BreezeNET DS.11 Series

PC-DS.11

User's
Manual

Trade Names

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Statement of Conditions

The information contained in this manual is subject to change without notice. BreezeCOM Ltd. shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual or equipment supplied with it.

Warranty

In the following warranty text, "the Company" shall mean:

 - BreezeCOM Inc., for products located in the USA.

 - BreezeCOM Ltd., for products located outside the USA.

This BreezeNET product is warranted against defects in material and workmanship for a period of one year. During this warranty period the Company will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, the product must be returned to a service facility designated by the Company. Authorization to return products must be obtained prior to shipment. The buyer shall pay all shipping charges to the Company and the Company shall pay shipping charges to return the product to the buyer.

The Company warrants that the firmware designed by it for use with the unit will execute its programming instructions when properly installed on the unit. The Company does not warrant that the operation of the unit or firmware will be uninterrupted or error-free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, buyer supplied interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. No other warranty is expressed or implied. The Company specifically disclaims the implied warranties of merchantability and fitness for any particular purpose.

Electronic Emission Notices

This device complies with Part 15 of the FCC rules, ETSI 300-328, UL, UL/C, TUV/GS, and CE.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency Interference Statement

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

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed an operated with the minimum distance between your body and the antenna as shown in the table below:

Integrated PCMCIA antenna	1.8cm (0.7 inches)
Optional PC Card 2dBi antenna	1.8cm (0.7 inches)

Professional Installer (Antennas)

The indoor PC Card antennas use a unique connector and do not require professional installation.

Information to User

Any changes or modifications of equipment not expressly approved by the manufacturer could void the user's authority to operate the equipment and the company's warranty.

Contacting BreezeCOM Technical Support

Should you need assistance beyond the scope of this guide, please contact your local BreezeCOM reseller or distributor. If they cannot solve your problem, feel free to contact the BreezeCOM Technical Support Department. The support representatives can assist you in solving any problems that cannot be solved by your reseller. When requesting support, please have the following items available:

- Configuration of the system, including models of the BreezeCOM equipment used.

- Distance between devices.

- Configuration, statistic counters, and error messages.

- Description of problems encountered.

To contact BreezeCOM Technical Support, refer to the Technical Support page of the BreezeCOM web site: www.breezecom.com

TABLE OF CONTENTS

1. INTRODUCTION

This chapter describes the main features of the BreezeNET PC-DS.11 Wireless LAN Card.

1.1 How to Use This Guide

This User's Manual contains instructions for overall planning and setting up your wireless LAN, and provides details of how to install each unit, and how to install antennas and accessories.

This manual contains the following chapters:

⇒ **Chapter 1 Introduction** – Explains how to use this manual and presents the BreezeNET DS.11 series.

⇒ **Chapter 2 Installation** – Describes how to install the BreezeNET DS.11 series units.

⇒ **Chapter 3 System Troubleshooting** - Contains a troubleshooting guide for some of the more common problems which may occur when installing and using the BreezeNET DS.11 products.

⇒ **Chapter 5 Downloading Software Upgrades** – Explains how to perform future upgrades for BreezeNET DS.11 series units using a TFTP application.

⇒ **Chapter 6 Technical Specifications** - Lists the technical specifications for the BreezeNET DS.11 series units.

1.2 BreezeNET DS.11 Features

The following are the main features of the BreezeNET DS.11 series:

- **Rate** - 11 Mbps with 5.5, 2, and 1 Mbps auto fallback rates.

- **Future-proof Investment** – All "infrastructure" items in the DS.11 series line offer Flash updates.

- **Easy Installation** - The DS.11 series supports a true plug-and-play.

- **Transmit Diversity** - The DS.11 series supports a single or dual antennas diversity.

- **Power Management** – The PC-DS.11 can operate in stand-by mode between transmissions to reduce batter consumption

- **Drivers to support -** Windows 95/98/NT and Linux

- **PC-DS.11 Card Utility –** Allows the user to control network conntections and measure signal quality.

1.3 BreezNET DS.11 Compatibility and Standards

- IEEE 802.11 TGb Compliant – All BreezeNET DS.11 series units are fully compliant with the final IEEE 802.11 specification for wireless LANs, and thus support interoperability with other 802.11 compliant vendors.

- Completely inter-operable with other 802.11 and 802.11 TGb products

- Uses the 2.4 Ghz ISM unlicensed band

1.4 BreezeNET DS.11 Functional Description

BreezeNET DS.11 units add wireless functionality to existing Ethernet LANs.

