

# ***BreezeNET DS.11 Series***

***AP-DS.11***

***SA-DS.11***

# **User's Manual**

*May, 1999*

*Cat xxxxxxxx*

*Rev A*

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## **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 and operated with the minimum distance between your body and the antenna as shown in the table below:

Low gain indoor antennas ( $\leq 6\text{dBi}$ )	4.5cm (1.8 inches)
High gain outdoor antennas ( $> 6\text{dBi}$ )	30cm (12 inches)

## Professional Installer (Antennas)

**WARNING:** It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden in accordance to FCC rules CFR47 part 15.204.

The indoor 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.
- Antenna type and cable lengths.

- Site information such as possible radio path problems (like trees, machines, and buildings).
- Distance between devices.
- Configuration, statistic counters, and error messages as seen on the monitor.
- Description of problems encountered.

To contact BreezeCOM Technical Support, refer to the Technical Support page of the BreezeCOM web site: [www.breezecom.com](http://www.breezecom.com)



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# 1. INTRODUCTION

This chapter describes the main features of the BreezeNET DS.11 Wireless LAN, which includes the following products:

- AP-DS.11 - Wireless Base Station
- SA-DS.11 - Wireless Bridge Client

Also in this chapter: relevant standards, compatibility issues, product functionality and use of the DS (Direct Sequence) WLAN.

## 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 4 Using the BreezeNET Management Utility** – Describes how to use the BreezeNET Management utility to setup, configure, and manage BreezeNET DS.11 series units.
- ⇒ **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.
- **LED Display** – Power, Network Activity, and WLAN Load or Signal Quality LEDs indicate the current status of the unit.
- **Upgrading** – Simple, quick, and free software upgrades via TFTP.
- **Future-proof Investment** – All “infrastructure” items in the DS.11 series line offer Flash updates.
- **Management utility** – This user-friendly application helps you quickly setup and manage your WLAN. You can save the configuration to a file and import the file to other stations for fast installation.
- **Easy Installation** - The DS.11 series supports a true plug-and-play.
- **MIB support** - The DS.11 series supports all major SNMP management software: HP/OpenView, SUN NetManager, SNMPC.
- **Transmit Diversity** - The DS.11 series supports a single or dual antennas diversity.
- **Bridge Client Support** - Remote bridge clients support is up to 15 miles away. In addition, the DS.11 series supports up to 64 Bridge clients.

## **1.3 BreezeNET 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
- Supports the common SNMP standard MIB groups and the 802.11 MIB
- 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.

### **1.4.3 SA-DS.11 Wireless Station Adapter**

The SA-DS.11 station adapter connects up to 4 workstations through a hub. When a station on the SA-DS.11’s LAN sends a message that is not destined for a local station, the SA-DS.11 wirelessly forwards the message to the AP-DS.11. When the AP-DS.11 receives a message destined for a station on the SA-DS.11’s LAN, the AP-DS.11 wirelessly forwards it to the SA-DS.11. In this manner, the SA-DS.11 and the AP-DS.11 work together like a standard network bridge.

The first time each station on the SA-DS.11's LAN sends a message, the station's address is registered in the SA-DS.11 and the AP-DS.11. The SA-DS.11 and AP-DS.11 can hold all the addresses necessary to support an entire LAN connected to a SA-DS.11.

## **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.

By using a directional antennas, spatial separation, and cross polarized discrimination DS.11 can feed FH (Frequency Hopping) distribution points with no performance loss.

**Backbone links** - Our DS.11 Bridge has low latency, which makes it ideal for backbone links of the WLAN.

**Data rates** - The DS.11 is ideal for clients that need high sustained data rates or high burst rates.

**Long links** - The DS.11 remote bridging capabilities enables it to support clients up to 15 mile away.

**Latency sensitivity** - Use the DS.11 for applications that are sensitive to latency.

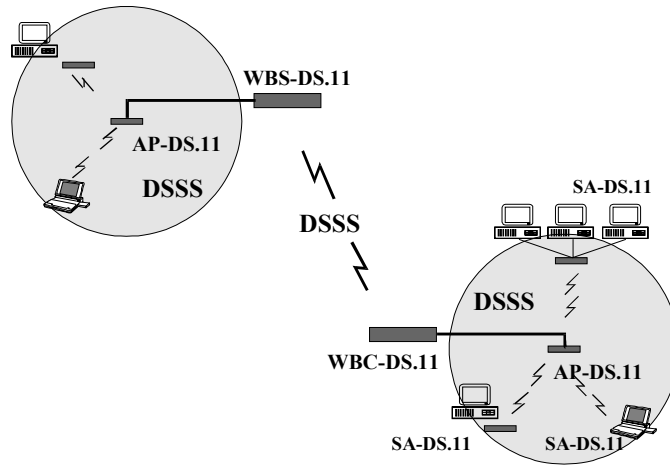


Figure 1-1. A Typical DS.11 installation with indoor and outdoor systems

## 2. INSTALLATION

1. Mount the antenna (see BreezeNET User's Manual) and locate the AP/SA accordingly.
2. Make sure the antennas are in a vertical position (if not, rotate over 90 degrees).
3. Insert the power connector.
4. Attach the Unshielded Twisted Pair (UTP) cable to the Wireless Base Station.
5. Switch on the unit.

