as described in the previous bullet.
3. Ensure that both WaveLAN/EC-S device, and your computer use the same subnet mask value.
 - For “out-of-the-box” WaveLAN/EC-S devices, set your computer to use the subnet mask 255.255.255.0.
 - For previously configured devices, set the subnet mask to the same value as the WaveLAN/EC-S device, or reset the unit to its factory-set defaults as described above.
4. Once finished, turn to “Open the Telnet Session” on page 4-6 to launch the built-in configuration tool.

Access via Remote Telnet Connection

To allow remote access to the WaveLAN/EC-S device using Telnet, you will need to ensure that your installation meets the following requirements:

1. Each WaveLAN/EC-S device has a unique IP Address assigned.
If this is not yet the case, typically when you wish to configure WaveLAN/EC-S devices “out-of-the-box” use either:
 - The WaveMANAGER/EC program (see “Assign TCP/IP Parameters” on page 3-18).
 - A direct connection as described on page 4-4.
2. The network architecture allows you to access the device via a WavePOINT-II access point:
 - Your computer is a wireless computer connected to the same access point as the targeted device.
 - Your computer is a (wired) terminal that is connected to the WavePOINT-II via the Ethernet backbone.
 - The WavePOINT-II access point has not been configured for “Closed System” mode, which would deny access to device using the WaveLAN Network Name “ANY”.¹

If all these requirements have been satisfied, proceed with the steps as described in “Open the Telnet Session” on page 4-6.

1 WaveLAN/EC-S devices are programmed to use “ANY” as their default WaveLAN Network Name. For information about “Closed Systems”, please consult the WaveMANAGER IEEE User’s Guide.

Open the Telnet Session

1. Connect the Ethernet 10Base-T cable and power cord to the WaveLAN/EC-S device.
2. Connect the opposite end of the Ethernet cable to:
 - Your computer when following the scenario as described in “Access via Direct Telnet Connection” on page 4-4, or
 - The remote computing device if you are following the scenario as described in “Access via Remote Telnet Connection” on page 4-5.
3. Power-up your computer and the WaveLAN/EC-S device.
4. Start the Telnet program, and connect to the WaveLAN/EC-S device of your choice. For most Telnet applications, the procedure is summarized as follows:
 - a. From the Menu bar, select “Connect, Remote System”
 - b. Enter the IP Address of the WaveLAN/EC-S device:
 - For new “out-of-the-box” WaveLAN/EC-S devices, or devices that have been reset to the factory-set defaults, this value should read 10.10.10.128.
 - For previously configured units, enter the current IP Address value.
 - c. Next enter the port type:
 - For standard Telnet applications, select port-type “Telnet”.
 - For other applications use Port 23 (which is the default for all “telnet” programs).
 - d. When prompted to enter a Term type, select vt100.
 - e. Click “Connect” to establish the connection.

When the Telnet application successfully connects to the WaveLAN/EC-S device, the device will launch its built-in configuration tool, and display the Main Menu pictured in Figure 4-2 on page 4-10.

The Built-in Configurator

Access via a Telnet Session

- If this menu appears correctly in your Telnet window, turn to “Running the Built-in Configurator” on page 4-10 for more information.
- If the menu does not appear, but is prompting to enter a password, the connection to the WaveLAN/EC-S device was established successfully. However the device has been password protected upon a previous configuration setting. To access the Main Menu of the built-in configuration tool, you will need to enter the correct password (default= “public”).
- When the Telnet application returns a “Connect Failed” error, please verify if:
 - You entered the correct IP Address.
 - All criteria described on the previous pages were met to establish this connection.
 - Optionally you can use the “ping” command, to verify whether the selected IP Address is accessible.
For example in MS-DOS environments, the “ping” command looks as follows:
c:\ping 10.10.10.128
where the value 10.10.10.128 must be replaced by the actual IP Address value of the target device.

If you do not succeed establishing the Telnet connection, or if you have forgotten the password, you can reset the device to its factory-set defaults, as described in Appendix B “Troubleshooting”, and try again, following the procedures as described for “out-of-the-box” devices under “Access via Direct Telnet Connection” on page 4-4.

The Built-in Configurator

Access via the Reset/Config Button

Access via the Reset/Config Button

When your WaveLAN/EC-S device is connected via a serial cable, you can use the Reset/Config button (pictured in Figure 4-1) to open the built-in configuration program of your WaveLAN/EC-S device.

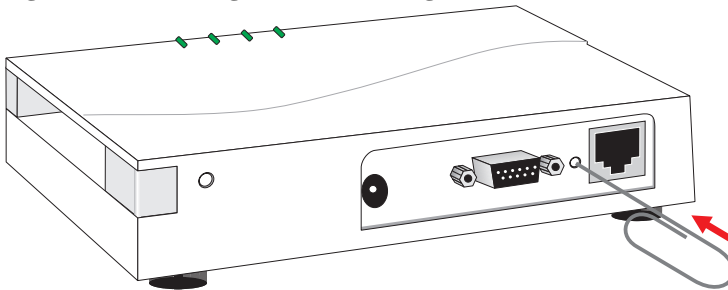
This option requires that the WaveLAN/EC-S device is connected to a computer that runs a terminal emulation program, such as ProComm, HyperTerminal or Telix.



NOTE:

When your WaveLAN/EC-S device is connected via a 10Base-T Ethernet cable you can not use this option.

Figure 4-1 Pressing the Reset/Config Button



To access the configuration of your WaveLAN/EC-S device using the Reset/Config button, proceed as follows:

1. Use the RS-232 cable to connect the WaveLAN/EC-S device to your computer.
2. Power up the WaveLAN/EC-S device and your computer.
3. Next start the terminal emulation program.
4. Display the communication parameters of your terminal emulation program (also referred to as “properties”).

The Built-in Configurator

Access via the Reset/Config Button

5. Now change the following parameter settings to match the following values:
 - Connect using a COM port (instead of modem)
 - Bits per second (Baud Rate) "9600"
 - Data Bits "8"
 - Parity "None"
 - Stop bit "1"
6. Follow the instructions of the terminal emulation program, to:
 - Close its "properties" window and return to the main menu.
 - Connect to the selected COM port.
7. Next, use a paper clip or other thin metal object to press the "Reset/Config" button as pictured in Figure 4-1 on page 4-8.



CAUTION:

Press the Reset/Config button only briefly. Keeping this button pressed for more than 5 seconds, will reset the configuration of your WaveLAN/EC-S device to its factory-set default configuration.

This procedure will launch the built-in configuration program of your WaveLAN/EC-S device.

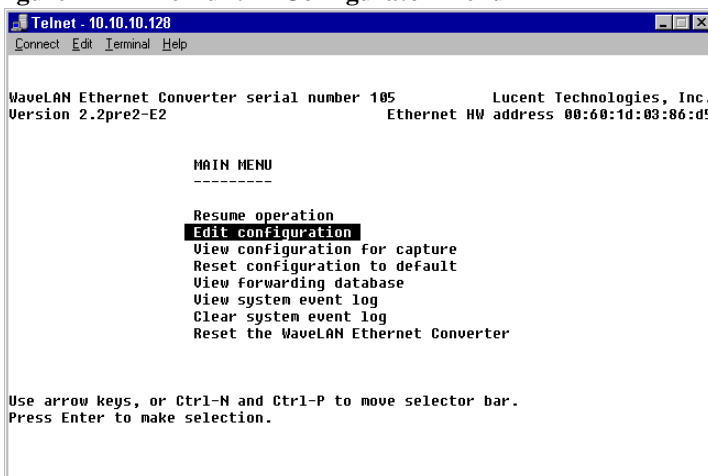
- If the display of your terminal emulation program displays the menu as pictured in Figure 4-2 on page 4-10, turn to "Running the Built-in Configurator" on page 4-10 for further instructions.
- If this menu does not appear:
 1. Check if all cables have been connected properly (remind that this procedure does not work with a 10Base-T cable).
 2. Check the LED status of the WaveLAN/EC-S device to verify that it is powered on and properly connected.
 3. Verify that the parameters listed in step 5 are set correctly, and/or select another COM port for serial communication.

Running the Built-in Configurator

Once you have established a connection to the WaveLAN/EC-S device as described on the preceding pages, your terminal emulation program should automatically display the Main Menu of the Built-in Configurator tool pictured in Figure 4-2.

If the Built-in Configurator tool prompts you to enter a password, enter the correct password (default is “public”).

Figure 4-2 The Built-in Configurator Menu







The Main Menu displays a number of items that allow you to:


- View/modify the configuration of the WaveLAN/EC-S device.
- View or clear the System Event Log.
- Reset the device to restart using its factory-set configuration.

Changes in any of the “Edit” menus will be stored in the WaveLAN/EC-S directly. However the change will not take effect until you power the WaveLAN/EC-S off and back on again, or use the option “Reset the WaveLAN/EC-S” (described on page 4-24).


Navigating the Menus


To select an option use the  and  cursor keys of your keyboard to highlight the item of your choice, and press the  key. Alternatively you can use the following keyboard shortcuts:

Ctrl-P (previous) or  - to move the cursor up.

Ctrl-N (next) or  - to move the cursor down.

Keyboard shortcuts that you can use in other menus are:

Ctrl-B (back) or  - to move the cursor left.

Ctrl-F (forward) or  - to move the cursor right.

Ctrl-A - to move the cursor to the beginning of the line.

Ctrl-E (end) - to move the cursor to the end of the line.

Ctrl-H or  - to delete text left of the cursor.

Ctrl-K - to delete text from the cursor to the end of the line.

Ctrl-L - to force the screen to redraw.

If your computer is running an “X Window System”, you can also use your mouse device to select menu items.

To confirm or cancel your changes in the “Edit” menu:

Ctrl-W (write) - to save changes and return to the previous menu.

Ctrl-X (exit) - to exit without saving changes.



NOTE:

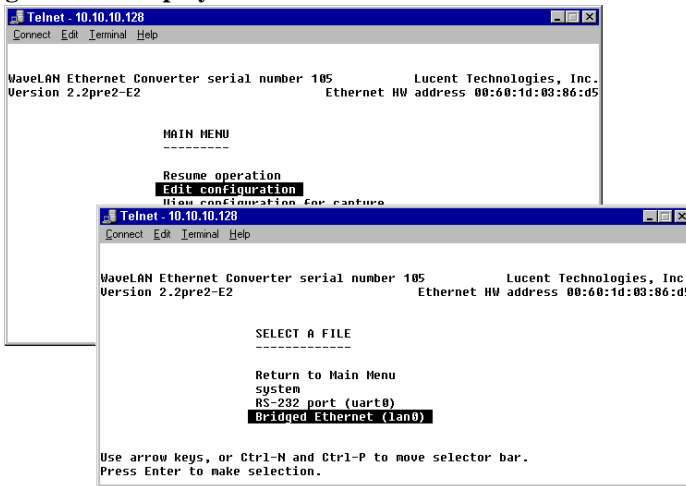
Looking at the configuration menus, you will see entries preceded by a pound or hash sign (#). This sign indicates a comment, which does not influence the settings of the device. A comment can be inserted either by the programmer or person that modified the configuration. Occasionally the # sign is used to disable a listed feature, where clearing the sign will enable it again.

