

BreezeACCESS 2.4

Base Station Equipment

Installation Manual

Revision 3
November, 2000
Cat. No. 213125

© 2000 by BreezeCOM Ltd. All rights reserved.

No part of this publication may be reproduced in any material form without the written permission of the copyright owner.

Trade Names

BreezeACCESS, BreezeNET, BreezeLINK, BreezeVIEW, BreezeMANAGE and WIX are trade names of BreezeCOM Ltd. Other brand and product names are registered trademarks or trademarks of their respective companies.

Statement of Conditions

The information contained in this manual is subject to change without notice. BreezeCOM 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 Ltd., for products located outside the USA.
- BreezeCOM Inc., for products located in 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.

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.

Limitations 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.

BreezeCOM shall not be liable to any person for any special or indirect damages, including, but not limited to, loss of profits or revenues, loss of use or damage to any associated equipment, cost of capital, cost of substitute products, facilities or services, downtime costs or claims resulting from any cause whatsoever arising from or in any way connected with the manufacture, sale, handling, service, repair, maintenance or use of the products. In no event shall the company's liability exceed the purchase price denoted on the invoice.

Electronic Emission Notice

This device complies with Part 15 of the FCC rules. 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 digital equipment, 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/her own expense.

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 BreezeACCESS Base Station equipment components and cables.

RF Warning

To comply with FCC RF exposure requirements in section 1.1307, a minimum separation distance of 2m (79 inches) is required between the antenna and all persons.

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.

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 outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes.

Table of Contents

1. INTRODUCTION	1
2. BASIC INSTALLATION	2
2.1 Packing List – Modular Shelf Equipment	2
2.1.1 BS-SH Base Station Shelf.....	2
2.1.2 AU-A/E-BS Access Units (up to six per shelf).....	2
2.1.3 BS-PS Power Supply (one or two per shelf).....	2
2.2 Packing List – Stand-alone AU-A/E-NI Access Unit	3
2.3 Other Items Required for Installation.....	3
2.4 Guidelines for Selection of Equipment Location	3
2.5 Installing the Outdoor Radio Unit.....	6
2.5.1 Mounting the Outdoor Unit	6
2.5.2 Connecting the Antenna Cable (AU-RE)	8
2.5.3 Connecting the Ground and IF Cables.....	8
2.6 Installing the Modular Shelf Indoor Equipment	9
2.6.1 BS-SH Slot Assignments	9
2.6.2 The BS-AU	10
2.6.3 The BS-PS.....	12
2.6.4 Shelf and Modules Installation Procedure	13
2.7 Installing the AU-NI Indoor Unit.....	14
3. CONFIGURING SYSTEM PARAMETERS.....	15
3.1 Getting Started with the Local Terminal.....	15
3.2 Configuring Basic Parameters.....	17
3.3 Reset Unit.....	18
4. VERIFYING CORRECT OPERATION	19
4.1 Verifying Correct Operation of the AU-A/E-BS	19

4.2 Verifying Correct Operation of the AU-A/E-NI	19
4.3 Verifying Correct Operation of the Outdoor Unit.....	20
5. SPECIFICATIONS	21
5.1 Radio	21
5.2 Outdoor Unit to Indoor Unit Communication.....	21
5.3 Configuration and Management.....	22
5.4 Interfaces	22
5.5 Electrical	23
5.6 Mechanical	23
5.7 Environmental.....	23
5.8 Standards Compliance, General	23
APPENDIX A. USING TELNET	
APPENDIX B. BASIC PARAMETERS	

Table of Figures

Figure 2-1. Holes/Grooves/Screw Holes.....	6
Figure 2-2. AU-RE 3" Pole Mounting Installation Using the Special Brackets	7
Figure 2-3. AU-RA/AU-RE Radio Unit Bottom Panel.....	8
Figure 2-4. Shelf Slot Assignments.....	9
Figure 2-5. BS-AU Front panel.....	10
Figure 2-6. BS-PS Front Panel.....	12
Figure 2-7. AU -NI Rear Panel	14
Figure 2-8. AU -NI Front Panel	14
Figure 3-1. Main Menu	16

Table of Tables

Table 2-1: IF Cables.....	4
Table 2-2: BS-AU LEDs	11
Table 2-3: BS-PS Power Supply LEDs.....	12
Table 4-1: AU-NI LEDs.....	19
Table 4-2: AU-RA/RE LEDs	20
Table 5-3. Hopping Sequences.....	26

1. INTRODUCTION

This manual describes installation guidelines for BreezeACCESS 2.4 base station equipment, including the stand-alone AU-E/A-NI-2.4 Access Units and the modular AU-E/A-BS-2.4 Units with the BS-SH rack mounted shelf.

