

# ***BreezeACCESS Access Unit***

***AU-O-2.4 110/220***

# **Installation Manual**

Revision B.1

August, 1999

Cat. No. 213062

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## **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 BreezeACCESS product is warranted against defects in material and workmanship for a period of one year from date of purchase. 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 within the USA.

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**

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## **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.

## **Safety Considerations**

For the following safety considerations, "Instrument" means the *Breeze-Access Base Station* components and its cables.

### **Caution**

To avoid shock, do not perform any servicing unless you are qualified to do so.

## **Grounding**

Before connecting the instrument to the power line, verify that a suitable power cord is being used (the protective earth terminal of this instrument must be connected to the protective conductor of the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. If an extension cord (power cable) is used make sure it has a protective conductor (grounding).

## **Line Voltage**

Before connecting this instrument to the power line, make sure that the voltage of the power source matches the requirements of the instrument:

- 100-120 VAC for AU-O 2.4-110
- 207-253 VAC for AU-O 2.4-220

## **Radio**

The instrument transmits radio energy during normal operation. To avoid possible harmful exposure to this energy, do not stand or work for extended periods of time in front of its antenna. The long-term characteristics or the possible physiological effects of Radio Frequency Electromagnetic fields have not been yet fully investigated.

## **Antenna Installation and Grounding**

Be sure that the Outdoor unit, the antenna and the supporting structure are properly installed to eliminate any physical hazard to either people or property. Verify that the antenna mast is grounded so as to provide protection against voltage surges and static charges. Make sure that the installation of the antenna and cable is performed in accordance with all relevant national and local building and safety codes.

**FCC Notice**

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 and, if not installed and used in accordance with the instructions, 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 to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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# About this Manual

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**This manual contains the following information:**

- ⇒ System Description
- ⇒ Packing List
- ⇒ Installation Guidelines
- ⇒ Installing the Outdoor Unit
- ⇒ Installing the Indoor Unit
- ⇒ Setting Basic System Configuration Parameters
- ⇒ Specifications
- ⇒ Preparing the Indoor-to-Outdoor Baseband Cable

## **1. System Description**

The BreezeACCESS IP Broadband Wireless Local Loop (WLL) system is a high-performance wireless access system. It allows ISPs and service providers to offer their subscribers high-speed wireless IP connectivity services. BreezeACCESS employs wireless packet data switching technology, significantly more appropriate for IP-based services than older switching technology, and supports Voice over IP (VoIP) based on the H.323 protocol.

BreezeACCESS Access Units allow remote Subscriber Units (SUs) to communicate over the wireless infrastructure at data rates of up to 3Mbps.

Access Units are installed at the Base Station site. Access units are comprised of an Indoor unit and an Outdoor unit. The outdoor unit of the AU-O 2.4-110/220 can be connected to one or two separate antennas. The Indoor unit connects to the Ethernet hub, switch or router.