Set the WaveLAN Parameters

The WaveLAN Parameter menu includes two types of parameters:

- Basic WaveLAN Parameters, which should be set for each WaveLAN/EC-S device.
- Advanced WaveLAN Parameters, which only require modification in special situations, or for specific purposes.

Figure 4-3 Display WaveLAN Parameters



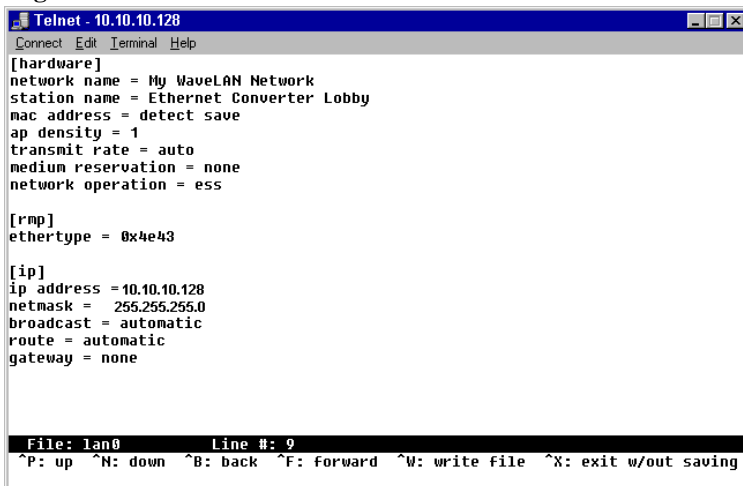
Basic WaveLAN Parameters

The Basic WaveLAN parameters identify the unique identifiers of your WaveLAN/EC-S device and the network to which it should be connected. To view or modify these parameters:

1. Start the built-in configurator as described on the previous pages.
2. From the Main Menu, select the item “Edit configuration” to open the Edit Menu pictured in Figure 4-3 above.

3. Select the option “Bridged Ethernet (lan0)” to open the WaveLAN Parameter window pictured in Figure 4-4.

Figure 4-4 WaveLAN Parameter Menu

A screenshot of a Telnet window titled "Telnet - 10.10.10.128". The window contains a configuration menu for the WaveLAN interface. The menu is organized into sections: [hardware], [rmp], and [ip]. The [hardware] section includes parameters for network name, station name, mac address, ap density, transmit rate, medium reservation, and network operation. The [rmp] section includes the ethertype. The [ip] section includes ip address, netmask, broadcast, route, and gateway. At the bottom of the window, there is a status bar showing "File: lan0" and "Line #: 9", along with a legend for navigation keys: ^P: up, ^N: down, ^B: back, ^F: forward, ^W: write file, ^X: exit w/out saving.

```
Telnet - 10.10.10.128
Connect Edit Terminal Help
[hardware]
network name = My WaveLAN Network
station name = Ethernet Converter Lobby
mac address = detect save
ap density = 1
transmit rate = auto
medium reservation = none
network operation = ess

[rmp]
ethertype = 0x4e43

[ip]
ip address = 10.10.10.128
netmask = 255.255.255.0
broadcast = automatic
route = automatic
gateway = none

File: lan0      Line #: 9
^P: up ^N: down ^B: back ^F: forward ^W: write file ^X: exit w/out saving
```

4. In the section **[hardware]**, you can adjust the WaveLAN interface settings.

To connect your WaveLAN/EC-S device to a WaveLAN IEEE wireless network, the only parameters that you will need to verify/modify are:

- network name
- station name
- network operation

For a description of the other parameters, consult the sections “Advanced WaveLAN Parameters” on page 4-16.

Network Name

When you select to connect your WaveLAN/EC-S device to an infrastructure network, you will also need to identify the name of the WaveLAN IEEE Infrastructure:

- Use the default value “ANY” (all upper-case!) to allow your WaveLAN/EC-S device to connect to the first WavePOINT-II device that it can find in its vicinity.
- Use a unique WaveLAN Network Name value when you would like to connect your device to one specific WaveLAN Network only.

Using a unique WaveLAN Network Name value will avoid that your device might unintentionally attempt to establish a connection with a neighboring network.

Valid values are any string of alphanumeric characters in the range of “a-z”, “A-Z” and “0-9” with a maximum of 32 characters (default value is “ANY”).

The WaveLAN Network Name must be the same for all WaveLAN devices and WavePOINT-II devices in the network. Consult your LAN Administrator for the WaveLAN Network Name value that applies in your network.



NOTE:

In IEEE 802.11 networks that include Lucent Technologies WavePOINT-II access points, the LAN Administrators may have “closed” the network to wireless stations that use the network name “ANY” to avoid unintentional connections as described above.

When your WaveLAN/EC-S device is set to “ibss” network operation mode (see “Network Operation” on page 4-15), the device will ignore this value, and be able to communicate peer-to-peer with any wireless station in its vicinity that is operating in ibss mode too.

Station Name

Use this field to enter a unique descriptive name for the device, such as the user's name or the location of the device within the building.

This name will be used to identify your WaveLAN/EC-S device when running the standard WaveLAN diagnostic tools.

Valid values are any string of alphanumeric characters in the range of "a-z", "A-Z" and "0-9" with a maximum of 32 characters. Default value is "Ethernet Converter".

Network Operation

Use the "Network Operation" field to identify the type of network to which you would like to connect your WaveLAN/EC-S device.

- To connect your device to a network infrastructure that includes WavePOINT-II access points set this value to "ess".¹
- To connect your device to an independent wireless workgroup (i.e. an ad-hoc workgroup that does not include WavePOINT-II access points), set this value to "ibss".²

The value must be entered in lower-case characters.

Once you have finished setting the Basic WaveLAN parameters, press the keys **CTRL-W** on your keyboard to confirm your changes, and return to the Edit Menu.

Next, select one of the other menus that you would like view or modify, or return to the Main Menu and proceed as described in "" on page 4-48.

-
- 1 Extended Service Set, normally referred to as IEEE 802.11 Infrastructure (see "Infrastructure Network" on page 1-7).
 - 2 Independent Basic Service Set, normally referred to as "Ad-hoc Demo" mode (see "Independent Network" on page 1-9).

Advanced WaveLAN Parameters

The Advanced WaveLAN parameters enable you to set a number of additional parameters:

- MAC Address (see below).
- AP Density (see page 4-18).
- Transmit Rate (see page 4-19).
- Medium Reservation (see page 4-21).
- IP Parameters (see page 4-22).

In most networking environments you do not need to modify these parameters, as their default settings will prove most efficient for normal network communications.

MAC Address

The MAC Address value is a standard identification designator that is used to identify the different devices connected to a network. By default, each networking device has a factory-loaded (Universal) MAC Address that can not be changed.

When connecting the WaveLAN/EC-S device to the Ethernet port of a computer terminal, the combination of the devices actually has two MAC Addresses:

- The Universal MAC Address of the Ethernet interface on your computer.
- The Universal MAC Address of the WaveLAN IEEE PC Card inserted into the WaveLAN/EC-S device.

This MAC Address value is printed on the label on the back of your WaveLAN card.

To avoid confusion in network communications, you can configure the WaveLAN/EC-S device to “adopt” one of the two MAC Address values, using one of the parameter options described on the following page.

The Built-in Configurator

Set the WaveLAN Parameters

Consult your LAN Administrator for the MAC Address setting/value that applies in your networking environment.

Value ¹	Description
■ detect	<p>Your WaveLAN/EC-S device will try to retrieve the MAC Address of the computer terminal or peripheral device connected to its Ethernet interface, each time when the WaveLAN/EC-S device and/or the connected device is powered up.</p> <p>Use this option if you plan to swap the WaveLAN/EC-S device frequently between multiple devices that require a network connection</p>
■ detect save	<p>Your WaveLAN/EC-S device will remember a detected MAC Address and start operation using this address immediately after the computer is powered-up, or re-activated from sleep-mode.</p> <p>This is the preferred option if you do not intend to swap the WaveLAN/EC-S device between multiple computers.</p>
■ built-in	<p>Select this value if you wish to set the WaveLAN/EC-S device to use the MAC Address value of the inserted WaveLAN/IEEE PC Card.</p> <p>Use this option only in situations where you intend to connect a single computing device via the Serial RS-232 port without using the 10Base-T port.</p> <p>This option may disrupt regular LAN communication to devices connected via the 10Base-T interface.</p> <p>This setting equals the value "Universal" as displayed in the WaveMANAGER/EC program (see page 3-9).</p>
■ xxxxxxxxxxxx	<p>When you are running a network operating system that requires you to assign dedicated MAC Address values to networking devices, you can also enter a 12-digit hexadecimal value, representing the Local MAC Address.</p>

¹ Alphabetical characters must be entered in lower-case.

AP Density

The Access Point Density parameter controls the roaming sensitivity of your wireless station. This parameter should be set to a value that matches:

- The physical density of the WavePOINT-II access points that have been installed throughout the wireless network area, and
- The setting of this parameter in the configuration of the access points.



CAUTION:

Using non-matching values may seriously affect wireless performance of your wireless station.

Consult your LAN Administrator for the appropriate values that apply to your network, and use one of the 1-digit numerical values listed below to select the correct AP Density setting:

Value	Description
■ 1 (=default)	for Low AP Density.
■ 2	for Medium AP Density.
■ 3	for High AP Density.

Consult the WaveMANAGER IEEE User's Guide for more information about the AP Density parameter.

Transmit Rate

The actual data transmission speed of your WaveLAN device is subject to the following criteria:

- The type of WaveLAN IEEE cards at both ends of the wireless link, being:
 - The card inserted into your WaveLAN/EC-S device, and
 - The card inserted into the WavePOINT-II or, the peer-to-peer partner in an Ad-hoc network.
- The communications quality of the wireless link.
- The user-defined preference for the data Transmit Rate.

The Transmit Rate does not influence the speed at which your WaveLAN card can receive data messages.



NOTE:

Transmissions at high data rates do not cover the same distances as wireless data transmitted at Standard or Low data rates (see Table A-4 on page A-6).