The BreezeACCESS IP Broadband Wireless Local Loop (WLL) system allows access service providers to provide high-speed IP connectivity services to their subscribers. To support IP-based services effectively BreezeACCESS systems employ wireless packet data switching technology.

The BreezeACCESS 2.4 line of products uses Frequency Hopping Spread Spectrum radios that operate in Time Division Duplex (TDD) mode in the 2.400GHz – 2.500GHz frequency range.

The AU-A/E-NI and the AU-A/E-BS Access Units are comprised of an indoor unit and an outdoor unit. In the AU-A-NI and AU-A-BS products, the outdoor unit (AU-RA) contains the radio module and an integral flat antenna. In the AU-E-NI and AU-E-BS products, the outdoor unit (AU-RE) contains the radio module and an interface to an external antenna (not included).

The indoor unit of the AU-A/E-NI is a stand-alone unit (AU-NI) that is powered from the mains via its AU-PS power supply unit. The indoor unit of the AU-A/E-BS is a module (BS-AU) that is designed for insertion into the BS-SH shelf. The BS-SH, which is a 3U shelf suitable for installation in 19" racks, can contain up to six BS-AU active modules and one or two BS-PS power supply modules. The shelf is powered from a –48VDC power source. Power supply redundancy is supported through the optional use of a second BS-PS power supply module.

The indoor unit provides the interface to the network. It also contains an IF (Intermediate Frequency) module and is connected to the outdoor unit via a 50-ohm coaxial IF cable. The IF cable serves for transmission of the 440MHz IF signal between the indoor and the outdoor units. It also serves for transferring power (12VDC), management and control signals from the indoor unit to the outdoor unit.

Note: *The information contained in this manual is applicable to BreezeACCESS 2.4 units with software release 2.5 and up.*

2. BASIC INSTALLATION

2.1 Packing List – Modular Shelf Equipment

2.1.1 BS-SH Base Station Shelf

- BS-SH shelf (with blank panels)
- Rubber legs for optional desktop installation

Note: Unless ordered otherwise, each BS-SH will be shipped with one BS-PS power supply installed.

2.1.2 AU-A/E-BS Access Units (up to six per shelf)

- Outdoor unit:
 - ⇒ AU-RA with integral antenna
 - or
 - ⇒ AU-RE with a connector to an external antenna (not included)
- Pole mounting kit for the outdoor unit (with two brackets, four sets of screws, nuts and washers)
- BS-AU Network Interface module
- Monitor cable

2.1.3 BS-PS Power Supply (one or two per shelf)

- BS-PS Power Supply module
- Power cable

2.2 Packing List – Stand-alone AU-A/E-NI Access Unit

- AU-NI indoor unit
- Outdoor unit:
 - ⇒ AU-RA with integral antenna
 - or
 - ⇒ AU-RE with a connector to an external antenna (not included)
- AU-PS power supply with a mains power cord
- Pole mounting kit for the Outdoor unit (with two brackets, four sets of screws, nuts and washers)
- Wall mounting kit for the AU-NI unit

2.3 Other Items Required for Installation

- IF cable (s)* (one for each AU)
- Grounding cable(s) with an appropriate termination (one for each AU)
- Ethernet cable(s) (straight, one for each AU)
- Antenna(s)* and RF cable(s)* (AU-E-NI or AU-E-BS only)
- A portable PC with terminal emulation software
- Installation tools and materials.

Items marked with an asterisk () are available as options from BreezeCOM.*

2.4 Guidelines for Selection of Equipment Location

Select appropriate locations for the equipment using the following guidelines:

- The outdoor unit can be pole—or wall mounted. Its location should allow easy access to the unit for installation and testing.
- The AU-RA unit with its integrated antenna, or the external antenna connected to the AU-RE unit, should be installed where it provides coverage of all subscriber units in the area it is intended to serve. The higher the AU-RA or the antenna, the better coverage it can provide.