### 2.1 Checking The LED Indicators

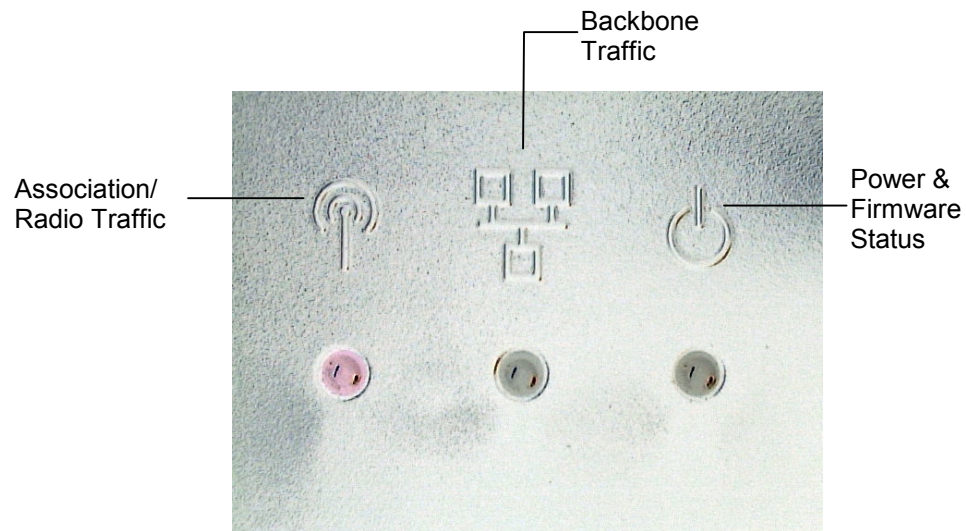


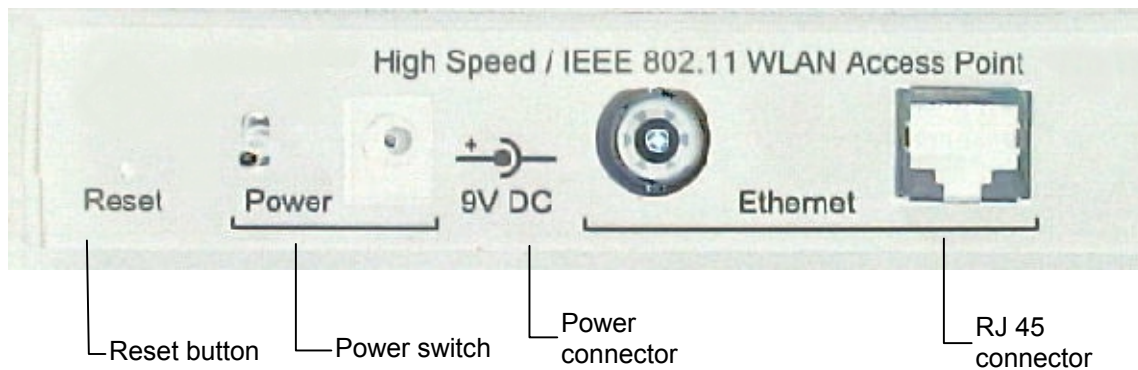
Figure 2-1. DS.11 LEDs



The following table lists the DS.11 LEDs and their diagnostics:

<b>LED</b>	<b>Color</b>	<b>Explanation</b>
Association/Radio Traffic Backbone Traffic Power & Firmware Status	Green	The server sends beacons immediately (10/s). while the station is scanning; the LED blinks irregularly until it is synchronized
Power & Firmware Status	Red	Firmware did not start. Power fault or wrong firmware.
Backbone Traffic	Red	No network connection detected. Check that the right cable is connected properly (crossed or not crossed).

## 2.2 The Rear Panel



*Figure 2-2. DS.11 Rear Panel*

To reset the unit press the Reset button. Configured parameters will not be changed.

You can reset the unit's settings to factory defaults by pushing a paper clip in the little hole next to the Power switch while switching the unit on.