In most networking scenarios, you will see that the factory-set default “Auto” will prove the most efficient. Whenever your computer communicates via the wireless medium the WaveLAN interface will:

- Sense the maximum transmit rate as supported by both communication partners, and switch to that Transmit Rate.
- Determine if the communication quality allows for communicating at this data rate.

Transmissions at lower data speeds are usually more reliable. Therefore when the communications quality drops beneath a certain level, the WaveLAN cards will automatically switch to a lower data rate.

The Built-in Configurator

Set the WaveLAN Parameters

When the communications quality improves again, both WaveLAN cards will gradually increase the data rate again, until they have reached the highest available Transmit Rate as supported by both cards.

Alternatively, you may wish to balance speed versus reliability, by either:

- Limiting the range of the Auto Transmit Rate, or
- Fixing¹ the Transmit Rate to a single speed.

You are advised to do so only in special circumstances, typically upon advice of a WaveLAN IEEE expert or WaveLAN Technical Support representative.

To select a Transmit Rate option, use one of the values listed below:

Type	Value ¹	Description
Auto	■ auto	Auto Select in the range "High-Medium-Standard-Low"
	■ 7	Auto Select in the range "Medium-Standard-Low"
	■ 6	Auto Select in the range "Standard-Low"
Fixed	■ 5	Fix to "High" Speed only.
	■ 4	Fix to "Medium" Speed only.
	■ 2	Fix to "Standard" Speed only.
	■ 1	Fix to "Low" Speed only.

1 Alphabetical characters must be entered in lower-case.



NOTE:

When the WaveLAN PC card inserted into the WaveLAN/EC-S device does *not* support the selected Transmit Rate, the card will automatically use the highest Transmit Rate available.

For example, Standard WaveLAN IEEE PC Cards that do not support the Turbo speeds, will interpret the settings "Medium" or "High" as "Standard Transmit Rate".

Medium Reservation

It is normal behavior for WaveLAN stations to defer transmissions automatically when they sense that another WaveLAN device is using the wireless medium.

The Medium Reservation mechanism enables you to improve wireless performance in network environments where the CSMA/CA protocol would fail due to the “hidden station” problem as described in “Medium Reservation” on page 3-14 in more detail.

When troubleshooting wireless performance setting this parameter to one of the options described below, may help you solve the problem:

- The text string “none” will disable the WaveLAN Medium Reservation (default).
- A numerical value in the range of 1 to 1514.
Entering a numerical value will enable the RTS/CTS mechanism of WaveLAN Medium Reservation based on the length of the data frame. Recommended value is “500”, which equals the setting “Hidden Station” that can be selected in the WaveMANAGER/EC program (see page 3-14).

You can enable Medium Reservation on individual stations, i.e. the setting of this parameter does not have to be the same for all WaveLAN devices in your network.

For more detailed information on these advanced settings, please consult:

- The User’s Guide that was shipped with your WaveLAN IEEE 802.11 PC Card.
- The WaveMANAGER IEEE User’s guide, that is shipped with every WavePOINT-II

Both documents can be downloaded from the WaveLAN website.

IP Parameters

When you wish to use a remote computing system to view/modify the configuration of WaveLAN/EC-S devices in your network, you can assign a unique IP Address to each WaveLAN/EC-S device.

Doing so will enable you to use Telnet or a similar program on the remote (LAN Administrator) station to start the “Built-in Configurator”, even if the WaveLAN/EC-S device would be located beyond a Router or Gateway.¹



NOTE:

The IP Address for the WaveLAN/EC-S device mentioned above is a separate IP Address, that is used only to allow remote management of the WaveLAN/EC-S device only.

For networking systems where (wireless) clients need to use the TCP/IP protocol and a unique IP Address value, this (second) IP Address for the computer terminal should be set in the “Network Properties” for the Ethernet interface of your computing device.

To assign an IP Address to your WaveLAN/EC-S device:

1. Open the WaveLAN Parameters window as described earlier in this chapter.
2. In the section **[ip]** change the default value **10.10.10.128** to a unique IP Address value from the range assigned to your organization.
3. In the field “**netmask**” enter the IP subnet mask for the LAN segment to which you will connect the WaveLAN/EC device.

The subnet mask value you select should be the same for all WaveLAN and WavePOINT-II devices in your network.

1 This requires that the “remote management” station has the TCP/IP protocol installed.



NOTE:

To allow roaming operation for WaveLAN IEEE devices, all WaveLAN devices and WavePOINT-II access points should logically be connected to the same IP subnet. WaveLAN devices can not roam “over routers”.

4. In the Gateway field, enter the IP Address of the Gateway, that will provide access to other LAN segments.
5. Press the keys **CTRL** - **W** on your keyboard to confirm your changes, and return to the Edit Menu.

Next, select one of the other menus that you would like view or modify, or return to the Main Menu and proceed as described in “” on page 4-48.

Saving the Configuration Changes

Once you confirm changes in any of the Built-in Configurator menus, the changes are immediately stored in the FlashROM of the WaveLAN/EC-S device.

To activate the changes, you can either:

- Use the Main Menu options:
 - Resume Operation.
 - Reset the WaveLAN/EC-S.
- Disconnect and reconnect power to the WaveLAN/EC-S device.

Resume Operation

This option allows you to save configuration changes into the WaveLAN/EC-S device, without taking effect immediately.

The changes will be stored in the FlashROM of your WaveLAN/EC-S device, but will only become active when the device is reset, or powered off and on again.

If you would like the device to start operation using the changes immediately, use the option “Reset the WaveLAN/EC-S”.

Reset the WaveLAN/EC-S

Use this option to save changes made in the configuration menus, and load this new configuration into the WaveLAN/EC-S device.

When you select this option, the built-in configuration tool will prompt you to confirm or cancel the reset:

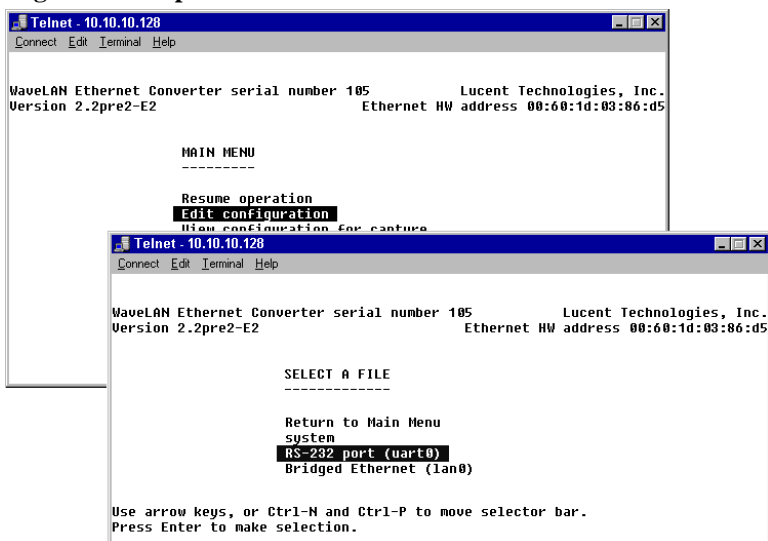
- Select “**Yes**” to reset the device and allow it to restart operation using the new configuration settings.
- Select “**No**” if you do not wish to save any changes that you may have made.

Set the Serial Parameters

The Serial Communication parameters identify the behavior of your WaveLAN/EC-S device when connected to a computer terminal or peripheral device via the RS-232 port. To view/modify these parameters:

1. Start the built-in configurator as described on the first pages of this chapter.
2. From the Main Menu, select the item “Edit configuration” to open the Edit Menu.

Figure 4-5 Open the Serial Parameters Menu



3. From the Edit Menu, select the option “RS-232 port (uart0)” to display the RS-232 Configuration Menu, pictured in Figure 4-6 on page 4-26.

The Built-in Configurator

Set the Serial Parameters

About the Serial Parameters

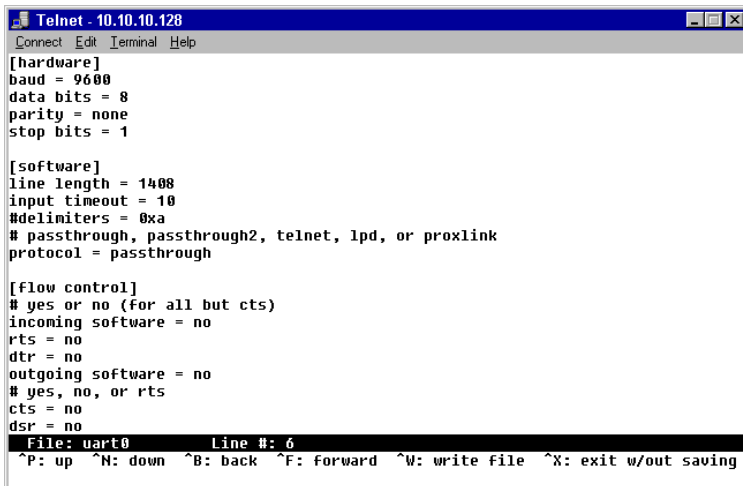
The Serial Parameters menu pictured in Figure 4-6, enables you to tailor the serial communications to:

- Match the settings of applications running on the devices connected to your WaveLAN/EC-S via the RS-232 port.
- Customize the configuration of your WaveLAN/EC-S device to use one of the special protocols described in Chapter 5.

The most important serial parameters are the hardware parameters described on the following page.

You will only need to view/modify the other parameters in case you intend to customize the settings of the WaveLAN/EC-S device to meet specific requirements. For more details about the various items in the Serial Parameters menu, please consult Chapter 5 "Serial Port Specifications".

Figure 4-6 Serial Communication Parameters



```
Telnet - 10.10.10.128
Connect Edit Terminal Help

[hardware]
baud = 9600
data bits = 8
parity = none
stop bits = 1

[software]
line length = 1408
input timeout = 10
#delimiters = 0xa
# passthrough, passthrough2, telnet, lpd, or proxlink
protocol = passthrough

[flow control]
# yes or no (for all but cts)
incoming software = no
rts = no
dtr = no
outgoing software = no
# yes, no, or rts
cts = no
dsr = no

File: uart0      Line #: 6
^P: up ^N: down ^B: back ^F: forward ^W: write file ^X: exit w/out saving
```

Hardware Parameters

To allow proper communication between your WaveLAN/EC-S and its host device connected via the RS-232 port, you must ensure that the data transfer parameters in the WaveLAN/EC-S are set to match the values of (applications running on) the host device.

Parameter Name	Valid Values
----------------	--------------

- | | |
|-------------|---|
| ■ Baud Rate | 300, 1200, 2400, 9600,
19200, 38400, 57600, 115200, 230400

Alternatively you can use a custom value in the range of 112.5 and 115.200, but you should only do so in case the host device does not support one of the standard rates listed above.