1.4.1 Quick Review of Ethernet

Standard Ethernet LAN stations are wired to a common bus. When one of the stations sends a message, it assigns a destination address to the message and sends the message on the bus. All stations on the bus "hear" the message, but only the station with the proper address processes the message.

1.4.2 AP-DS.11 Wireless Access Point

The AP-DS.11 enables 802.11 access to 802.3 (Ethernet) and guarantees inter-station communication. The Access Point is required for the PC-DS.11 card to communication to other PC-DS.11 cards or to the wired Ethernet LAN.

1.5 Where to Use DSSS

DSSS technology (Direct Sequence Spread Spectrum) spreads a signal power over 22MHz bandwidth; the same frequency is used for each transmission. This provides the DS.11 with a fast bit rate and long range links, ideal for outdoor bridging.
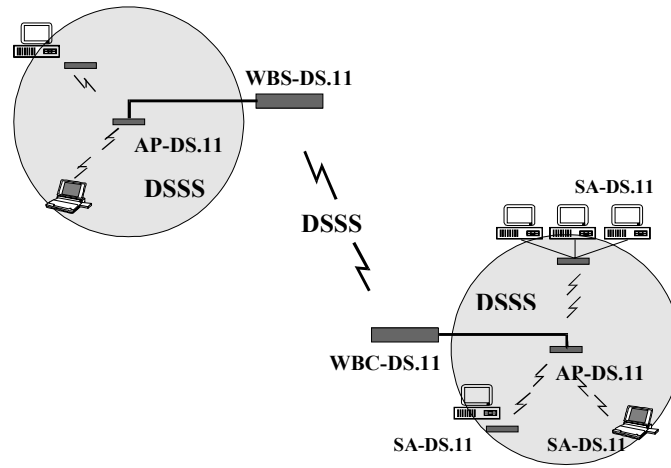
Figure 1-1. A Typical DS.11 installation with indoor and outdoor systems

2. INSTALLATION

PC Card
PC-DS.11

2.1 Installation for Windows 95B

⇒ *To install on Windows 95B, do the following:*

1. Insert the PC-DS.11 slot in the PCMCIA slot on your computer. Windows 95 detects the unit, briefly displays the *New Hardware Found* window, and then displays the *Update Device Driver Wizard* window.

2. Insert the *BreezeCOM drivers diskette* and press **Next**. When Windows 95 notifies it has found the driver, press **Finish**.

3. If the Windows 95 CAB files are not found automatically, the message *Please insert disk labeled Windows 95 CD-ROM* appears. Press **OK**.

4. If no other windows appear, the installation is complete. If the *Please insert disk labeled Windows 95 CD-ROM* appears, press **OK**, enter the path of the Windows 95 CAB files, and press OK. Installation is now complete.

5. Restart the computer.

2.2 Installation for Windows 98

⇒ *To install on Windows 98, do the following:*

1. Insert the PC-DS.11 slot in the PCMCIA slot on your computer. Windows detects the unit and displays the *New Hardware Found* window.

2. When the *Add New Hardware Wizard* window appears, press **Next**.

3. Select the *Search for best driver* option and press **Next**.

4. Insert the *BreezeCOM drivers diskette*, select the *Floppy disk drives* option, and press **Next**.

5. The installation wizard notifies you that the driver for the BreezeCOM PCMCIA Wireless LAN Adapter has been located. Press **Next**.

6. A window appears notifying you that the driver for the BreezeCOM Wireless LAN Adapter has been installed. Press **Finish**.

7. Restart the computer.

2.3 Installation for Windows NT

⇒ *To install on Windows NT, do the following:*

1. Press the Windows **Start** button, select *Settings*, and then select *Control Panel*. Double-click on the *Network* icon.

2. If the message *The Windows NT Networking is not installed. Do you want to install it now?*, continue with step 2a. If this message does not appear, continue with step 2b.

    a. Press **Yes** and choose *Wired to the network*. When a list of supported

network adapters appears, press **Have Disk**.

b. Go to the *Adapters* tab, press **Add**, and then press **Have Disk**.