## 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.

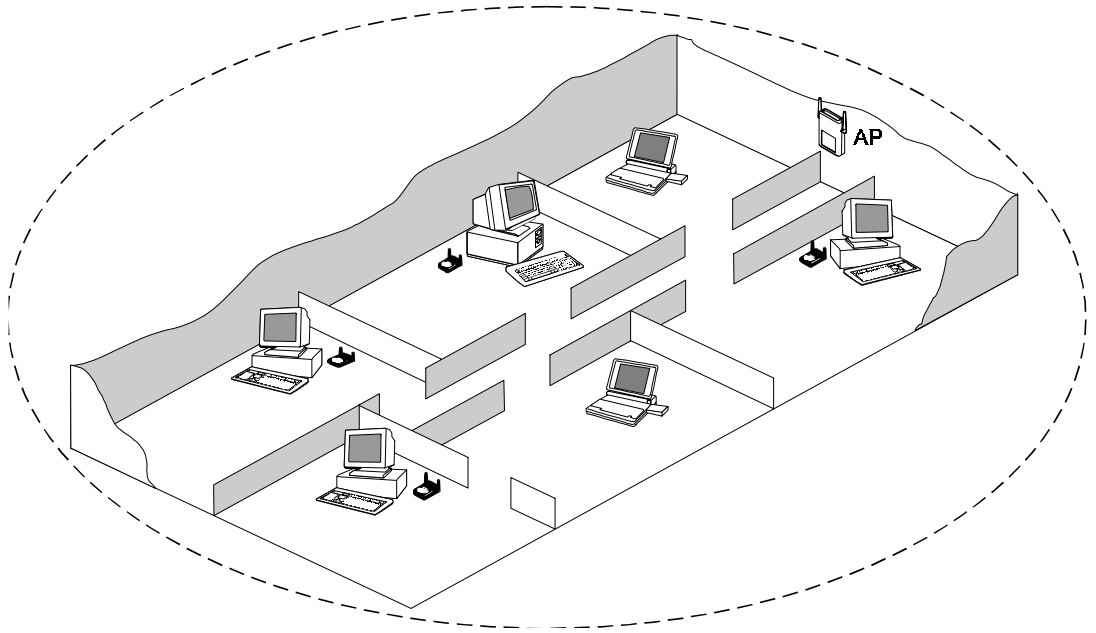


Figure 0.1: BreezeNET LAN in a typical office environment

### 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. Antennas for Indoor applications**

For most indoor applications, the best choice is the standard unit equipped with its provided 5dBi antennas. The units are small, easy to install and cover a large area.

In some installations, it is required to install the unit and antenna separately. In such instances, use the AP-DS.11 with the omni-6 antenna kit (6dbi omni-directional antenna with 6 feet LMR-600 cable). In the USA (FCC regulated) and in non-regulated countries, the omni-6 comes with a shorter antenna cable, extending the coverage area.

The Uni-8.5 is also useful in indoor applications. It is very small and easily wall-mounted, but its radiation pattern is limited (75°).

BreezeCOM recommends that, for indoor applications, you use two antennas per unit to utilize the diversity gain of the system.

### **1.1.2.1 Antenna Diversity**

In applications where no multipath propagation is expected, a single antenna is sufficient to ensure good performance levels. However, in cases where multipath propagation exists, BreezeCOM recommends that two antennas be used. This takes advantage of space diversity capabilities. By using two antennas per unit, the system can select the best antenna on a per-packet basis (every several milliseconds).

Multipath propagation is to be expected when there are potential reflectors between the main and remote sites. These reflectors may be buildings or moving objects such as airplanes and motor vehicles. If this is the case, the radio signal does not

travel in a straight line, but is reflected or deflected off of the object, creating multiple propagation paths.

When installing a single antenna, modify the *transmit antenna* option to either antenna 1 or antenna 2, according to the antenna being used (refer to section **Error! Reference source not found.**).

### **1.1.2.2 Antenna Polarization**

Antenna polarization must be the same at either end of the link. In most applications, the preferred orientation is vertical polarization. Above-ground propagation of the signal is better when it is polarized vertically. To verify antenna polarization, refer to the assembly instructions supplied with the antenna set.

### **1.1.3. 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 guideline to predict the effects of different materials.

**Table 0.1: Signal Loss Chart**

<b>Obstruction</b>	<b>Additional Loss (dB)</b>	<b>Effective Range</b>	<b>Approx. Range</b>
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)

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***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.*

---

### **1.1.4. 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 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 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 help (see Section **Error! Reference source not found.**). If the problem persists, please feel free to contact your local distributor or the BreezeCOM Technical Support Department.