Default value = 9600 |
| ■ Data bits | 7, 8

This parameter determines the number of bits in a UART character frame (default value = 8). |
| ■ Parity | odd, even, none.

This parameter sets the parity in the UART character frame which will be used to verify correct data transmission (default value = none). |
| ■ Stop bits | 1, 1.5, 2

This parameter determines the number of bits that will be used to represent the end of a character bit in the UART frame (default= 1). |
-

Software Parameters

When forwarding data between the Serial RS-232 port and the WaveLAN radio, your WaveLAN/EC-S actually translates “stream-based” data into “packet-based” data.

- **Stream-based** data for the Serial UART interface is transmitted and received one byte at a time. This type of communication does not include a mechanism to separate one

The Built-in Configurator

Set the Serial Parameters

chunk of data from another. What the data means and/or how the data is to be delimited is known only to the devices generating and exchanging the data.

- **Packet-based** data systems, such as the WaveLAN radio, split data into separate chunks. The transmitting device “wraps” the data into specific frames that include a destination address and information about related frames.

When the WaveLAN/EC-S receives data via the WaveLAN radio addressed to the device connected to its serial port, it will:

- Remove the wrapper information, and
- Forward the “true” data to the serial port as fast as it can.

When the WaveLAN/EC-S receives data via the serial port (which must be forwarded via the WaveLAN radio, it will need to:

- Split the serial data stream into multiple chunks.
- Embed these chunks into separate frames
- Add the destination address to these frames.

For most networking environments however, you are advised to leave these settings to their factory-set defaults, as displayed in Figure 4-6 on page 4-26.

In special circumstances, you can use the section [software] to customize the translation protocol of your WaveLAN/EC-S device.

The Built-in Configurator

Set the Serial Parameters

Parameter Name	Valid Values
■ line length	<p>Any digit in the range of 1 through 1408 (default =1408)</p> <p>This parameter determines the maximum number¹ of characters that the WaveLAN/EC-S should wait before transmitting the data over the radio.</p> <p>To avoid losing data packets, the number you select should preferably not be too small.</p>
■ input timeout	<p>Any digit in the range of 1 through 65536 (default =10).</p> <p>This parameter controls the time period the WaveLAN/EC-S device should wait and listen for more data, once a small data stream was received on the RS-232 port.</p> <p>The actual time period is related to the Baud rate selected in the section “Hardware Parameters” on page 4-27.</p> <p>For example, if you set the “Baud Rate” is set to 9600, and this “input timeout” to 10, this means the WaveLAN/EC-S device can receive up to 960 characters per second.</p> <p>To allow proper communication, the WaveLAN/EC-S will wait 1/96th of a second to determine if the host device wishes to send more data:</p> <ul style="list-style-type: none">■ If another character is received before the time-out expires, it will restart the timer to wait for more data.■ If the timer expires, the data is considered to be complete and will be transmitted immediately.
■ delimiters	<p>One of the Hexadecimal values listed below:</p> <ul style="list-style-type: none">■ 0xa (=default)■ 0x8 (rxbd / txbd count)■ 0xC (buffer count)

The Built-in Configurator

Set the Serial Parameters

The delimiters are special characters that identify the end of a data transmission. Once the WaveLAN/EC-S receives any of the characters listed in for this parameter, it will immediately start transmission.

Applications that use serial communications, often “reserve” a character, similar to a “newline” command or hit on the Enter key in human-interface applications.

As an alternative or complement tot the proposed three values, it will greatly improve communication efficiency, if you could identify the type of delimiters used by your host devices and their applications, and enter the characters in this list (maximum is four characters).

Delimiters can be specified as decimal or hexadecimal numbers, separated by a space.

These three values are used mainly to control the buffer size internal to the software. Changing of these values is not recommended. The rxbd and txbd count default to 8 and buffer count defaults to 12.

-
- protocol Use this parameter to select the type of protocol that the WaveLAN/EC-S should use for transferring data between the WaveLAN radio and the RS-232 interface².
 - passthrough (=default).
 - passthrough2.
 - telnet.
 - lpd.

-
- 1 Maximum number of characters is regardless of the content of the data.
 - 2 For a description of these protocols, please consult Chapter 5.

If you are using the WaveLAN/EC-S device in specific environments, you may wish to select an alternative protocol, instead of the default value “passthrough”. If you decide do so, you will also need to verify/modify the corresponding protocol settings, which are described on

Flow Control

The WaveLAN/EC-S supports six different flow controls that you can use to customize the incoming and outgoing data flows between your WaveLAN/EC-S device and the host device connected via the Serial RS-232 port.

You can use the [flow control] menu to select which flow controls you would like the WaveLAN/EC-S to recognize or ignore.

- To allow the WaveLAN/EC-S to recognize a specific flow control signal, change the parameter value to “yes”.
- To instruct the WaveLAN/EC-S to ignore a specific flow control signal, change the parameter value to “no” (=default).

The host device can use one or more of the following incoming flow control signals to instruct the WaveLAN/EC-S when to start/stop sending data:

- incoming software¹.
- rts (request to send).
- dtr (data terminal ready).

You can set the WaveLAN/EC-S device to use one or more of the following outgoing flow control signals whenever it wishes to instruct the host device to start and stop sending data:

- outgoing software.
- cts (clear to send).
- dsr (data set ready).

Your WaveLAN/EC-S will typically send these signals to the host computer whenever its buffers are full or empty again.

1 The incoming/outgoing software are also referred to as XON/XOFF.



NOTE:

Most devices today are designed to allow RTS flow control in the computer's direction. However if the host device that will be connected to your WaveLAN/EC-S is rather old, you may need to verify if this device does support bi-directional RTS/CTS control.

If it does not support bi-directional RTS/CTS control, the device will probably expect the modem to send data at any time. However if the WaveLAN/EC-S device would not do so (for example waiting for a CTS) subsequent data frames might get lost.

To emulate the "old-style" RTS/CTS behavior you may need to use configure the flow control slightly different:

- Set the RTS parameter to "no".
- Set the CTS parameter to "rts".

Doing so, the WaveLAN/EC-S will:

- Always forward data received at its WaveLAN interface directly to the host device.
- Check the Serial RS-232 port for incoming "Request To Send" signals and respond with "Clear To Send" whenever it is ready to receive data.

I/O Control

This section defines control over digital inputs and outputs of the WaveLAN/EC-S, separately from the data lines described in the previous section "Flow Control" on page 4-31.

Using the controls in this section enables you to send digital data from one WaveLAN/EC-S to another without interpretation by the WaveLAN/EC-S device itself. Like the flow control signals

The Built-in Configurator

Set the Serial Parameters

described on the previous pages, the i/o control signals distinguish incoming and outgoing signals.

Parameter	Description
■ rts	The rts and dtr signals control the incoming data flow.
■ dtr	Valid values are: <ul style="list-style-type: none">■ none (=default)■ passthrough If set to “none” the WaveLAN/EC-S will ignore these digital signal inputs. When set to “passthrough”, the status of these lines will be forwarded to the WaveLAN/EC-S unit as indicated in the “socket” parameter (described below).
■ cts	The cts and dsr are output lines. Valid values are:
■ dsr	<ul style="list-style-type: none">■ assert (=default)■ negate■ sleep■ passthrough When set to “assert” or “negate”, they will output a continuous digital value. <ul style="list-style-type: none">■ “negate” outputs a logic 1, or “mark”, which is electrically negative. This is also the state seen on an RS-232 connector when the cable is unplugged.■ “assert” outputs a logic 0, or “space”, which is electrically positive. When set to “passthrough”, CTS will output the value that the remote WaveLAN/EC-S is receiving on its RTS line, and DSR will output the remote DTR value. The source of these remote signals depends on the “socket” setting of the remote WaveLAN/EC-S.

The Built-in Configurator

Set the Serial Parameters

Parameter	Description
■ resend interval	<p>Any numerical number. Default value = "0".</p> <p>In "normal" situations, digital input lines are transmitted whenever they change, so do not need a resend.</p> <p>In special situations, for example where a remote unit is switched off and back-on again, you may wish to re-inform the device about the digital status of the WaveLAN/EC-S device.</p> <p>This parameter enables you to have the WaveLAN/EC-S device retransmit digital input signals at regular intervals. The numerical value corresponds with the number of seconds between the various retransmissions.</p>
■ socket	<p>Specifies a network connection used to send RTS and DTR input states to a remote WaveLAN/EC-S. The value of this setting must be the name of a section that describes the network connection to use. The connection must use RMP protocol.</p>

Tailor the Selected Protocol

The paragraphs listed below refer to the selections you made for the parameter "protocol" in the section "Software Parameters" on page 4-27.

Passthrough

If you selected the passthrough protocol in the section Software Parameters, you can only use one socket for network communication (rmpbind). The value entered in this section refers to another section in the RS-232 menu, which contains the values necessary to "bind a socket" (see "rmpbind" on page 4-38). Scroll down to the RS-232 menu to find this section.

Passthrough2

If you selected the passthrough2 protocol in the section “Software Parameters” on page 4-27, you can use this section to set the operating parameters for the passthrough2 protocol.

With passthrough2, there are two sockets:

- **listen** - related to incoming data
- **connect** - related to outgoing data.



NOTE:

Both of these sockets require the TCP/IP protocol.

As in the socket key for the [passthrough] section above, the values for the passthrough2 key only identify the name of other sections in the RS-232 menu, which define the network connection.

- For the parameter **listen** the default value is the section **tcpbind1a** (see page 4-39).
- For the parameter **connect** the default value is the section **tcpbind1b** (see page 4-41).

Telnet

If you selected the Telnet protocol in the section “Software Parameters” on page 4-27, you can use this section to customize the Telnet protocol parameters.