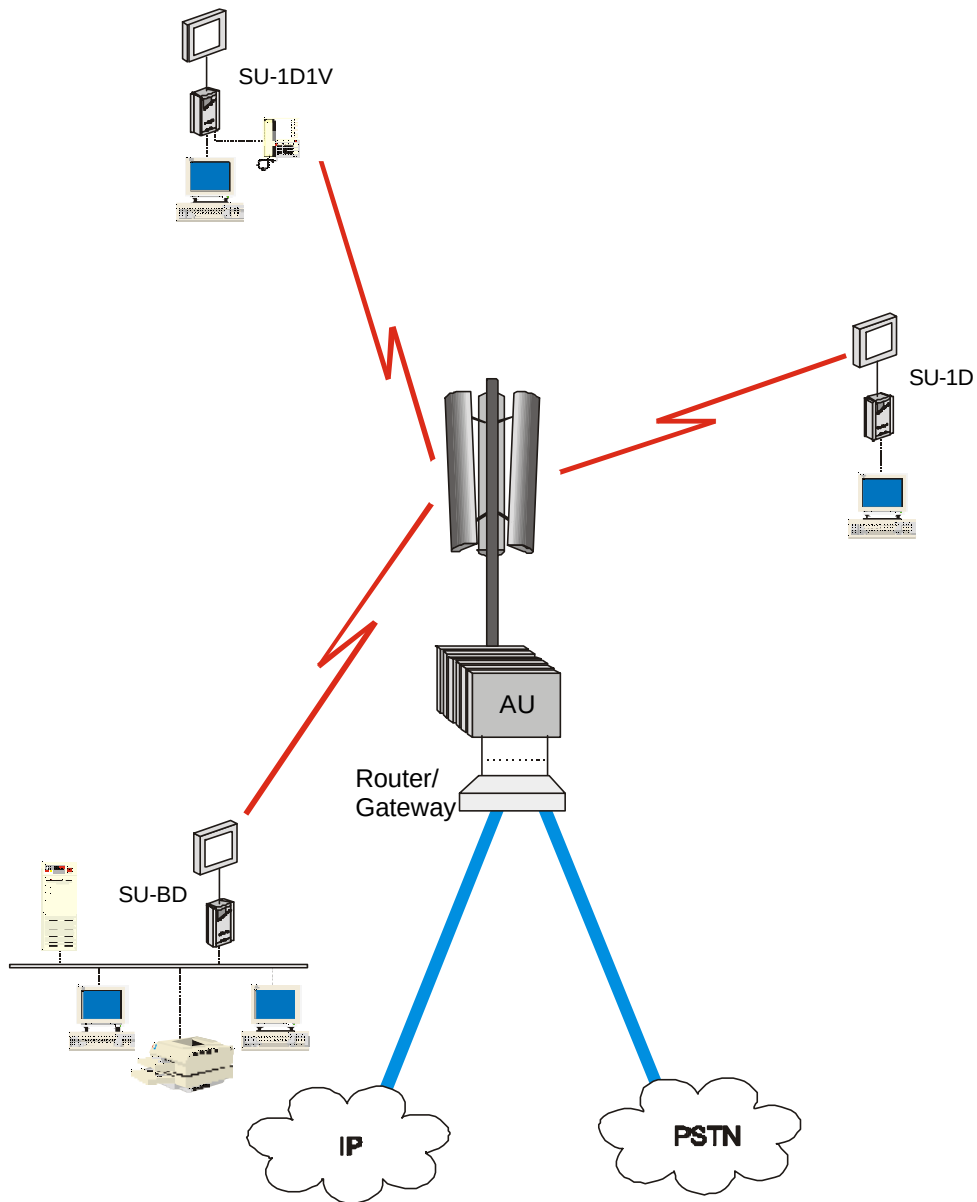


Figure 1. System Diagram

## **2. Packing List**

The Access unit is shipped with the following units and accessories. The exact packing list varies depending on system configuration and ordered equipment.

- Indoor unit
- Outdoor unit
- 110/220 VAC Power cord (open ended)
- Sun-guard (installed on the rear side of the outdoor unit)
- Technician cable

### **2.1 Other Optional Items Available from BreezeCOM**

- U-bolts size A kit for pole mounting (up to 2" pole)
- U-bolts size B kit for pole mounting (up to 3" pole)
- Wall mounting kit
- Sun-guard (optional for front side)
- Baseband cable (available in different lengths)
- A set of connectors for the Baseband cable (when not using the cables available from BreezeCOM. Refer to Appendix A for instructions on how to build the cable.)

### **2.2 Other Required Items**

In addition to the items supplied by BreezeCOM, the following items must be available for the installation:

- Antenna (or two antennas) for Outdoor units; refer to the Specifications on page 20 for information regarding the radio unit.
- Power mains cable termination plug per country of installation
- U-bolts or metal bands for pole mounting (if not using the optional U-bolts kit available from BreezeCOM)
- Ground cables with an appropriate terminal

- Ethernet cable (straight)

### **3. General Installation Guidelines**

Follow these guidelines when selecting the locations for the indoor unit and the outdoor units:

- Select an appropriate location for the Outdoor unit and the antenna (not supplied by BreezeCOM). The antenna should be mounted on a pole and should be installed where a direct line of sight with the Access Unit/Base Station antenna can be established.
- The Outdoor unit can be pole- or wall-mounted. Its location should be selected to allow easy access to the unit for installation and testing. The antenna and Outdoor unit should be installed near each other.
- The Outdoor unit is designed for operation under outdoors environmental conditions. However, it is recommended to try to install it in a place where its exposure to direct sunlight will be minimal.
- The unit is designed to withstand rain and humidity. However, it is not designed to withstand immersion in water and it should not be installed in a place where large quantities of water can accumulate.
- The maximum length of the Baseband cable, between the Indoor and the Outdoor unit, should not exceed 30 meters.
- Select an appropriate location for the Indoor unit. The Indoor unit should be installed in a place that is as close as possible to the exit point of the cable connecting it to the Outdoor unit. The selection of location of the Indoor unit should also take into account the need to connect it to a power outlet and to the network.