- The AU-RE outdoor unit should be installed as near as possible to its antenna.

Note: *The distance between any two antennas should be greater than 40 cm.*

- The outdoor unit is connected to the indoor unit by means of a coaxial IF cable carrying signals, controls and power. The IF frequency is 440 MHz. The maximum allowed attenuation of the IF cable is 15dB and its maximum allowed DC resistance (the sum of the DC resistance of the inner and outer conductors) is 1.5 ohm. This allows for cable lengths of up to 30m when using the standard RG 58 cable. If longer cables are required, a cable with lower attenuation and/or DC resistance should be used.

Table 2-1 provides data regarding several industry-standard cables such as RG 58 and RG 213. If the spectral environment is polluted with noise in the 440 MHz band, it is recommended to use a higher quality double-shielded cable such as LMR 240 or LMR 400 (manufactured by Times Communications).

Table 2-1: IF Cables

Cable Type	RG 58	RG 213	LMR 240	LMR 400
Maximum cable Length (m)	30	100	65	150

- The BS-SH and its modules and the SU-NI are designed for indoor operation, i.e., inside buildings, a suitable cabinet or a shelter. Air temperature control might be necessary – the equipment is designed to operate over the temperature range 0°C to 45°C.

Notice: *Outdoor units and antennas should be installed ONLY by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities.*

The system complies with EN61000-4-5, level 3, (2kV) standard and is protected against secondary lightning strikes when its outdoor unit is properly grounded according to the applicable country-specific industry standards for protection of structures against lightning. The use of any antenna other than those certified with this product is forbidden in accordance to FCC rules 15.204.

Failure to do so may void the BreezeACCESS product warranty and may expose the end user or the service provider to legal and financial liabilities. BreezeCOM and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas. Refer to Appendix C for approved antennas.



2.5 Installing the Outdoor Radio Unit

2.5.1 Mounting the Outdoor Unit

The outdoor unit can be secured to the pole using one of the following options:

- Special brackets and open-ended screws (supplied with each unit). There are two pairs of screw holes on the rear of the unit, allowing use of the brackets with various pole widths.
- U-bolts - size A (inner installation holes, up to 2" pole).
- U-bolt - size B (outside installation holes, up to 3" pole).
- Metal bands (9/16" wide, minimum 12" long).

Figure 2-1 shows the locations of the U-bolt holes, band grooves and screw holes on the rear side of the unit.

Figure 2-2 illustrates the method of installing an AU-RE unit on a pole using the supplied brackets and open-ended screws. The installation of an AU-RA unit with an integral antenna is very similar to the installation of an SU-RE unit.

Note: Make sure to install the unit with the bottom panel (the panel with the IF connector) facing downward.