#### 3.1 Troubleshooting Guide

Problem and Indication	Possible Cause	Corrective Action
No Power to Unit. Power LED is off.	<ol style="list-style-type: none"> <li>1. Power cord is not properly connected.</li> <li>2. Power supply is defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify power cord is properly connected to the BreezeNET unit and to the power outlet.</li> <li>2. If this is not the cause, replace the power supply.</li> </ol>
Failure to establish wireless link. Association LED is off and unit resets every few minutes.	<ol style="list-style-type: none"> <li>1. Power supply to units may be faulty</li> <li>2. The units may not have the same ESSID as the AP-DS.11.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify power to units.</li> <li>2. Verify that all units in the network have the same ESSID as the AP (ESSID must be identical in all units in the network): Verify wireless link: Set AP-DS.11 and Bridge unit side by side. Power on each unit and see if a wireless link is established (even “D” models without their external antennas should establish a link if placed side by side with the AP-DS.11). If the units fail to associate, reset units to factory default values reset unit (see Section 2.2). The units should now establish a wireless link.</li> </ol>



<b>Problem and Indication</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
<p>Failure to establish wireless link</p>	<ol style="list-style-type: none"> <li>1. Power supply to units may be faulty.</li> <li>2. Cables may be improperly connected</li> <li>3. There may be some problem with antenna installation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify power to units.</li> <li>2. Verify that all cables are connected securely.</li> <li>3. Refer to previous Section and verify wireless link between the units.</li> <li>4. Verify that the antenna(s) are properly installed (see relevant Section in this manual):                      Check antenna alignment.                      Verify that antenna polarization is the same at both ends.                      Verify that the range matches specifications.                      Verify line-of-sight/antenna alignment/antenna height.</li> </ol>
<p>Wireless link established, but there is no Ethernet activity (AP-DS.11 and SA-DS.11 units).</p>	<ol style="list-style-type: none"> <li>1. Ethernet hub port or UTP cable is faulty.</li> <li>2. Ethernet port in unit is faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the Association LED is on and solid at the hub port. If this is not the case, the port is inactive. Try another port on the hub or another UTP cable.</li> <li>2. Verify that Ethernet port in unit is working. Ping unit to verify Ethernet connection.</li> <li>3. Verify that you are using a cross-over UTP cable (pins 1 &amp; 3, 2 &amp; 6) if connected directly to workstation, or a straight-through cable if connected to a hub.</li> <li>4. Check ETHR LED indicator in unit and Ethernet counters in Monitor to verify Ethernet activity (see Section 4.1.5).</li> </ol>

## **4. BREEZENET MANAGEMENT UTILITY**

The BreezeNET DS.11 is an SNMP-based (Simple Network Management Protocol) management utility that provides a consistent view of the wireless network. The systems administrator can use the management utility to control a large number of DS.11 Access Points from a single location.

Among the supported features:

- Assign radio channels for optimal cell management
- Program an Access Point with a specified IP address
- Set the SNMP Write Community strings
- Verify the status of all Access Points in the network
- Perform a site survey
- Antenna selection
- Configuration of parameters

### **4.1 BreezeNET Management Utility Main Window**

The BreezeNET Management utility main window consists of two main areas:

- **The IP and Community Selection area** - In this area, you select the community string and address of the unit you wish to manage or edit.
- **The Tab area** - This area consists of five tabs containing parameter required for the management of the WLAN. When you switch between the tabs, the IP Selection area with the selected unit address, remains displayed.

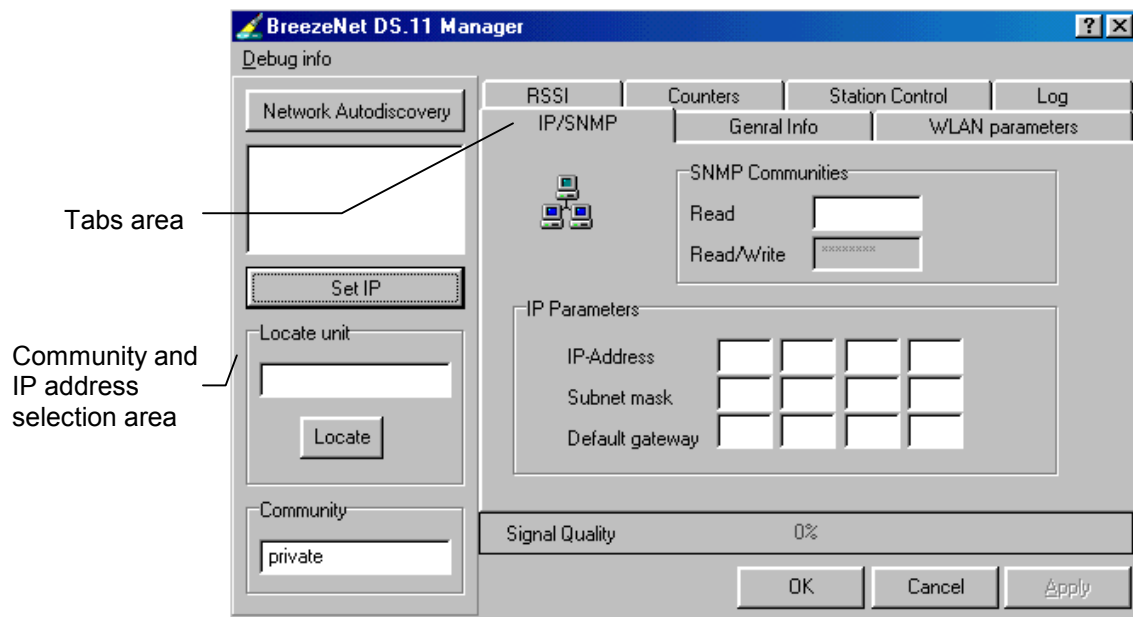


Figure 4-1. BreezeCOM Manager Main Window (IP/SNMP Tab)