#### **3.1 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 diversity* option to either antenna 1 or antenna 2, according to the antenna being used (refer to page 17).

## 3.2 Installation Overview

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**Note:** *It is highly recommended to complete configuration of the system parameters in a lab prior to the installation. Refer to page 14 for instructions on those settings.*

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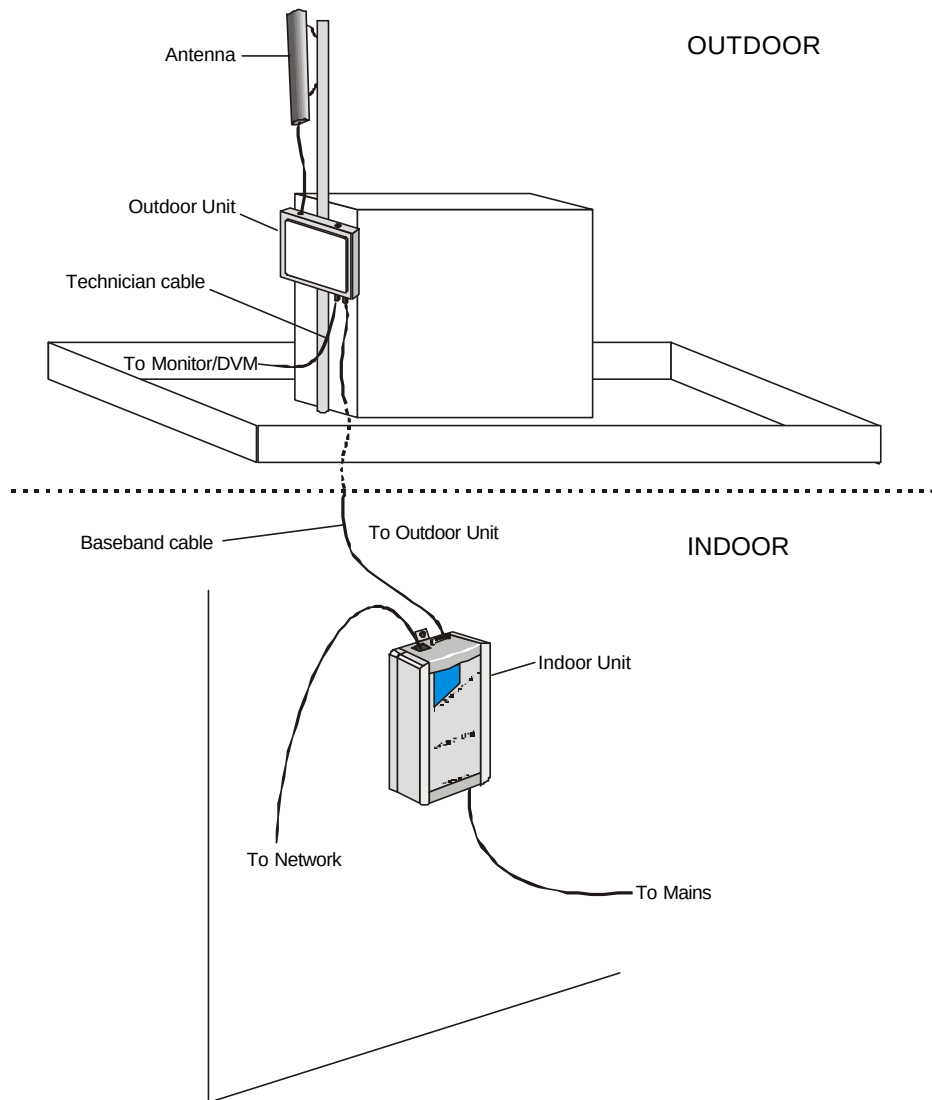
The typical installation scheme is depicted in Figure 2. The installation process should follow these general steps:

1. Mount the Outdoor unit. Mount an external antenna. Connect the Outdoor unit to the antenna. Connect the Baseband and ground cables to the Outdoor unit.
2. Mount the Indoor unit. Connect the Baseband cable (from the Outdoor unit). Connect the Indoor unit to the AC mains via the power cable.
3. Connect an ASCII terminal to the MON port of the Outdoor unit via the technician cable and configure basic system parameters.
4. Verify correct operation of the Outdoor unit.
5. Connect the Indoor unit Ethernet connector to the network using a straight Ethernet Cable.

---

**Note:** *The Indoor unit should be connected to the power source only after the Outdoor unit have been connected to it.*

---



**Figure 2. General Installation Scheme (AU-O, Pole Mounting)**

## 4. Installing the Outdoor Units

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**Note:** When mounting the Outdoor unit, be sure to mount it with the Antenna connectors facing upwards.