Parameter	Description
■ connect	<p>This entry dictates what kind of prompt is seen on the serial port output. Two choices are available:</p> <ul style="list-style-type: none">■ command prompt - (default) will give a prompt “telnet>” much like Telnet software on a UNIX system. From this prompt, you can use the “open” command to connect to a particular machine. For example, typing “open 128.1.1.1” will open a Telnet session to the machine with the IP address 128.1.1.1.■ wait for keystroke - allows for a configuration that only connects to one machine, requiring only a keypress to initiate the connection.
■ wait data 1	<p>This entry states what text to use as a prompt in wait for keystroke mode. The value is specified as a combination of a string and ASCII values.</p> <p>The default value is “Press any key to connect to host...”. (The double-quote marks are a part of this value, unlike in previous examples.)</p> <p>Binary data can be added by writing data as hex or decimal, outside of quote marks. For example, the ANSI clear-screen command string (escape, left-bracket, H, escape, left-bracket, J) can be added to the front of this string: 0x1b “[H” 0x1b “[J “Press any key to connect to host...”.</p>
■ wait data 2	<p>This entry states what text to display after the keystroke is received. The format of the data is the same as in “wait data 1”. The default is “0xd 0xa” (without the quotes), which will move the cursor to the next line.</p>

The Built-in Configurator

Set the Serial Parameters

Parameter	Description
■ ip address	When in wait for keystroke mode, this specifies the IP address of the machine to automatically connect to. 128.1.1.1 is the default.
■ tcp port	When in wait for keystroke mode, this specifies the TCP port number to connect to automatically. The default is 23, which is standard port for Telnet-type applications.
■ reopen after shutdown	This parameter identifies whether the command prompt should re-appear once a connection has been closed. <ul style="list-style-type: none">■ If Yes, enter the value "on" (default).■ If No, enter the value "off".

Network Bindings

The last part of the RS-232 menu includes 5 pre-configured bindings that may serve as an example to customize the serial communications of your WaveLAN/EC-S device.

When the protocol is set to "passthrough", the WaveLAN/EC-S will use one socket only, which by default will use the "rpbinding" binding.

When the selected protocol is "passthrough2" the WaveLAN/EC-S requires two sockets ("**listen**" and "**connect**", which are typically bound to the network bindings identified in the passthrough section of the RS-232 menu (see page 4-35).

rmpbind

This is the standard binding for the passthrough protocol (see page 4-34), but can also be used for the i/o control socket setting (see “I/O Control” on page 4-32).

Parameter	Description
■ protocol	This example uses the RMP protocol, so the value of this entry is “rmp”. RMP binding options are described below. If you wish to use the TCP/IP protocol, skip to the next example.
■ source address	This is the value that this WaveLAN/EC-S will use to identify its serial port when sending serial data to and receiving serial data from other WaveLAN/EC-S units (in short, this is its “port address”). The default value is “ default ” which will cause the WaveLAN/EC-S to use its serial number as the address.
■ source address filter	Setting this value will tell the WaveLAN/EC-S to only accept data coming from the address specified. For example, if this entry is set to “1234”, only data originating from a WaveLAN/EC-S with the port address of 1234 will be accepted; all other data will be ignored. The default value is “ none ”.
■ destination address	This value tells the WaveLAN/EC-S what port address to send data received on the serial port to. It can be the serial port address of another WaveLAN/EC-S device, or the “ broadcast ” or “ dynamic ” address. Broadcast means to send the data to all WaveLAN/EC-S units. Dynamic means to send the data to the WaveLAN/EC-S it last received data from. Dynamic has the effect of causing two WaveLAN/EC-S units that are by themselves to communicate to each other. The default value is “ dynamic ”.

The Built-in Configurator

Set the Serial Parameters

- **transmit try count** For non-broadcast data, this specifies the number of attempts that the WaveLAN/EC-S should make in transmitting each piece of data to a remote WaveLAN/EC-S. A transmission may fail if the destination WaveLAN/EC-S is out of range or turned off; when this happens, the data would be lost if additional attempts are not made. This value gives the user the ability to tell the WaveLAN/EC-S how diligently to attempt transmission. The maximum value is 65000. The default value is **"infinite"**.
- **transmit retry interval** When attempting additional transmit attempts (specified with **"transmit try count"**, above), it can be useful to additionally specify how long to wait between attempts. This setting gives that ability. The value is specified in 1/100ths of a second, so that 100 means 1 second. The maximum value is 65000. The default value is 100.

tcpbind1a

This is the standard binding for the "listen" socket as used by the passthrough2 protocol (see page 4-35). It can also be used in combination with the standard passthrough protocol, as an alternative to the rmpbind described above.

Parameter	Description
■ protocol	These examples use the TCP protocol, so the value of this entry is "tcp" .
■ local tcp port	If the type is listen, this will specify the TCP port number that the WaveLAN/EC-S will wait for connections on (default=4000).
■ reopen after shutdown	If the type is listen, the value "on" states whether a second connection will be accepted after the first connection terminates. If the type is connect, this states whether another connection attempt will be made if the first connection is closed by the remote computer. To disable enter the value "off" .

The Built-in Configurator

Set the Serial Parameters

- socket connect data
The value in this field, is an optional ASCII text message that will be displayed upon a successful attempt to establish a connection.
For example, the default value is **“Please Login:” 0xd 0xa**
- serial connect data
The value in this field, is an optional ASCII text message that will be displayed upon a successful attempt to establish a connection via the RS-232 serial interface.
For example, the default value is **“Received Listener Connection:” 0xd 0xa**
- serial disconnect data
The value in this field, is an optional ASCII text message that will be displayed upon closing a serial connection.
For example, the default value is **“Disconnected from listener” 0xd 0xa**
The message data is appended to any data already in progress. The closing of the socket will not cancel UART transmission of any data already received over the socket.
- serial fail data
The value in this field, is an optional ASCII text message that will be displayed whenever a socket connection fails, for example when the remote machine was unavailable or refused the connection. However, it is valid to use it to catch listen problems should any software problem occur.
For example, the default value is **“Accept Failed” 0xd 0xa**



NOTE:

By default the last three parameters of this section have been “disabled” using the # sign.

- If you would like to use the ASCII strings, you will need to clear the # sign at the beginning of the parameter line.

- If you wish to modify the contents of the ASCII strings please note that the value must be entered between double-quote marks!

tcpbind1b

This is the standard binding for the “connect” socket as used by the passthrough2 protocol (see page 4-35). It can also be used in combination with the standard passthrough protocol, as an alternative to the bindings **rmpbind** or **tcpbind1a** described above.

Parameter	Description
■ protocol	These examples use the TCP protocol, so the value of this entry is “ tcp ”.
■ ip address	This parameter is only used to enter the IP Address of a remote WaveLAN/EC-S device in one of the following situations: <ul style="list-style-type: none">■ You are using the standard passthrough protocol to setup a point-to-point replacement for a serial cable as described in page 4-42.■ You are using the passthrough2 protocol and wish to identify the IP Address for the “connect” socket of tcpbind1a.
■ remote tcp port	When using the passthrough2 protocol, this parameter identifies the TCP port number of the “connect” socket. This value should match the value for “local tcp port” of the remote link partner.
■ reopen after shutdown	Same as for tcpbind1a (see page 4-39).
■ socket connect data	Same as for tcpbind1a (see page 4-39). The default value is “ Hello! ” 0xd 0xa .
■ serial connect data	Same as for tcpbind1a (see page 4-39). Default value is “ Connected to socket. ” 0xd 0xa .
■ serial disconnect data	Same as for tcpbind1a (see page 4-39). Default value is “ Disconnected from socket. ” 0xd 0xa .
■ serial fail data	Same as for tcpbind1a (see page 4-39). Default value is “ Connection failed. ” 0xd 0xa .

A Sample Scenario

Special Station to Station Topologies

Most of the examples and configurations described in this User's Guide, refer to standard infrastructure network scenarios, where wireless computer terminals connect to the network via WavePOINT-II access points.

When you would like to setup two WaveLAN/EC-S device as a replacement to serial cable connections, you will need to configure the WaveLAN/EC-S device in slightly different way.

- The WaveLAN network operation mode of both devices should be configured to an "Independent Basic Service Set" (ibss)¹.
- Assign a unique IP Address to each station (see page 4-22).
- Set the TCP/IP Binding parameter of each WaveLAN/EC-S device to communicate exclusively with the IP Address of the corresponding Link Partner.

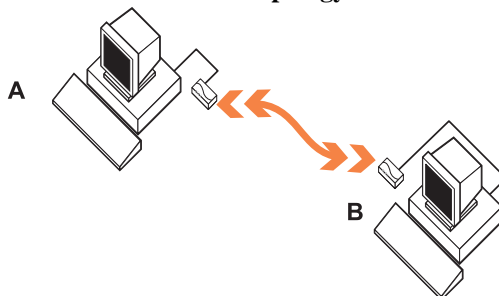
For example looking at Figure 4-7, the parameter setting for both stations A & B would look as follows:

Edit Menu	Parameter Name	Station A	Station B
Bridged Ethernet (WaveLAN)	■ network operation	ibss	ibss
	■ IP Address	10.10.10.128	10.10.10.129
RS-232 port	tcpbind1b	10.10.10.129	10.10.10.128

The IP Address values can of course be replaced with any valid IP Address value from the range assigned to your organization.

1 ibss is usually referred to as "Ad-hoc Demo" mode.

Figure 4-7 Station-to-Station Topology



To connect two WaveLAN/EC-S devices via a Station-to-Station link, proceed as described below:

1. Connect both WaveLAN/EC-S to their computer terminal using the serial cable provided.
2. Start the built-in configurator as described on the first pages of this chapter.
3. From the Main Menu, select the item “Edit configuration” to open the Edit Menu pictured in Figure 4-5 on page 4-25.
4. From the Edit Menu, select the item “Bridged Ethernet (lan0).
 - a. In the section **[hardware]** set the Basic WaveLAN parameter “**network operation**” to “**ibss**”
 - b. (Optional) enter a Station Name for this device. Looking at Figure 4-7 you could enter name “Station A”.
 - c. In the section **[ip]** enter a unique IP Address for this device. Use either:
 - A unique IP Address from the range assigned to your organization, or
 - The default value 10.10.10.128.
 - d. (Optional) If required, change the subnet mask to a value that matches your IP Addressing scheme.

**NOTE:**

Write down the IP Address value, as you will need it later on, when configuring the link partner.

5. Press **CTRL-W** on your keyboard to confirm your changes, and return to the Edit Menu.

6. From the Edit Menu, select the item "RS-232 port (uart0).

- a. Scroll down this menu to display the following section:

[tcpbind1b]

protocol = tcp

ip address = 10.10.10.129

Looking at the highlighted status bar at the bottom of your screen, you can find this section at Line # 85.

The **[tcpbind1b]** section enables you to enter the unique IP Address value of the remote Link Partner.

- b. Change the IP Address value to the value that you assigned/will assign to the remote link partner. You can use either:
 - A unique IP Address from the range assigned to your organization, or
 - The default value 10.10.10.129.
7. (Optional) If required, change the subnet mask to a value that matches your IP Addressing scheme.
8. Press **CTRL-W** to confirm the changes, and return to the "Edit Menu".
9. Proceed as described in "" on page 4-48 to save the configuration to your WaveLAN/EC-S device.
10. Repeat steps 1 through 9 to configure the link partner.
11. Power up both devices and your ready to go.