3. Insert the BreezeCOM drivers diskette, enter the location of the diskette (such as a:\) and press OK.

4. From the list choose BreezeNET Wireless LAN PC Card and press OK. The PC-DS.11 LAN Adapter Properties window appears.
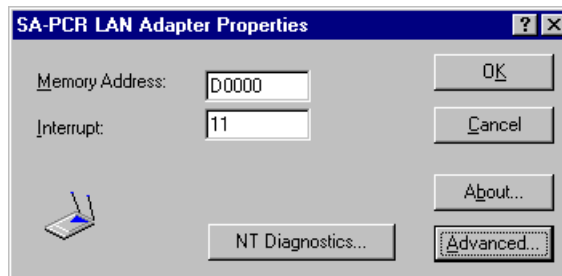
Figure 4.1: PC-DS.11 LAN Adapter Properties Window

5. The default settings are memory range D0000h to D3FFFh, IRQ 11. In the following steps we will verify that these default settings are acceptable for your machine.

Note: *If the PC-DS.11 Configuration application is already installed, you can access it directly by pressing* ***Advanced****.*

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6. Press the Windows **Start** button and select *Run*. Type *WINMSD* and press **OK**. The *Windows NT Diagnostics* window appears.

Windows NT Diagnostics - \\PCMCIA_NT

File   Help

| Version | System | Display | Drives | Memory |
| Services | Resources | Environment | Network |

Include HAL resources ☐

IRQ	Device	Bus	Type
01	i8042prt	0	Isa
03	Serial	0	Isa
04	Serial	0	Isa
06	Floppy	0	Isa
12	i8042prt	0	Isa
14	atapi	0	Isa

| IRQ | I/O Port | DMA | Memory | Devices |

| Properties | Refresh | Print | OK |
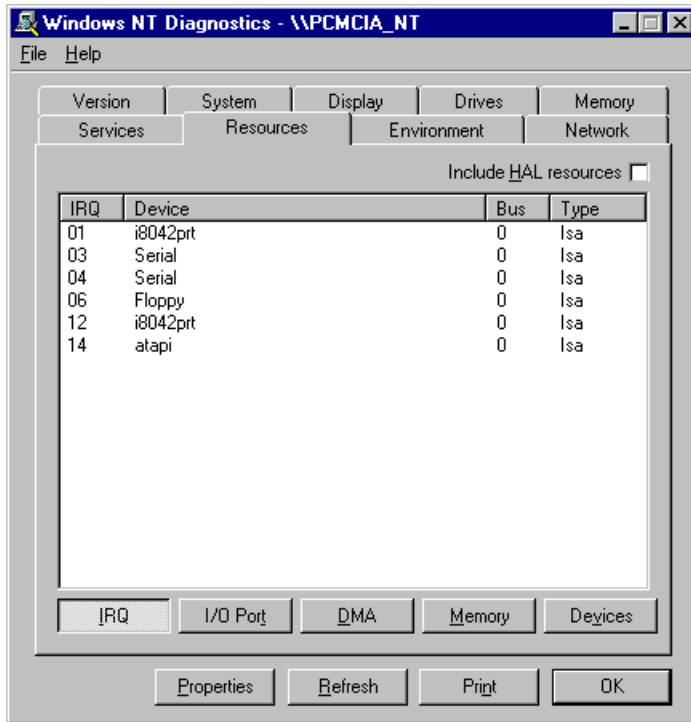
1.1. Indoor Installation considerations

This chapter describes various considerations to take into account when planning an indoor installation including site selection, antenna diversity, antenna polarization, construction materials, and cell size.
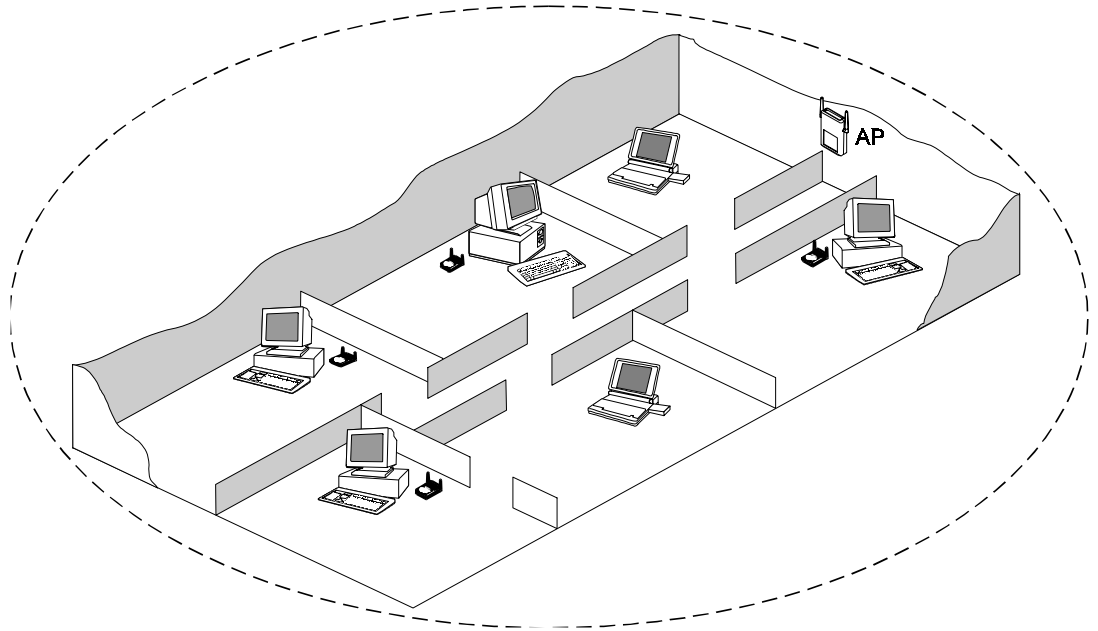