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The Outdoor unit can be mounted in either of the following configurations:

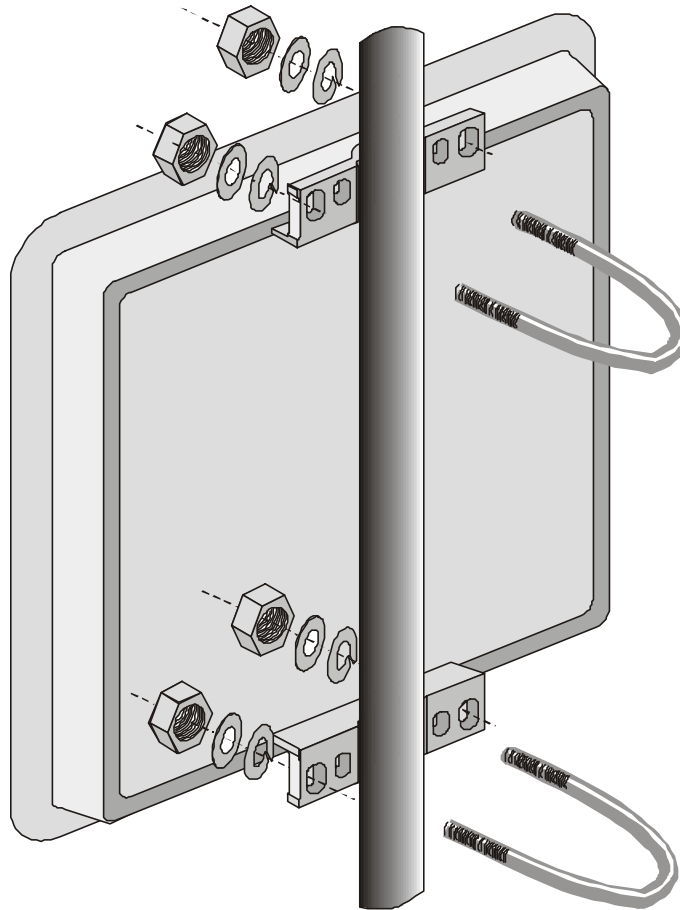
- Pole mounted
- Wall mounted

### 4.1 Pole Mounting

Choose a location where the unit's exposure to direct sunlight is minimal. Avoid placing it in locations where water might accumulate. If necessary, install the sun-guard plate on the panel where exposure to sunlight is expected.

The installation holes on the rear side of the Outdoor unit (see Figure 3) can be used to pole mount the unit using one of the following options:

- U-bolt - size A (inside installation holes, up to 2" pole)
- U-bolt - size B (outside installation holes, up to 3" pole)
- Metal bands



**Figure 3. Pole Mounting Installation**

## 4.2 Mounting the Antenna

Secure brackets to the antenna using screws, lock washers and nuts as appropriate. Mount the antenna on a pole and secure it using metal bands or U-bolts. Do not tighten the metal bands or U-bolts, in order to enable rotation of the antenna over the horizontal plane. The front of the antenna should be directed towards the Base Station/Access Unit. Use Vertical Polarization.

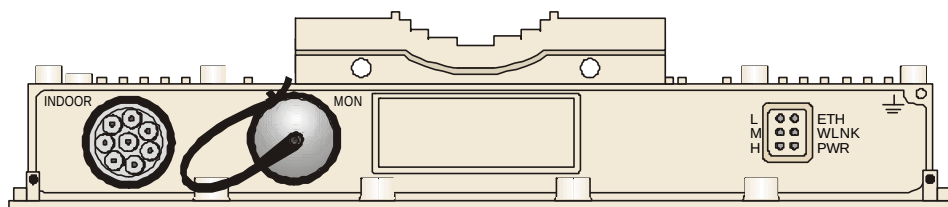
The AU-O Outdoor unit comes with a sun-guard mounted on its rear side. This accessory can be removed by unscrewing the attaching screws, and can be installed on the front side if necessary. A second, optional sun-guard can be ordered for assembly on the front cover. The second sun-guard is recommended for installations where both the front and the back of the Outdoor unit may be exposed to direct sunlight. Contact your BreezeCOM representative for a parts catalog with the accessories that you can order.