Display Device Information

To display detailed information about the configuration and/or hardware status of your WaveLAN/EC-S device, you can select one of the following options from the Main Menu:

- View Configuration For Capture.
- View System Event Log.

You can use the WaveLAN/EC-S Device Information to:

- Compare the versions loaded into the WaveLAN/EC-S device with software available on the WaveLAN website to determine if you need to update any of the items listed on this screen.
- Provide more details about your installed product(s) when contacting WaveLAN Technical Support.
- Check if the device lists any error messages, that you can use as a reference to finding the right solution when consulting Appendix B "Troubleshooting".

View Configuration For Capture

This option enables you to display all configuration settings in one ASCII text window, without changing the parameters. If your terminal emulation software supports a capture mode, you could use this option to:

- Save the captured parameters to an ASCII text file, allowing you to build a configuration record of your WaveLAN/EC-S devices.
- Print the captured data to a local printer.

In case you are troubleshooting problems operating the WaveLAN/EC-S device, you can send the file or print-out to your WaveLAN Technical Support representative.

View System Event Log

You can use this option to display the error log in situations where:

- You wish to verify *if* errors have occurred, or
- A red-colored Power LED of your WaveLAN/EC-S indicates the occurrence of an error, that may require detailed investigation (see also “Error Messages” on page B-7).

Clear System Event Log

Use this option to clear all messages from the WaveLAN/EC-S event log.

Password Protect the Configuration

The configuration of the WaveLAN/EC-S is password protected to prevent unauthorized changes to the parameter settings. The default password for “out-of-the-box” WaveLAN/EC-S devices is “public”.



NOTE:

You are advised to change this default value, to avoid tampering with the configuration settings of your WaveLAN/EC-S device. Especially when you wish to allow remote configuration of the WaveLAN/EC-S device via TCP/IP, changing the default password is “good practice” for managing your network.

To change the default password proceed as follows:

1. Start the built-in configurator as described on the first pages of this Chapter.
2. From the Main Menu, select the item “Edit configuration” to open the Edit Menu pictured in Figure 4-3 on page 4-12.
3. From the Edit Menu, select the item “system”.
4. Select one of the following password options:
 - To enable password protection clear the # sign in front of the password value, and change the default value “**public**” into a text string of maximum 12 characters in the range of “0-9” and “a-z” (lower-case characters only).
 - To disable password protection, insert the # sign in front of the password value.
5. Press the keys **CTRL-W** on your keyboard to confirm your changes, and return to the Edit Menu.

Next, select one of the other menus that you would like view or modify, or return to the Main Menu and proceed as described in “” on page 4-48.

Secure Networks

An advantage of WaveLAN networking products is that you can secure network environments and data communications from unauthorized access, by implementing one or more of the following security measures:

- Wired Equivalency Privacy (WEP) data encryption.
- Closing WaveLAN networks to stations that have been configured with a non-matching WaveLAN Network Names or the value "ANY".
- Static MAC Address filtering.



NOTE:

WEP will be available with future releases. Consult the WaveLAN website for the latest information about WEP.

For more information about these security measures, please consult the WaveMANAGER IEEE User's Guide that is shipped with each WavePOINT-II access point.

Serial Port Specifications

5

Contents

Introduction	5-1
Protocol Specifications	5-1
Passthrough	5-2
Passthrough2	5-3
Telnet	5-3
LPD	5-4
Serial Topologies	5-6
Station to Station Topology	5-6
Broadcast Topology	5-7

Serial Port Specifications

5

Introduction

This chapter describes the following RS-232 serial port specifications of the WaveLAN/EC-S in more detail:

- “Protocol Specifications” on page 5-1.
- “Serial Topologies” on page 5-6.

Protocol Specifications

The WaveLAN/EC-S device uses the RS-232 serial port standard for communicating between a DTE (Data Terminal Equipment) device and a DCE (Data Communications Equipment) device, where the WaveLAN/EC-S device conforms to the DCE side of the connection and the user's device or terminal must conform to the DTE side.

The serial interface of the WaveLAN/EC-S can interpret and process serial data in one of four ways:

- “Passthrough” on page 5-2.
- “Passthrough2” on page 5-3.
- “Telnet” on page 5-3
- “LPD” on page 5-4

The format of the information presented to the device's serial port is different, depending on which of these modes is selected.

Passthrough

You can use the Passthrough protocol to transmit a stream of serial data from the serial (RS-232) serial port over the (radio) network to one or more wireless receiving stations.

The data us passed using either:

- TCP/IP protocol
- RMP (Lucent proprietary protocol)

With this protocol, data is sent transparently to the receiving device, as though the devices were directly connected via serial cables. The data is not filtered or interpreted by either of the WaveLAN/EC-S devices.

The Passthrough protocol should be used:

- For applications where an RS-232 cable is to be replaced by a pair of WaveLAN/EC-S devices without changing the network protocols used by the terminals or application, or
- When WaveLAN/EC-S devices are being used to form a client/server or broadcast topology.

This protocol is most useful if the WaveLAN/EC-S is to be used as a drop-in replacement for serial cable; i.e. the device which the WaveLAN/EC-S is connected does not know that its data is being transmitted by radio.

The Passthrough protocol has several configuration options, some designed to optimize data throughput. These options tell the WaveLAN/EC-S when to transmit data, to reduce communication overhead when transmitting the data over the radio.

For example, sending one hundred (100) bytes of data takes roughly half the amount of time as it takes to send one thousand (1000) bytes. Through configuration, the user can help the WaveLAN/EC-S decide how to minimize this overhead.

Passthrough2

The Passthrough2 protocol, like the Passthrough protocol, makes no changes to the serial data stream as it is transmitted or received. It is only available using the TCP/IP network protocol¹.

It differs in the fact that it creates two independent network connections for transmitted and received data, allowing transmitted data to be sent to a different location than received data originates from.

The standard Passthrough protocol is based upon a single bi-directional TCP/IP connection to a remote computer (or another WaveLAN/EC-S). Since there is only one connection, data must travel in both directions on it.

The Passthrough2 protocol allows you to set up a link that is based on two separate connections; a send link and a receive link.

Telnet

Telnet is a protocol that uses the TCP/IP networking protocol. Originally designed for UNIX-based operating systems, it allows a person on one computer to connect to a remote computer to:

- run applications, or
- control a remote computer.

The WaveLAN/EC-S provides a “telnet prompt” much like that used on UNIX systems. From this prompt, a user can open connections to any computer that is connected to the same

1 The Passthrough2 protocol is not available for the RMP protocol because RMP does not restrict the source and destination locations of data, like the TCP/IP protocol.

Serial Port Specifications

Introduction

network as the WaveLAN/EC-S and is running Telnet daemon software.

At this time, there are only two commands that the telnet prompt recognizes; **help** and **open**.

help - provides a short on-screen instruction about the commands.

open - takes one mandatory argument, which is the IP address of the machine to connect to. It also takes one optional argument; the TCP port number to open the connection on. If the port number is omitted, the default value of 23 is used.

There are some configuration options for Telnet, such as forcing a destination IP address and offering a connect prompt. These features are designed for extending dumb terminals into Internet terminals while setting restrictions on the destination of the connection.

LPD

LPD is a printer driver protocol used mainly by UNIX based systems. This is uni-directional protocol: data received on the network connection will be forwarded via the serial port. Data received on the serial port with this protocol is ignored.

A WaveLAN/EC-S configured to use the LPD protocol can buffer up to approximately 32K of data from the network. The document is printed while it is being received on the network.

To use this protocol, you must have a UNIX or Windows NT system (or other operating system that supports LPD) with a printer configuration set up to use the WaveLAN/EC-S as a remote host.

Serial Port Specifications

Introduction

Configuration of the printer varies from one brand to the next; it is recommended that you consult documentation that came with your system to properly configure the printer and WaveLAN/EC-S for serial settings and flow control.

Your operating system must put the data to be printed into a format that the printer will recognize. The WaveLAN/EC-S does not perform data translation or formatting.

There is no configuration needed for LPD on the WaveLAN/EC-S. When configuring your operating system, use the hostname or IP address of the WaveLAN/EC-S as the remote printer host (UNIX systems should be set up using the WaveLAN/EC-S as a remote LPD capable workstation), and any name for the printer.

Serial Topologies

Station to Station Topology

When a WaveLAN/EC-S device is configured for Station-to-Station communication, the device that receives a message on its serial port will translate the serial message into a network packet.



NOTE:

With a WaveLAN/EC-S device, a network packet can be generated on any computer that has TCP/IP support and is connected to a wired network. The WaveLAN/EC-S will process the packet as though it were a serial data packet.

To this packet the device adds its own address and the destination address of the remote device (as stored in the configuration or passed along in the serial message), as well as other critical information.

Next, it contends for time on the airwaves, then transmits the packet over the radio. Finally, the device waits for an acknowledgment from the destination device that the packet was received without error. If it does not receive an acknowledgment, and it has not exceeded its maximum retry count, the device will retransmit the packet. This acknowledge and retry mechanism provides for error-free communication.

Any device that receives packets over its radio will filter them based on the destination address. Only the device with the correct address will save the packet and send an acknowledgment back to the source device.

Upon receiving a packet the device also extracts the original message out of the packet and sends it out its serial port. If there was an error in the packet, the device will ignore it causing the

sender to retry. This guarantees the receiving device only receives error-free transmissions.

Broadcast Topology

Unlike with Station-to-Station configurations, after the WaveLAN/EC-S WaveLAN/EC-Sends a packet, it does not wait for an acknowledgment. Broadcast mode is an unacknowledged service for two reasons:

1. The broadcasting device doesn't know who is going to be receiving the data, and
2. Even if it did know the receiver, it can be extremely inefficient to have every device acknowledge a message once the packet is received.

Since broadcasts are unacknowledged, a device cannot retry transmissions while configured for this topology.

Any WaveLAN/EC-S device that correctly receives the packet compares the packet's broadcast address to the device's own broadcast address. If the two addresses match, the device will extract the message and send it out its serial port. This guarantees that the user devices only receive error-free transmissions.



NOTE:

Since broadcasting is an unacknowledged service, if a message was lost or damaged, the message will not get through. Therefore, the user devices should contain software to perform message retransmissions should this be necessary. In most cases, devices that use wired networks already contain this software.

Serial Port Specifications

Serial Topologies

The TCP/IP network protocol is not capable of broadcast operation, due to the connection-based design of the protocol. If broadcast operation is desired, you must use the RMP protocol.