### 4.1.1 Selecting IP Addresses of Units

You can select a unit's IP address in one of the following ways:

- Click the **Network Autodiscovery** button. All the current units IP addresses (under the selected community) are displayed in the list box below. Double-click on an address to select it.
- For stations which are located behind a router, type the unit's address in the Locate unit field and click **Locate** to display its parameters.
- **Signal Quality bar** - This bar appears only if the selected IP address is a SA-DS.11 unit, and displays the signal quality between the selected Bridge unit and the AP-DS.11 unit connected to it.

If the selected IP address is a SA-DS.11 you can view its signal quality in the RSSI tab.

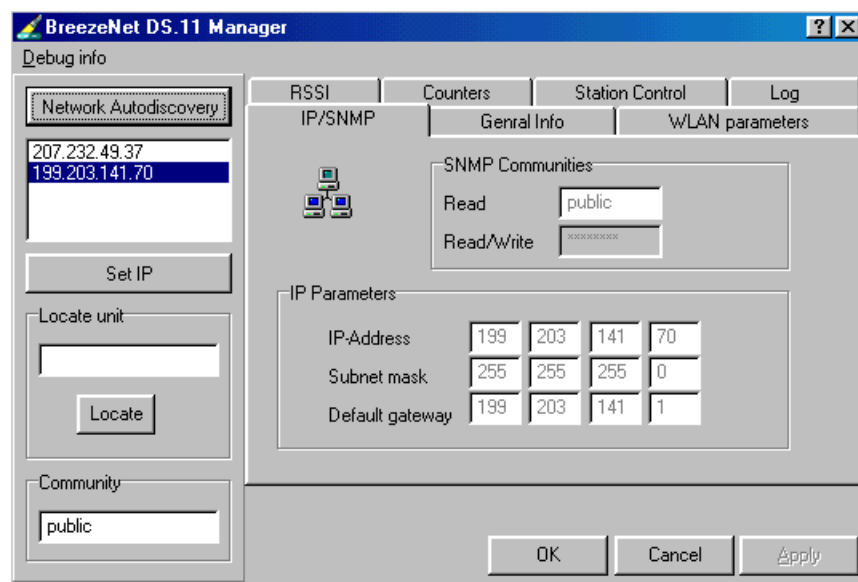
*Note:* If you select an IP address of a AP-DS.11 unit, the signal quality is displayed in the Signal Quality tab. This tab displays a table that lists all the MAC addresses, connected to that AP, and their signal quality.

*When the community is Read the parameters are grayed out (disabled).*

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### 4.1.2 The IP/SNMP Tab

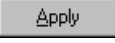
All BreezeNET DS.11 units contain IP Host software. This software is used for testing the unit for SNMP management functions (and for downloading software upgrades using the TFTP protocol).



**Figure 4-2. IP/SNMP Tab**

The IP/SNMP tab allows you to define or edit IP parameters for the DS.11 units.

#### 4.1.2.1 Assigning and Editing IP Parameters Using the Network Autodiscovery

1. Type the known Read/Write Community string in the Community field (the default string is Private).
2. Select a unit address as describe in Section 4.1.1. The unit's Read-Read/Write Community strings appear in the SNMP Communities area of the window, and the unit's parameters appear in the IP Parameters area of the window:
  - **Read** - The read only community string of the unit.
  - **Read/Write** - The read/write community string of the unit.
  - **IP Address** - The IP address of the selected unit.
  - **Subnet musk** -The Subnet mask of the selected unit.
  - **Default gateway** - The Default gateway of the selected unit.
3. Click  to apply configuration

#### 4.1.2.2 Assigning and Editing IP Addresses Manually

1. Click the  button. The Set IP dialog box is displayed.

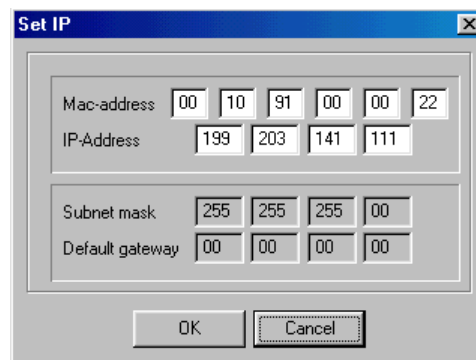


Figure 4-3. The Set IP Dialog Box

2. Type the parameters in the appropriate fields and click **OK**. A message box is displayed notifying you when the changes to take affect.