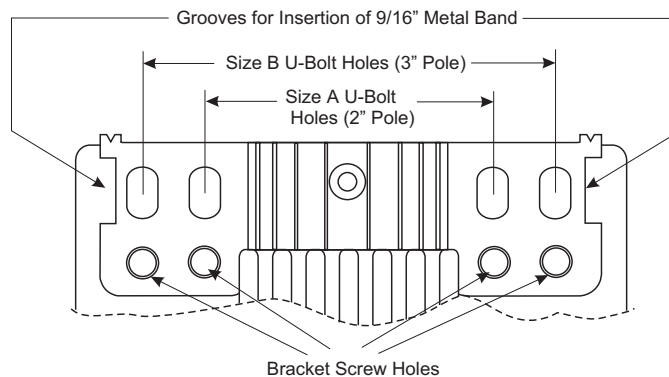


Figure 2-1. Holes/Grooves/Screw Holes

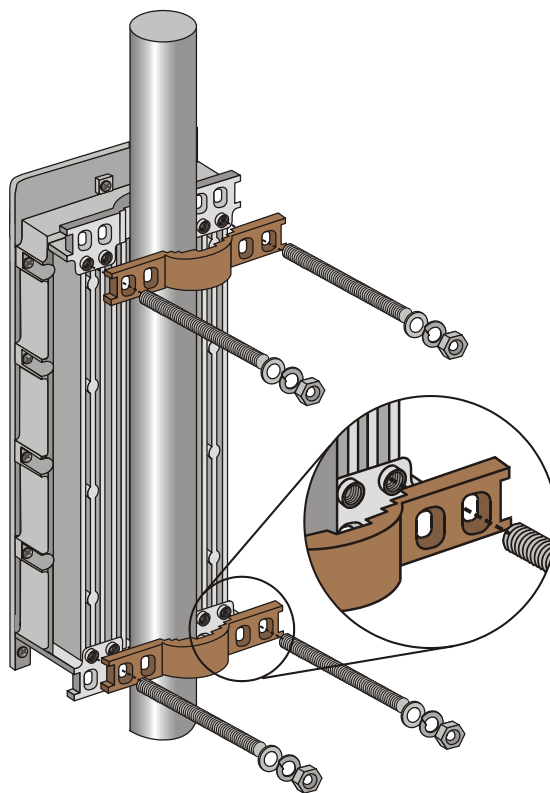
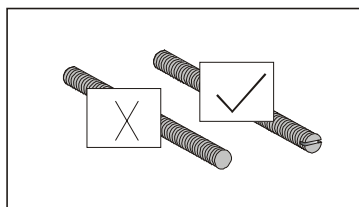


Figure 2-2. AU-RE 3" Pole Mounting Installation Using the Special Brackets

Note: When inserting the open-ended screws, make sure to insert them with the grooves pointing outwards; these grooves are intended to allow fastening of the screws with a screwdriver.



2.5.2 Connecting the Antenna Cable (AU-RE)

Connect an RF cable between the ANT connector (located on the top panel of the unit, marked ANT) and the antenna.

2.5.3 Connecting the Ground and IF Cables

The Ground terminal (marked \oplus) and the IF cable connector (marked IF) are located on the bottom panel of the Outdoor unit, shown in Figure 2-3.

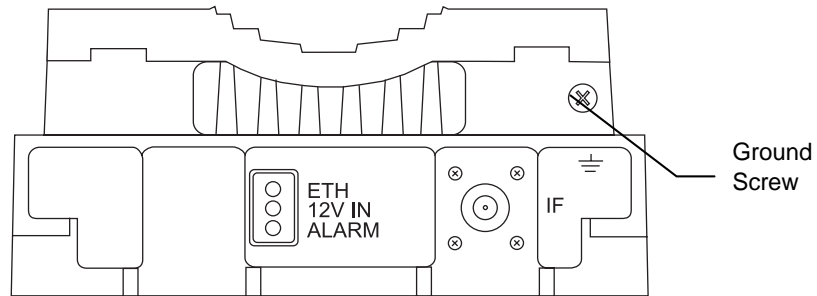


Figure 2-3. AU-RA/AU-RE Radio Unit Bottom Panel

1. Connect one end of the grounding cable to the Ground terminal and connect the other end to a good ground connection.
2. Connect the coaxial cable to the IF connector. Verify that the length of the IF cable is sufficient and that it can easily reach the Indoor unit.

Note: Make sure to switch OFF the power of the indoor unit prior to connecting/disconnecting the IF cable.