## 4.3 Wall Mounting the Outdoor Unit

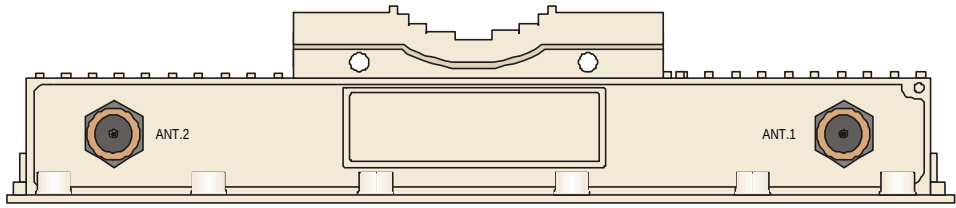
See the instructions included with the wall mounting kit.

## 4.4 Connecting the Baseband, Antenna and Ground Cables

The Baseband, Ground and Monitor cable connectors are located on the bottom panel of the Outdoor unit, shown in Figure 4. The Antenna connectors are located on the top panel of the Outdoor unit, shown in Figure 5.



**Figure 4. Outdoor Unit Bottom Connection Panel**

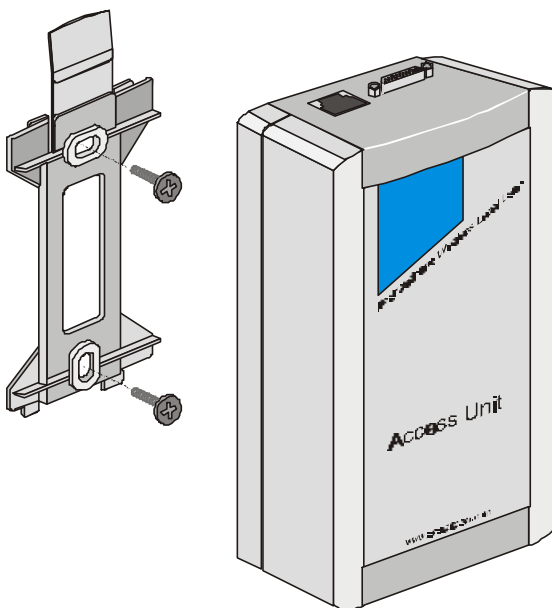


**Figure 5. Outdoor Unit Top Connection Panel**

1. Connect the antenna cable between the Outdoor unit and the antenna; if you are installing a second antenna (see Section 6.4), connect it to the second antenna connector on the top panel of the unit.
2. Connect one end of the ground cable to the Outdoor unit and connect the other end to a good ground connection.
3. Connect the Indoor unit to Outdoor unit Baseband cable, supplied with the access unit, to the appropriate connector. Appendix A provides instructions on how to prepare this cable.

## 5. Installing the Indoor Unit

1. Remove the wall mounting bracket clipped to the rear of the Indoor unit and mount the Indoor unit on a wall as shown in Figure 6.



**Figure 6. Wall Mounting the Indoor Unit**

2. According to specific conditions, route the Outdoor unit to Indoor unit Baseband cable into the building so that it shall conveniently reach the Indoor unit in such a way as to ensure minimal interference, leaving some spare. Connect the Baseband cable to the Radio connector, located on the front panel of the Indoor unit shown in Figure 8.
3. Connect the power cord to the unit's port connector, located on the rear panel shown in Figure 7. Connect the other end of the power cord to the AC mains.

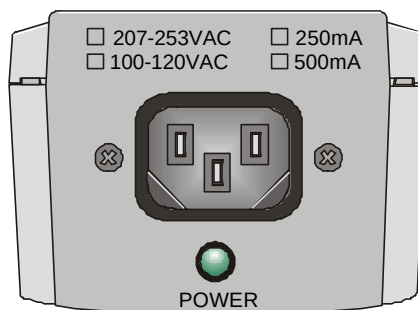
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**Note:** Prepare the other end of the power cord with a power plug appropriate to the country in which the unit is being installed. The color codes of the cable are:

|              |                   |
|--------------|-------------------|
| brown        | phase ~           |
| blue         | neutral 0         |
| yellow/green | grounding $\perp$ |

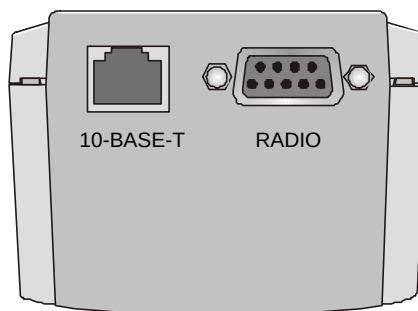
The factory set voltage of the Indoor unit is marked appropriately on the rear panel of the unit.