### 4.1.3 The General Info Tab

The General Info tab displays general information regarding the unit's firmware and hardware versions, and general unit address information.

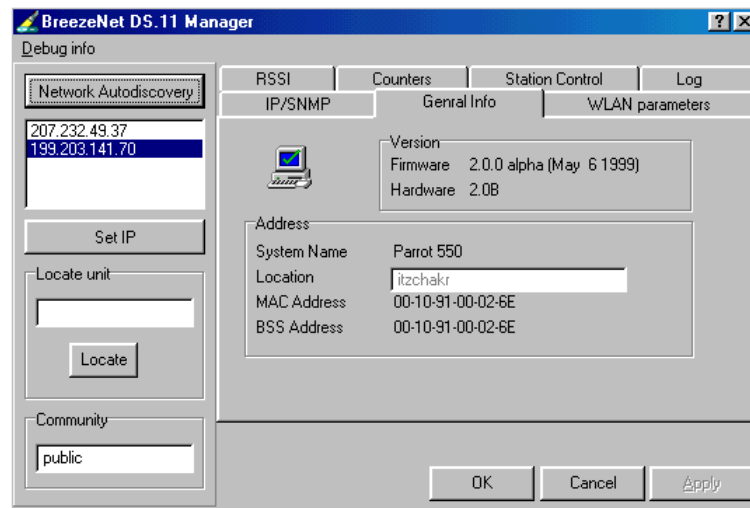


Figure 4-4. General Info Tab

- **Firmware** - the current firmware version.
- **Hardware** - the current hardware version.
- **System Name** - the name of the selected unit.
- **Location** - location of the selected unit.
- **MAC Address** - MAC address of the selected unit.
- **BSS Address** - BSS address of the selected unit.

---

*Note:* You can select unit's address in the same way you have selected addresses in the IP/SNMP tab (i.e., selecting the address from the list, or typing it directly).

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### 4.1.4 The WLAN Parameters Tab

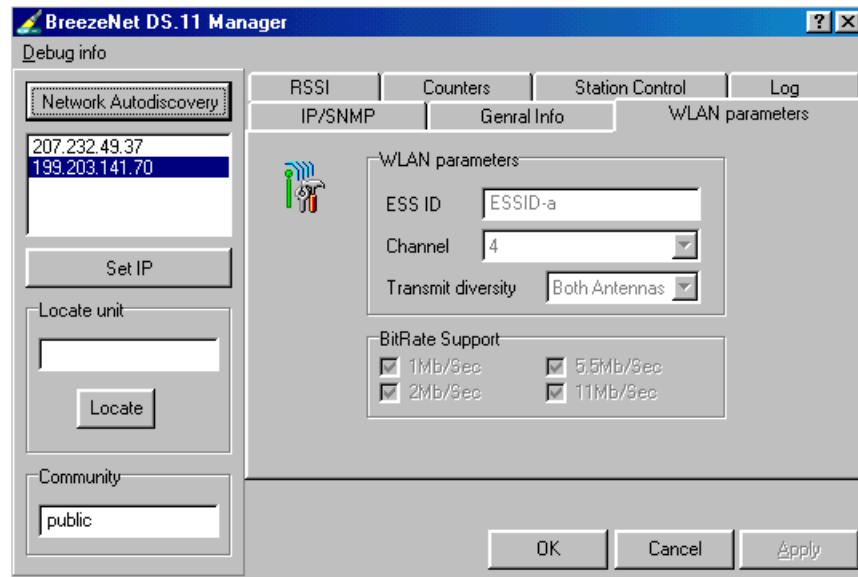


Figure 4-5. WLAN Parameters Tab

1. Set the ESS ID of the WLAN.
2. Select a channel.
3. Set Antenna diversity to Antenna No. 1, No. 2, or both.
4. Set the desired bit rate. For maximum bit rate support, check both 5.5 Mbps and 11 Mbps.