Figure 0.2: BreezeNET LAN in a typical office environment

1.1.1. Site Selection Factors

BreezeNET DS.11 wireless LAN products are robust, trouble-free units, designed to operate efficiently under a wide range of conditions. The following guidelines are provided to help you position the units to ensure optimum coverage and operation of the wireless LAN.

Metal Furniture

Position the units clear of metal furniture and away from moving objects such as metal fans or doors.

Microwave Ovens

For best performance, position the units clear of radiation sources that emit in the 2.4 GHz frequency band, such as microwave ovens.

Antennas

Make sure the antennas are extended upward vertically in relation to the floor. For models with external antennas, connect the external antennas and RF cable.

Heat Sources

Keep the units well away from sources of heat, such as radiators, air-conditioners, etc.

1.1.1.1   Site Selection for Access Points

When positioning Access Points, take into account the following additional considerations.

Height

Install the Access Point at least 1.5m above the floor, clear of any high office partitions or tall pieces of furniture in the coverage area. The Access Point can be placed on a high shelf, or can be attached to the ceiling or a wall using a mounting bracket.

Central Location

Install the Access Point in a central location in the intended coverage area. Good positions are:

- In the center of a large room.

- In the center of a corridor.

- At the intersection of two corridors.

Many modern buildings have partitions constructed of metal or containing metal components. We recommend that you install the Access Points on the corridor ceilings. The radio waves propagated by the **BreezeNET DS.11** LAN are reflected along the metal partitions and enter the offices through the doors or glass sections.

1.1.2. Construction Materials

A cell's coverage area is affected by the construction materials of the walls, partitions, ceilings, floors and the furnishings of the cell. Due to their intrinsic nature, these materials may cause radio signal loss:

- Metal objects reflect radio signals. They do not let the signals pass through.

- Wood, glass, plastic and brick reflect part of the radio signals and allow part of the radio signals to pass through.

- Water and objects with a high moisture content absorb a large part of the radio signals.

Use the following table as a guidline to predict the effects of different materials.

Table 0.1: Signal Loss Chart

Obstruction	Additional Loss (dB)	Effective Range	Approx. Range
Open Space	0dB	100%	1000ft. (300m)
Window (non-metallic tint)	3dB	70%	700ft. (215m)
Window (metallic tint)	5-8dB	50%	500ft. (150m)
Light Wall (dry wall)	5-8dB	50%	500ft. (150m)
Medium Wall (wood)	10dB	30%	300ft. (100m)
Heavy Wall (solid core 6")	15-20dB	15%	150ft. (50m)
Very Heavy Wall (solid core 12")	20-25dB	10%	100ft. (30m)
Floor/Ceiling (solid core)	15-20dB	15%	150ft. (50m)
Floor/Ceiling (heavy solid core)	20-25dB	10%	100ft. (30m)

Note: *Take stairwells and elevator shafts into consideration when positioning Access Points. There is no way to quantify the loss associated with these obstructions, however they do have an effect on the signal.*

1.1.3.   Cell Size

Cell size is determined by the maximum possible distance between the Access Point and the Station Adapter. This distance varies according to the building floor plan and the nature of that environment. There are several general categories:

Open Indoor Areas

Open office areas with no partitioning and no obstacles between the Access Point and the BreezeNET workstation.

The suggested maximum distance between Access Point and workstation:

Standard AP-DS.11 DS.11: ....200m (600 ft.)

Semi-Open Indoor Areas

Open-plan offices partitioned into individual workspaces, factory floor areas, warehouses, etc.