---



**Figure 7. Indoor Unit Rear Panel**

4. Verify that the LED, located on the rear panel, is ON indicating that 48 VDC is not shorted.



**Figure 8. Indoor Unit Front Panel**

5. Connect a hub, switch or router to the 10-Base T connector, located on the front panel of the Indoor unit. The cable connection should be straight.

---

**Note:** *The length of the Ethernet cable, together with the length of the Baseband cable, should not exceed 100 meters.*

---

## 6. Configuring System Parameters

After completing the installation process for both the Outdoor and Indoor units, as described in the preceding sections of this manual, proceed with configuration of the basic system parameters.

For this configuration process, you will need to connect an ASCII terminal with terminal emulation software (e.g., Procomm or Windows 95 HyperTerminal) to the MON port of the Outdoor unit via the technician cable.

### 6.1 Setup for PC Terminal Emulation Program

Use the following setup for the ASCII terminal connection:

|                     |                    |
|---------------------|--------------------|
| <i>Baud rate</i>    | 9600               |
| <i>Data bits</i>    | 8                  |
| <i>Stop bits</i>    | 1                  |
| <i>Parity</i>       | None               |
| <i>Flow Control</i> | None               |
| <i>Connector</i>    | Available Com Port |

---

**Note:** *Optionally, the product can be configured using Telnet over the Ethernet port, after setting the IP address. For further information, refer to the Administration Manual.*

---

The following system parameters must be configured for each specific installation:

- IP Address
- Subnet Mask
- Default Gateway Address
- ESS ID
- Antenna Diversity

The unit's factory default access rights setting is *Installer* to allow configuration of system parameters.

---

**Note:** You should select *Reset Unit* in the *Station Control Sub-menu* for the changes to take effect.

---

## 6.2 IP, Subnet Mask and Default Gateway Address Configuration

1. After connecting the ASCII terminal to the Outdoor unit, press **Enter** to obtain the BreezeACCESS Monitor main screen.

```
BreezeACCESS (AU-A/0)
Official Release Version - 1.3.5
Release Date: Wed Apr 28 16:23:57 1999
BreezeACCESS Monitor
=====
1 - System Configuration
2 - Advanced Settings
3 - Site Survey
4 - Access Control
BreezeACCESS >>>
```

**Figure 9. Breeze Access Monitor Main Menu**

2. Type 1 to access the *System Configuration* sub-menu.

```
System Configuration
=====
1 - Station Status
2 - TCP\IP and SNMP Parameters
3 - Wireless LAN Parameters
4 - Bridging
5 - Station Control
BreezeACCESS >>>
```

**Figure 10. System Configuration Sub-Menu**

3. Type 2 to access the *IP and SNMP Parameters* sub-menu.

```
IP and SNMP Parameters
=====
1 - IP Address
2 - Subnet Mask
3 - Default Gateway Address
4 - SNMP Traps
5 - TCP Parameters
S - Display Current Values
```

**Figure 11. IP and SNMP Parameters**

4. Type 1 to access the *IP Address* selection screen. Type in the required IP Address determined by the system manager. Press **Enter** to return to the *IP and SNMP Parameters* menu. Press **Esc** to return to the *IP and SNMP Parameters* menu without changing the values.
5. Type 2 to access the *Subnet Mask* selection screen. Type in the required Subnet Mask.
6. Press **Enter** to return to *IP and SNMP Parameters* menu.

7. Type 3 to access the *Default Gateway Address selection* screen. Type in the required gateway address. Press **Enter** to return to *IP and SNMP Parameters* menu.

### 6.3 ESSID Configuration

1. Press **Esc** to return to the *System Configuration* menu.
2. Type 3 to access the *Wireless LAN Parameters* menu.

```
Wireless LAN Parameters
=====
1 - Hopping Sequence (Shift) (AU only)
2 - Hopping Sequence Offset
3 - Hopping Sequence Set
4 - ESS ID
5 - Max. Data Rate
6 - Transmit Diversity
7 - Mobility
8 - Load Sharing
9 - Long Range
A - Prioritized Channels
S - Display Current Values
BreezeACCESS >>>
```

**Figure 12. Wireless LAN Parameters Menu**

3. Type 4 to access the *ESS ID selection* screen.
4. Type in the required ESS ID.

## 6.4 Antenna Diversity Configuration

1. From the main menu, select 1 to access the *System Configuration* menu.
2. Type 3 to access the *Wireless LAN Parameters* menu.
3. Type 6 to access the *Transmit Diversity* sub-menu.
4. Select the Antenna Diversity option: 0 - Use Two Antennas, 1 - Use Antenna No. 1, or 2 - Use Antenna No. 2.