---

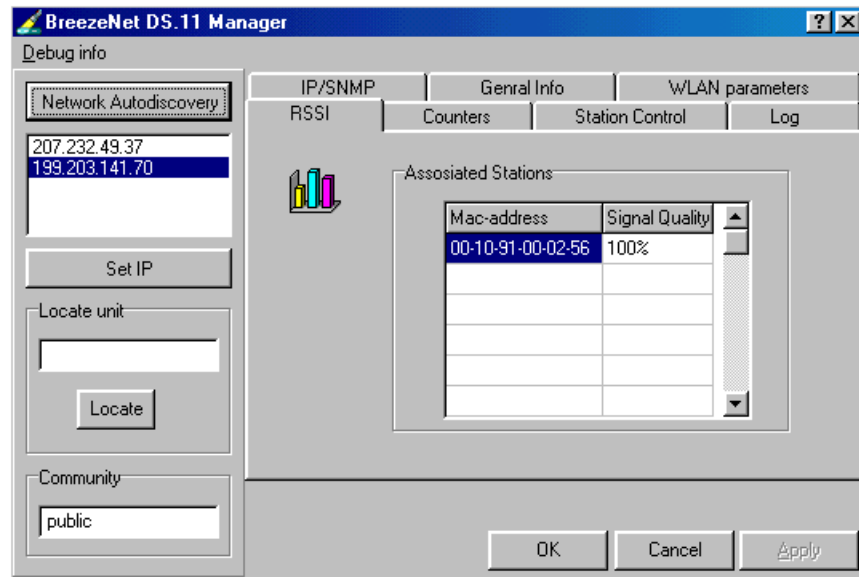
**Note:** The 1 Mbps and 2 Mbps bit rates are checked by default.

*In case of interference, the BreezeNET Management utility automatically falls back to the lower bit rate.*

---

### 4.1.5 The RSSI tab

This tab allows you to view signal quality of WBC units and the associated stations.



Select an IP address as explained previously in Section 4.1.1.

In the Associated Stations you can see all the stations associated with the selected unit and their signal quality.



## 4.1.6 The Counters Tab

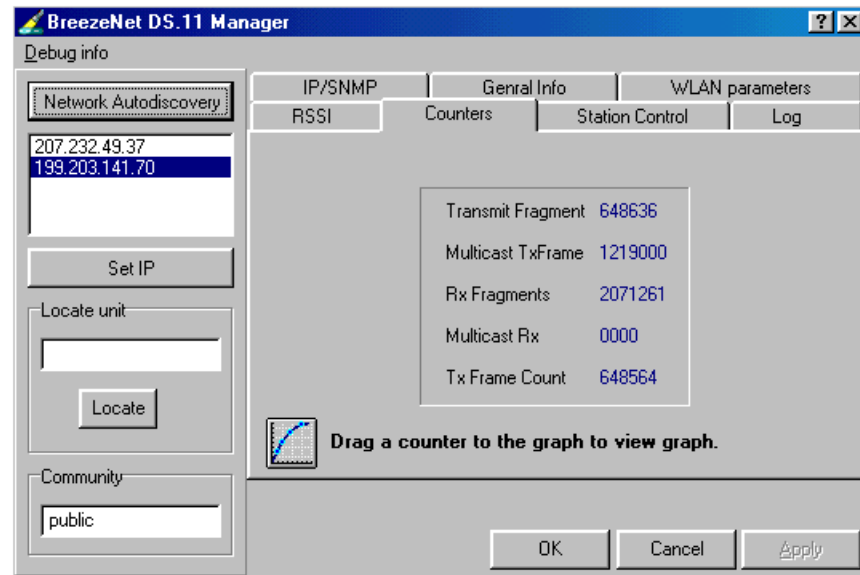



Figure 4-6. Counters Tab

Select a counter and drag it to the graph  icon to view the graph.

- **Transmit Fragment** - The total number of transmitted frames. The count includes data, control and management frames and also the number of retransmissions of data frames (for example, if the same data frame is retransmitted ten times then the count will increase ten times). In a point-to-point application, this counter should relatively correspond to the number of bad fragments received on the other side.
- **Tx Frame Count** - The number of frames transmitted to the wireless media. The count includes the first transmission of data frames (without retransmissions), and also the number of control and management frames.
- **Rx Fragments** - The total number of frames received, including data, control, and duplicate data frames.
- Multicast Rx -
- Multicast Tx -