Technical Specifications



Hardware Characteristics

Physical Specifications

Dimensions	14.1 x 9.2 x 3.0 cm (5.6 x 3.6 x 1.2 in)	
Weight	200 g (10 oz)	
Temperature & Humidity	0° to 40°C	
Operation	0° to 40°C ¹	
Transit	-20° to 55°C ²	
Storage	-10° to 55°C	
Humidity	20% to 90% (non-condensing)	
Safety Regulations	USA:	FCC 47CFR Part 15, UL1950
	Europe:	■ EMC Directive 89/336/EEC ■ LVD 73/23/EEC
	Japan:	VCCI

- 1 The maximum ambient temperature of the WaveLAN/IEEE PC Card has been specified at 55°C. To prevent overheating the PC Card when inserted into the WaveLAN/EC-S device, the ambient temperature of the WaveLAN/EC-S device may not exceed the 40°C limit.
- 2 Although the WaveLAN/EC-S device may still operate in the range of -20° to 55°C, operation outside the range of 0° to 40°C may no longer be according to the WaveLAN/IEEE specifications.

For specifications and regulatory information related to the WaveLAN radio, please consult the User's Guide that was shipped with your WaveLAN IEEE PC Card(s).

Technical Specifications

Hardware Characteristics

Power Characteristics

Input voltage	5V DC	
Current consumption	Standby	30 mA
	Receive	350 mA
	Transmit	400 mA
Power Connector	2.5 mm DC power jack	

Ethernet Interface

Interface	10Base-T (Unshielded Twisted Pair)
Data rate	10 Mbit/s
Connector	Female RJ-45 (10Base-T)
Pinout configuration	The pin layout of the RJ-45 connector is designed as a “cross-connect” interface, allowing direct connection to a computer or peripheral device. This type of connector does not allow for direct connection to a hub or patch panel, unless a special cross-connect cable is applied.

Serial Interface

Interface	RS-232-C 9-pin DB9 connector
Data rate	112.5 to 230,400 baud
Data format	■ 7 or 8 data bits ■ 1, 1.5, or 2 stop bits ■ even, odd, or no parity
Control Lines	TxD, RxD, RTS, CTS, DTS, DSR @ RS-232 levels
Connector	Female DB-9

Serial Pinout Configuration

Pinout configuration ¹	Pin	Signal	Description
	1	Configure	System Signal
	2	TxD	Transmitted Data
	3	RxD	Received Data
	4	DTR	Data Terminal Ready
	5	GND	Signal Ground (electrical signal)
	6	DSR	Data Set Ready
	7	RTS	Request To Send
	8	CTS	Clear To Send
	9	Reset	System Signal

- 1 The pinout configuration for the serial interface is wired to the DCE (Data Communication Equipment) specification, except pins 1 and 9.

The included serial cable is a standard 9-pin straight-through cable from computer or terminal to the WaveLAN/EC-S device:

- If for example the WaveLAN/EC-S device transmits data on pin 2 the connected computer or terminal device will receive it on pin 2 as well
- Similarly, when the computer or terminal device needs to transmit a signal, it should do so via pin 3, which corresponds to the receive data pin 3 on the WaveLAN/EC-S device.

The WaveLAN/EC-S is configured to ultimately support two sets of handshake lines for flow control:

- RTS/CTS (Request to Send/Clear to Send), and
- DTR/DSR (Data Terminal Ready/Data Set Ready).



NOTE:

The RTS/CTS signal here relate to communication via the serial RS-232 port only. They are fully independent from the WaveLAN RTS/CTS signals that are controlled via the WaveLAN Medium Reservation mechanism.

Regulatory Information

When installed and used in strict accordance with the manufacturer's instructions, the device described in this document, complies with the following safety standards:

- USA-FCC Interference Statement
- Canada - Industry Canada (IC)
- Europe - EU Declaration of Conformity

USA-FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this 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 and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

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

Technical Specifications

Regulatory Information

Canada - Industry Canada (IC)

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil de la class B respecte toutes les exigences du Règlement sur le matériel brouiller du Canada.

Europe - EU Declaration of Conformity

This device complies with the specifications listed below, following the provisions of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC:

- Product Safety EN60950
- EMC EN55022 Class B, Emissions
EN55082-1, Immunity

WaveLAN/EC-S and Radio Regulations

The WaveLAN/EC-S device described in this User's Guide, is typically used in combination with Lucent Technologies WaveLAN IEEE PC Cards, which are based upon Direct Sequence Spread Spectrum radio technology. When installing this device in combination with a WaveLAN PC Card, you must consult the User's Guide that came with the radio product for additional regulatory information that may apply.

Lucent Technologies is not responsible for any radio or television interference caused by unauthorized modification of the devices included with this IEEE 802.11 WaveLAN Kit, or the substitution or attachment of connecting cables and equipment other than specified by Lucent Technologies. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

Troubleshooting

B

Introduction

The WaveLAN/EC-S has been designed for easy installation and operation. If, however, you experience any difficulties during installation, use the information in this chapter to help diagnose and solve the problem.

Usually, problems experienced with the WaveLAN/EC-S can be categorized as one of the following:

- Configuration (software) error.
- Component (hardware) failure.
- Wired or wireless network problems.

In most cases, you can determine Ethernet related problems by using the WaveMANAGER/EC program, as described in "Introduction" on page 3-1.

For RS-232 connections, use the serial configuration "Main Menu" to determine the problem.

If you cannot resolve the problem using this manual, please contact your local Authorized WaveLAN Reseller or regional Lucent Technologies Sales Office.

Performance Issues

This section describes some of the most common problems encountered when using the WaveLAN/EC-S.

- **WaveLAN/EC-S device is "out of range"**

If the two WaveLAN/EC-S units are not within range of each other, you may be unable to establish reliable communication. Refer to the WaveLAN IEEE 802.11 PC Card manual that was shipped with your PC Card to determine the maximum distance recommended for wireless communications.
 - **WaveLAN Parameter Mismatch**

If you are able to load the software driver successfully, but cannot communicate with another machine on the network, it is possible that you do not have the same network name as on the other unit.

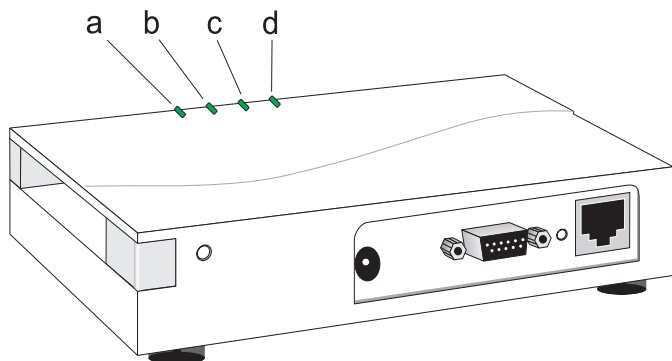
 - Verify that all wireless devices have been configured with the same WaveLAN Network Name.
 - If the network includes WavePOINT-II access points, verify if the system has not been "closed" to stations that use the network name "ANY".

Use the Main Menu (see $x^{\text{***}}$ on page 4-48) to change the default setting of the WaveLAN/EC-S.
1. **No WavePOINT-II Access Point.** If you are attempting to connect the WaveLAN/EC-S to an Ethernet network, you must have a WavePOINT-II Access Point in the network, within range of the WaveLAN/EC-S in order to get a proper wireless connection.

LED Activity

The LED Status overview listed below, may help you determine if a problem occurred. Errors are typically indicated by an Red Power LED, and are logged into the “Event Log of the device.

Figure B-1 WaveLAN/EC-S Ethernet LED



	LED	Color	Status
a	Power / Error	Green	Power is on. All is OK.
		Red	The WaveLAN/EC-S device detected an error that has been logged in the Event log: ■ See “Error Messages” on page B-7 ■ Clear Event Log
b	WaveLAN Activity	Green	Connected to a radio network
		Amber	Data traffic on radio network
c	Ethernet Activity	Green	Network detected via Ethernet port
		Amber	Network activity on Ethernet port
d	RS-232-C Rx / Tx	Green	Receiving data via serial port
		Amber	Transmitting data via serial port

When you power-up the WaveLAN/EC-S device, its Power/Error LED will blink very briefly to indicate start-up diagnostics. If the error light stays on, this may indicate either a hardware or configuration error. To determine if it's a hardware or configuration error, connect the WaveLAN/EC-S as described in Chapter 3 or Chapter 4.

- If you manage to establish a connection to the device, the error is probably a configuration error that may not prevent the device from operating.

Display either the Device Info (described on page 3-21) or the Event Log (described on page 4-48) to determine the nature of the error and correct it.

- If you do not manage to establish a connection to the device, the error may be a configuration error, which prevents you from accessing the device (like for example an incorrect IP Address) Use one of the following options to remedy the problem:

- Disconnect power from the WaveLAN/EC-S device and reconnect it again.

If configuration parameters were changed, without resetting the WaveLAN/EC-S device, it might still operate with older configuration parameters preventing you from accessing the device. Using the disconnect/reconnect power option will allow the unit to load the correct configuration from its FlashROM and start operation with the correct settings.

- Follow the instructions described on page B-5 to reset the device to its factor-set defaults and proceed as described in Chapter 3 or Chapter 4.
- If there is no LED activity at all, verify if the power supply is properly connected to both power outlet and WaveLAN/EC-S device.

Reset the WaveLAN/EC-S Device

In some cases you may wish to reset the WaveLAN/EC-S device to its factory-set defaults:

- You have forgotten the password, to access the unit's configuration
- You have forgotten the IP Address of the device, required to access the unit from a remote terminal.

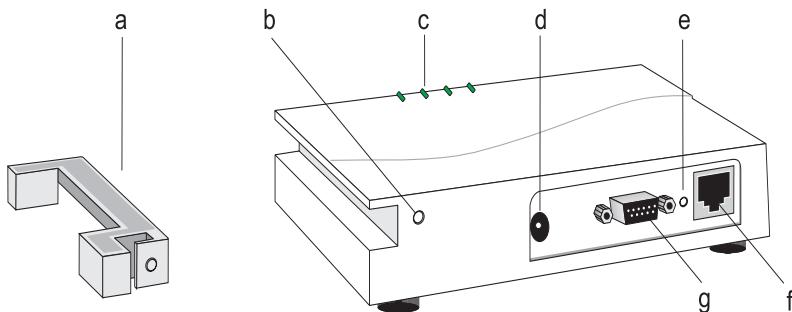
To reset the WaveLAN/EC-S device use one of the following two options:

- Reset using the Reset/Config button
- Reset using the Built-in Configurator

Reset using the Reset/Config button

Use a pointed object, such as a ball-point or paperclip to press the "Reset/config" button for approximately 5 seconds, until the Power LED changes color between Green and Red. The Reset/Config button is located next to the RJ 45 connector (see item e in Figure B-2).