## 6.5 Reset Unit

1. Press **Esc** twice to return to *System Configuration* menu.
2. Type 5 to access the *Station Control* sub-menu.
3. Type 1 to access the *Reset Unit* sub-menu.
4. Type 1 followed by **Enter** to reset the unit so that new configuration settings are applied.

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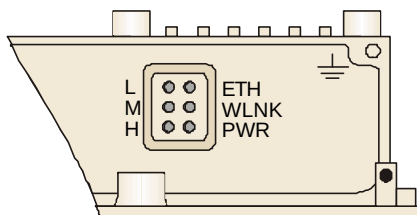
**Note:** *Should you make any mistake during configuration, or should you encounter any problem associated with system configuration parameters, you may configure the unit back to factory defaults: Select 2 in the Station Control menu to access the Set Factory Defaults menu and then Type 1 to load the default values.*

*Select 1 in the station control menu to access the Reset Unit, then type 1 so that the unit will be reset in order for the factory defaults to take effect.*

---

## 6.6 Initial Operation

After completing the installation as described above, and after connecting the Indoor unit to the AC Mains, the system starts operation. To verify correct operation, view the LED panel located on the bottom panel of the Outdoor unit, as shown in Figure 13.



**Figure 13. Outdoor Unit LEDs**

Table 1 lists the various LED states.

**Table 1. Outdoor Unit LEDs**

| Name | Description             | Functionality                                                                                  |                        |
|------|-------------------------|------------------------------------------------------------------------------------------------|------------------------|
| PWR  | Power supply            | On – After successful power up<br>Off – Power off                                              |                        |
| WLNK |                         | Not used                                                                                       |                        |
| ETH  | Ethernet activity       | Blinking – Reception of data from Ethernet LAN<br>Off – No reception of data from Ethernet LAN |                        |
| LOAD | Active subscriber units | L ○<br>M ○<br>H ○                                                                              | no subscribers         |
|      |                         | L ●<br>M ○<br>H ○                                                                              | 1-8 subscribers        |
|      |                         | L ●<br>M ●<br>H ○                                                                              | 9-16 subscribers       |
|      |                         | L ●<br>M ●<br>H ●                                                                              | 17 or more subscribers |

## 7. Specifications

### Radio

|                                   |                                                                              |                   |
|-----------------------------------|------------------------------------------------------------------------------|-------------------|
| Frequency                         | 2.4GHz ISM band                                                              |                   |
| Operation and Standards           | FHSS, ETSI, ETS 300 328; FCC Part 15                                         |                   |
| Operation mode                    | Time Division Duplex                                                         |                   |
| Sensitivity (dBm, BER $10^{-6}$ ) | 1Mbps<br>2Mbps<br>3Mbps                                                      | -81<br>-75<br>-67 |
| Output Power                      | FCC: 17 dBm<br>ETSI: 0 dBm                                                   |                   |
| Data rate                         | 3Mbps max per subscriber with automatic (or forced) fall back to 2 or 1 Mbps |                   |
| Modulation                        | Multilevel GFSK: 2 (@1Mbps), 4 (@2Mbps) or 8 (@3Mbps)                        |                   |

### Management

|                   |                                                       |
|-------------------|-------------------------------------------------------|
| Class of Service  | CIR/MIR by customer; Prioritize transport by customer |
| System Management | SNMP agent, Telnet                                    |
| Security          | Authentication based on RC-4                          |
| Software          | Upgradeable (download)                                |

**Interfaces**

|                     | Indoor Unit          | Outdoor Unit                        |
|---------------------|----------------------|-------------------------------------|
| RF Interface        |                      | 2 x N Type, male                    |
| Ethernet            | 10Base-T (RJ-45)     |                                     |
| Monitor             |                      | mini sealed connector 5 pin, female |
| Power               | AC power outlet      |                                     |
| Outdoor/Indoor Unit | 9-pin D-Type, female | mini sealed connector 8 pin, male   |

**Indicators**

| Indoor | Outdoor               |
|--------|-----------------------|
| Power  | Power, Ethernet, Load |

**Electrical**

| Indoor Unit | Outdoor Unit            |
|-------------|-------------------------|
| 110/220 VAC | 48 VDC from Indoor unit |

**Mechanical**

| Indoor Unit            | Outdoor Unit               |
|------------------------|----------------------------|
| 15.4cm x 8.4cm x 5.6cm | 31cm x 31cm x 4.7cm (AU-O) |