## 4.1.7 The Station Control Tab

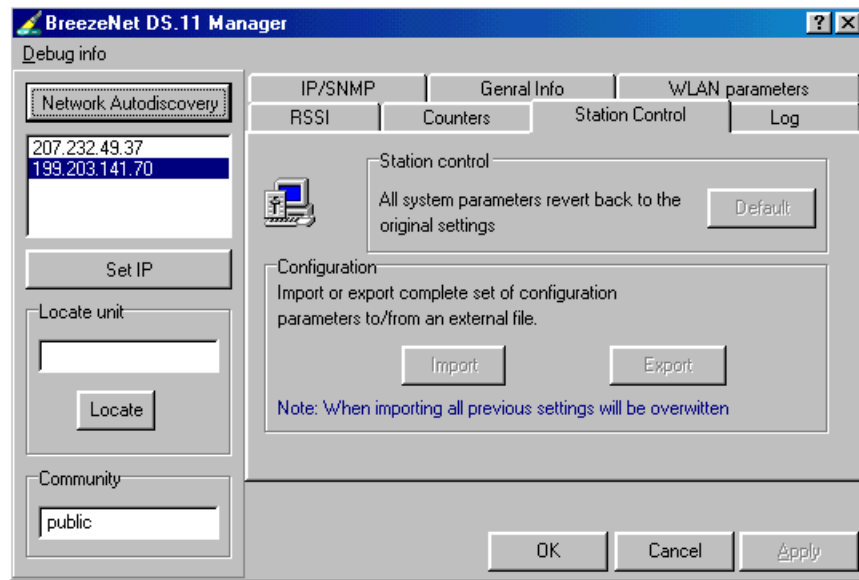
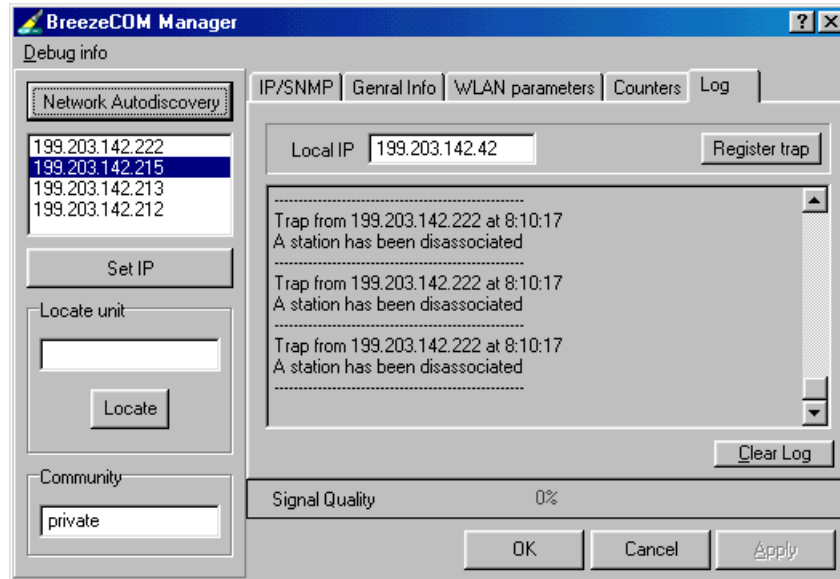


Figure 4-7. The Station Control Tab

**Station Control** - Click the  button to revert back to the factory default settings.

**Configuration** - Click Import/Export to import or export a complete set of configuration parameters to an external file.

## 4.1.8 The Log Tab



*Figure 4-8. Log Tab*

When an event occurs, a trap is sent to the defined host address. The Log tab allows you to configure the host address to which the traps are sent.

A list of the last traps is displayed in the event log area, below the Local IP field.

The default host address is the IP address of the PC running the BreezeNET Management utility.

1. Select the IP address as explained earlier. the selected address appears in the Local IP field.
2. Click the **Register trap** button to register this address as the host address.
3. Repeat Step 2 for all the IP addresses you wish to send traps to.

### **4.1.9 Debug Info**

This option allows you to create a log file, named BreezeLog.log. Later you can send this log file to BreezeCOM Technical Support and receive help based on the information recorded in this file.

To start recording, open the Debug Info option and select Start Log.

When you finish recording (usually after 24 hours) select Stop Log and send the file to BreezeCOM Technical Support representatives.

## **4.2 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 4.1.2.2 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 4.1.4 for further information. Add descriptive information about each Access Point for later reference.

## 4.3 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:

<b>Regulatory Domain</b>	<b>4.8.1.1 Area</b>	<b>Permissible Channels</b>	<b>Predefined channels</b>
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

## 5. SOFTWARE DOWNLOAD PROCEDURE

1. Set the unit's IP address, using the BreezeCOM Manager utility, and verify that the PC's IP address belongs to the same Subnet Mask as the unit.
2. Ping the unit's IP address. Make sure that the Ping replies are being received.
3. Use the TFTP utility on the PC:
  - a) Syntax: TFTP [-i] destination host [PUT] source file [password]
  - b) Example: TFTP -i 199.203.141.30 put ap1100.arm private

Download will be completed within 1 minute, and a message of successful file transfer will show on the screen.
4. Click OK; the unit resets itself.
5. Check the diagnostics LEDs, and use the BreezeNET Management utility to make sure that the version number is correct.

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**Note:** *Do not disconnect any cables or try to stop the process before downloading is completed.*

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## 6. TECHNICAL SPECIFICATIONS

### 6.1 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)

### 6.2 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)

### 6.3 Power specifications

DC power supply	In 100 - 230 VAC 50/60 Hz 150 mA Out 9 VDC 1.3 A
AP-DS.11 Access Point	In 9 VDC 1 A

## 6.4 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)

## 6.5 Specific features

Supported bit rates	<ul style="list-style-type: none"><li>• 11 Mbps</li><li>• 5.5 Mbps</li><li>• 2 Mbps</li><li>• 1Mbps</li></ul>
Utility Software	DS11 BreezeNET Management utility

## 6.6 Physical Dimensions

Size	180 x 220 x 40 mm
Weight	