Figure B-2 WaveLAN/EC-S Function Diagram



Reset using the Built-in Configurator

1. Connect to the device using the Serial Cable, and follow the procedure described in Chapter 4 "The Built-in Configurator", to connect to the WaveLAN/EC-S device.
2. From the Main Menu, select the item "Reset configuration to default".

When you select this option, the built-in configuration tool will prompt you to confirm or cancel the reset:

- Select **"Yes"** to reset the device and allow it to restart operation using its factory-set defaults.
- Select **"No"** if you to cancel the reset.

If you select **"Yes- Do it now"**, the WaveLAN/EC-S will resume operation using the settings listed below.

Factory-Set Default Configuration

WaveLAN Parameters

- Station Name: "Ethernet Converter"
- Network operation mode: Connect to Infrastructure (ESS).
- WaveLAN Network Name: "ANY"
- IP Address: 10.10.10.128
- Subnet Mask 255.255.255.0

Error Messages

When displaying the Device Info/Event log, your WaveLAN/EC-S device may list one of the following error messages, in case it detected an error.

Error Type	Error Message	Description/Action
Hardware	FLASH failure; unable to read or write configuration	FLASH may be damaged. Configuration cannot be accessed or saved.
	Initialization of interface "lanX" failed.	Radio could not be initialized. Possibly a hardware or software failure.
Software	Flow control overflow.	This indicates a software bug.
	Flow control underflow.	This indicates a software bug.
	xxxx: file does not exist.	Configuration file could not be found. This indicates a software bug
Configuration	xxxx: [yyyy]: section does not exist.	Section named yyyy in configuration file named xxxx was missing.
	xxxx: [ip]: "zzzz": entry refers to non-existent section.	Entry zzzz refers to a section that is not located in file xxxx.
	xxxx: [yyyy]: "zzzz": entry does not exist.	Entry zzzz in section yyyy of file xxxx was missing.
	xxxx: [ip]: "zzzz": entry is invalid.	Entry zzzz in section yyyy of file xxxx contains an invalid value.
	Unable to bring up interface "lanX".	Configuration values for the radio may be incorrect.
	xxxx: <[yyyy]zzzz>: Unable to add route.	Route values are out of range compared to the interface values.
	SCCUART_Restart: Out of buffer memory; efficiency reduced.	Buffer allocation values are too high. Values were automatically reduced.

Warranty Repair Card



About Warranty and Repair

In case your IEEE 802.11 WaveLAN product is not working properly, you are advised to consult the Troubleshooting hints, prior to contacting WaveLAN Technical Support.

In case your IEEE 802.11 WaveLAN product is defective, return it to your Dealer/Distributor in the original packaging.

Warranty Repairs:

When returning a defective product for Warranty, always include the following documents:

- The Warranty Repair card, and
- A copy of the invoice/proof of purchase

All other Repairs:

When returning a defective product for Repair, always include the following documents:

- The Warranty Repair card

You are advised to read the Information about “Limited Warranty” as described on the following page.

Limited Warranty

Lucent Technologies extends a limited warranty from date of purchase of:

- Thirty-six (36) months for WaveLAN hardware products
- Twelve (12) months for WavePOINT access points

Upon proof-of-purchase Lucent Technologies shall at its option, repair or replace the defective item at no cost to the buyer.

Defective items shall be returned to the dealer/distributor:

- Freight prepaid.
- Accompanied by a copy of proof-of-purchase.
- Accompanied by a filled out Warranty/Repair card.

This warranty is contingent upon proper use in the application for which the products are intended and does not cover products which have been modified without the seller's approval or which have been subjected to unusual physical or electrical demands or damaged in any way.



NOTE:

THIS WARRANTY CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF ANY BUYER OR SELLER'S EQUIPMENT AND THE SOLE AND EXCLUSIVE LIABILITY OF LUCENT TECHNOLOGIES IN CONNECTION WITH THE PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR USE AND ALL OTHER OBLIGATIONS OR LIABILITIES OF LUCENT TECHNOLOGIES.



To be filled out by the User

Product Description	:	
COMCODE (Product ID)	:	
Serial Number:		
Invoice Date:		(dd/mm/yyyy)
Name		
Title		
Company		
Address		
City/State/Zipcode		
Country		
Telephone		
Fax		
Email		

To be filled out by the Dealer/Distributor:

Dealer Name:	
Address:	
City/State/Zipcode:	
Country:	
Telephone:	
Fax	
Warranty ?	Comment
<input type="checkbox"/> Yes	
<input type="checkbox"/> No	
RMA Reference	

Reported Problem:

<input type="checkbox"/> Out-of-Box Failure
<input type="checkbox"/> Other

Problem Description:

List of Figures

Figure 1-1	Kit Contents	1-3
Figure 1-2	WaveLAN/EC-S Components	1-5
Figure 1-3	Basic Infrastructure Topology	1-7
Figure 1-4	Roaming Infrastructure Topology	1-8
Figure 1-5	Independent Network with WaveLAN/EC-S	1-9
Figure 1-6	Station-to-Station Topology	1-10
Figure 1-7	Multiple Station-to-Station Links	1-11
Figure 1-8	Broadcast Topology	1-12
Figure 1-9	Combined Topology	1-14
Figure 2-1	Removing the Yoke	2-5
Figure 2-2	Inserting the Yoke and PC Card	2-6
Figure 3-1	WaveMANAGER/EC Main Window	3-4
Figure 3-2	Enter WaveMANAGER/EC-S Password	3-5
Figure 3-3	Basic WaveLAN Parameters	3-6
Figure 3-4	Advanced WaveLAN Parameters	3-9
Figure 3-5	The Hidden Station Problem	3-15
Figure 3-6	WaveLAN/EC Management	3-17
Figure 3-7	WaveLAN/EC Event Log	3-21
Figure 3-8	Change Password	3-22
Figure 4-1	Pressing the Reset/Config Button	4-8
Figure 4-2	The Built-in Configurator Menu	4-10
Figure 4-3	Display WaveLAN Parameters	4-12
Figure 4-4	WaveLAN Parameter Menu	4-13
Figure 4-5	Open the Serial Parameters Menu	4-25
Figure 4-6	Serial Communication Parameters	4-26
Figure 4-7	Station-to-Station Topology	4-43
Figure B-1	WaveLAN/EC-S Ethernet LED	B-3
Figure B-2	WaveLAN/EC-S Function Diagram	B-5

Index

A

- Ad-Hoc Demo mode 1-9
- Advanced Parameters
 - AP Density 3-11, 4-18
 - MAC Address 3-9, 4-16
 - Medium Reservation 4-21
 - Transmit Rate 3-12, 4-19

B

- Basic Parameters
 - Network Name 3-7, 4-14
 - Network Operation (see Network Type) 4-15
 - Network Type 3-7
 - Station Name 3-7, 4-15
- Baud Rate 4-9
- broadcast 1-13
- broadcast messages 1-12

C

- Carrier Sense Multiple Access/
Collision Avoidance 3-14
- COM port (serial communications) 4-9
- Component Failure B-1
- Configuration
 - change default 3-1, 4-1
 - Independent Network 1-9
 - mismatch B-1
- Configure

- direct connection 4-4, 4-8
- remote connection 4-5
- CSMA/CA 3-14
- CTS
 - Serial Communication A-3

D

- Documentation Updates i
- DSR
 - Serial Communication A-3
- DSSS ii
- DTR
 - Serial Communication A-3

E

- Encryption 2-3
- Ethernet 1-1
 - 10Base-T 1-1
- Ethernet Connection (RJ 45) 1-5
- EU Declaration of Conformity
 - see Regulatory Information A-5

F

- FCC Interference Statement
 - see Regulatory Information A-4
- Flash ROM 1-4

Index

I

IBSS

- serial point-to-point connections 4-42

IBSS, see Ad-hoc Demo mode 4-42

IEEE ii

IEEE 802.11 ii, 2-3

IEEE Standard on Wireless LANs ii

Independent Basic Service Set 4-42

Independent Network 1-9

Industry Canada (IC)

- see Regulatory Information A-5

Information

- World Wide Web i

Infrastructure Network 1-7

Interoperability ii

IP Address 4-4

L

LED 1-5

M

MAC Address

- built-in (see Universal) 4-17

- detect 3-10, 4-17

- detect save 3-10, 4-17

- Local 3-11, 4-17

- Universal 3-10, 4-17

Main Menu

- built-in configurator 4-10

N

Network Operation

- same as Network Type 4-15

Network Problems B-1

P

packet 1-13

Parity (serial communications) 4-9

Password 4-7

- open configuration 3-5

Ping

- command 4-7

Point-of-Sale 1-14

POS, see Point-of-Sale 1-14

R

Radio

- Safety ii

- Technology ii

Radio Regulations

- see Regulatory Information A-5

Regulatory Information A-4

Release button 1-5

Reset/Config button 4-9

RJ45 1-2, 1-5

Roaming 1-7

RS-232 1-2, 1-5

RTS

- Serial Communication A-3

RTS/CTS

- See Medium Reservation 3-14, 4-21

Index

S

Security

- Configuration Password 3-22, 4-47

Serial Topologies

- multiple-drop 1-12
- party-line 1-12
- Station-to-Station 1-11

Software Updates i

- Stop bit (serial communications) 4-9

- Subnet mask 4-4

T

Technical Support i

- Telnet 4-3

Topologies

- Ethernet 1-6
- Independent Network 1-9
- Serial 1-10

Transmit Rate

- auto 4-19
- fixed 4-20

U

- Unshielded Twisted Pair (UTP) 1-5

- Update Embedded Software 3-20

- Updates i

W

- WaveLAN IEEE Turbo 3-13

- WaveLAN/EC 1-2

- WaveLAN/EC-S 1-2

- WavePOINT-II Access Point 2-1

- WEP 2-3

- Wired Equivalent Privacy 2-3

This book was created by:

Lucent Technologies Nederland B.V.
Wireless Communications and Networking Division
Zadelstede 1-10
3431 JZ Nieuwegein
The Netherlands

An electronic copy of this document can be downloaded from the WaveLAN Library on the World Wide Web:

<http://www.wavelan.com>

To view or print the electronic document, in Adobe's Portable Document Format (PDF), you will need the Acrobat Viewer from Adobe Inc., available at <http://www.adobe.com/acrobat>.

Dear reader,

We value your feedback. If you find errors or omissions in this book, or if you can suggest ways to improve its usefulness, we would like to hear from you.

Please contact me at:

Telephone: + 31 30 6097 471
Fax: + 31 30 6097 636
E-Mail: moolen@lucent.com

Sincerely,
William van der Moolen

011442/A
April 1999

Copyright © 1999 Lucent Technologies Inc.
All Rights Reserved