The suggested maximum distance between Access Point and workstation:

Standard AP-DS.11 ....100m (300 ft.)

Closed Indoor Areas

A floor divided into individual offices by concrete, masonry or sheet-rock walls. A house is also a closed indoor area.

The suggested maximum distance between Access Point and workstation:

Standard AP-DS.11 ....50m (150 ft.)

3. SYSTEM TROUBLESHOOTING

The following troubleshooting guide provides answers to some of the more common problems which may occur when installing and using BreezeNET DS.11 Series products. If problems not mentioned in this guide should arise, checking the Ethernet and WLAN counters may. If the problem persists, please feel free to contact your local distributor or the BreezeCOM Technical Support Department.

To run the PC-DS.11 Card Utility do the following:

1. Double click on the PC-DS.11 connection icon on the task bar.

2. Click on the Session Tab.

3. Click on Diagnostics. The PC card utility will give a message indicating the problem as it steps through the tests.

4. Click on the Signal Quality tab to see what the signal quality is for your connection. A signal quality above 80% is considered a good link.

If the signal quality is lower than 80%, move closer to the Access point to see if it improves. If moving closer does not improve the signal quality much, the relocate the Access Point, then re-measure the signal quality. Use the AP-DS.11 management utility to measure the RSSI to other PC-DS.11's on the network at the same time to get a better picture of what your changes are doing with the other stations.

3.1 Quick Start to Wireless Networking

Perform the following steps to configure a WLAN for the first time:

1. Physically connect the Access Points to the Ethernet LAN. Make sure they are switched on. The DS.11 wireless network will be up and running immediately. If you are content with the default settings of the Access Points, you can stop right here. It is more likely however, that you want to assign different radio

frequencies to each Access Point, or impose some restrictions on the use of your wireless network.

2. To be able to manage the Access Points via SNMP, every Access Point needs a unique IP address. If you provide a DHCP or BOOTP service on your LAN (and have sufficient free IP addresses available) this will be taken care of automatically. If not, refer to Section **Error! Reference source not found.** for further information on assigning IP addresses.

3. Use the BreezeNET Management utility to configure the Network Settings to reflect your situation.

4. Select the radio channels of the Access Points according to your cell plan. See Section **Error! Reference source not found.** for further information. Add descriptive information about each Access Point for later reference.

3.2 More about Cells

Each Access Point in the network forms the center of a cell, or BSS. The Cells should overlap slightly to guarantee seamless wireless connectivity everywhere. Neighboring Access Points should preferably send and receive on different channels for maximum throughput.

Creating a cell plan for your site can be complicated, and is usually done by experts employing special measuring equipment.

Furthermore, the radio channels you may use depend on both the capabilities of the PC-Cards you are deploying, as well as the regulations in your area.

The following table provides specifications for the main regulatory domains:

Regulatory Domain	4.8.1.1 Area	Permissible Channels	Predefined channels

FCC	United States	1 – 11	1, 6, 11
DOC	Canada	1 – 11	1, 6, 11
ETSI	Europe except Spain and France	1 – 13	1, 7, 13
SPAIN	Spain	10	10
FRANCE	France	10	10
MKK	Japan	14	14

4. TECHNICAL SPECIFICATIONS

4.1 Supported Standards

- Compliant with ETS 300 328 and ETS 300 826 (CE marked)

- IEEE 802.11 standard for Wireless LAN

- All major networking standards (including IP, IPX)

4.2 Environmental

Operating temperature (ambient)	0°C to 55°C (32°F to 131°F)
Storage temperature	-5°C to 70°C (23°F to 158°F)
Operating humidity	10% to 90% (non-condensing)
Storage humidity	5% to 95% (non-condensing)

4.3 Power specifications

DC power supply	RX: 250mA; TX: 400mA

4.4 Radio specifications

Range	outdoors up to 15 miles
Transmit power	+18 dBm +2 dBm (Low power for use with high gain antenna)
Frequency range	2.4-2.4835 Ghz, direct sequence spread spectrum
Number of Channels	Europe: 13 (3 non-overlapping) US: 11 (3 non-overlapping) France: 4 (1 non-overlapping)

4.5 Drivers

Windows	95/98/ NT 4.0
Linux	TBD

4.6 Specific features

Supported bit rates	• 11 Mbps • 5.5 Mbps • 2 Mbps • 1Mbps
Utility Software	PC-DS11 BreezeNET Card Utility

4.7 Physical Dimensions

Size	PCMCIA Type II