**Environmental**

|                       | <b>Indoor Unit</b>                    | <b>Outdoor Unit</b>                     |
|-----------------------|---------------------------------------|-----------------------------------------|
| Operating Temperature | 0 <sup>0</sup> C to 40 <sup>0</sup> C | -40 <sup>0</sup> C to 50 <sup>0</sup> C |
| Operating Humidity    | 5%-95% non condensing                 | Weather protected                       |



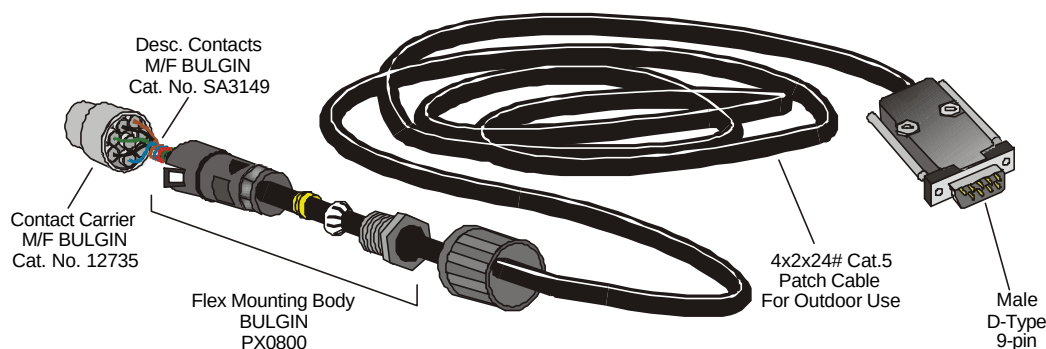
## Appendix A. Preparing the Indoor Unit to Outdoor Unit Baseband Cable

To assist in assembling the Indoor-Unit-to-Outdoor Unit Baseboard cable, use the following tools.

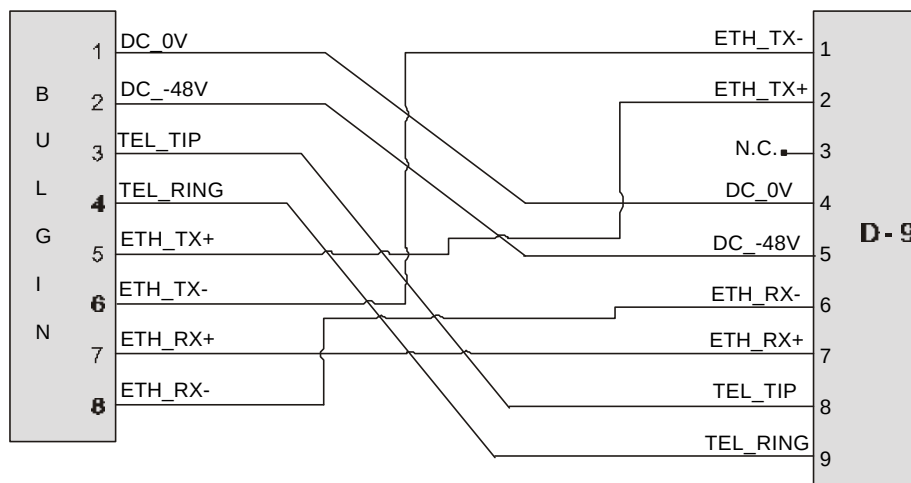
1. For Bulgin Mini Sealed connector:
  - Bulgin Contact Insertion Tool (P/N SA3150)
  - Bulgin Crimping Tool (SA 2800)

For further information, refer to Bulgin's Internet site at [www.bulgin.co.uk](http://www.bulgin.co.uk).

2. For D-Type 9-pin connector:
  - Amphenol hand crimp tool 17 D 440 SP
  - Amphenol contact insertion and removal tool 17 D 438 SP



**Figure 14. Assembling the Indoor-Unit-to-Outdoor Unit Baseband Cable**



**Figure 15. Bulgin to 9-Pin D-Type Pin Assignments**

**Table 2. Bulgin to 9-Pin D-Type Pin Assignments**

| D-9 | BULGIN | Description |
|-----|--------|-------------|
| 1   | 6      | ETH_TX-     |
| 2   | 5      | ETH_TX+     |
| 3   |        | N.C.        |
| 4   | 1      | DC_0V       |
| 5   | 2      | DC_-48V     |
| 6   | 8      | ETH_RX-     |
| 7   | 7      | ETH_RX+     |
| 8   | 3      | TEL_TIP     |
| 9   | 4      | TEL_RING    |