2.6 Installing the Modular Shelf Indoor Equipment

2.6.1 BS-SH Slot Assignments

The Base Station shelf has ten slots, as shown in Figure 2-4

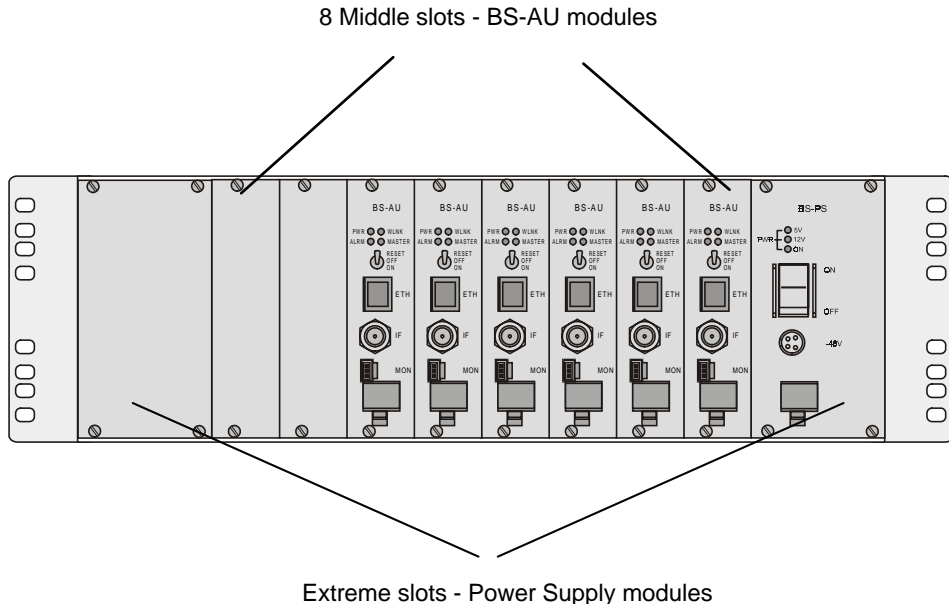


Figure 2-4. Shelf Slot Assignments

The two wide slots on the both sides of the shelf accommodate the BS-PS power supply modules. The shelf is designed to support power supply redundancy through the use of two Power Supply modules. If a single power supply is used, it can be inserted in any of the two available slots.

The remaining eight slots can accommodate up to six active BS-AU modules. Two extra slots are for future use. Active BS-AU modules can be installed in any of the 8 slots. Unused slots should be covered by blank panels.

2.6.2 The BS-AU

The BS-AU front panel is shown in Figure 2-5.



Figure 2-5. BS-AU Front panel

The BS-AU provides the following interfaces:

An Ethernet connector (ETH) for connecting the BS-AU to the network. This connector should be connected to a straight Ethernet cable.

An IF connector for connecting the BS-AU to an outdoor AU-RE or AU-RA radio unit. The outdoor radio unit provides the air link between the BS-AU and the remote Subscriber Units.

A MON connector for connecting an ASCII terminal with terminal emulation software for configuration and maintenance purposes.

The BS-AU front panel LEDs are described in Table 2-2.

Table 2-2: BS-AU LEDs

Name	Description	Functionality
PWR	Power supply 12 VDC	On – 12 VDC power is supplied to AU-RE Off – 12 VDC power is not supplied to AU-RE
WLNK	Wireless link activity	Blinking –Receiving packet from the wireless link Off – No reception of packets from the wireless link
ALRM	ALARM Indication	On – Loss of hopping synchronization (slave units)
MASTER	Master Indication	On – The unit is configured as a Master
ETH connector embedded LED	Ethernet activity	On- Receive/Transmit on Ethernet port Off- No Receive/Transmit on Ethernet port
ETH connector embedded LED	ETH Link Integrity	On- Unit is connected to Ethernet segment Off- Unit is not connected to Ethernet segment

The switch on the BS-AU front panel controls the supply of 12 VDC power to the outdoor unit via the IF cable. The momentary RESET position of this switch is for resetting the outdoor unit. In the OFF position, power is not supplied to the outdoor unit, even when the BS-AU unit is still ON.

2.6.3 The BS-PS

The BS-PS provides power to all the modules installed in the BS-SH rack. The BS-PS front panel is shown in Figure 2-6.

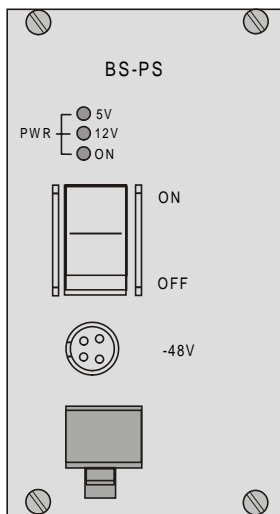


Figure 2-6. BS-PS Front Panel

The BS-PS provides a single connector (marked -48V) for connecting the -48VDC power source to the module. The color codes of the cable wires are:

black -48VDC
red + (Return)

The switch turns the mains power to the power supply ON and OFF.

Table 2-3: BS-PS Power Supply LEDs

Name	Description
ON	-48 VDC is available and Power Supply is ON
5V	The 5V power supply module is OK
12V	The 12V power supply module is OK

2.6.4 Shelf and Modules Installation Procedure

1. Install the BS-SH rack in a 19” cabinet (or place on an appropriate shelf/table). When mounting the BS-SH on a desktop, screw on the rubber legs shipped with unit.
2. Carefully insert the BS-PS Power Supply and the BS-AU modules into their intended slots and push firmly until they are securely locked; refer to Section 2.6.1 for a description of the slot assignments. Close the captive screws attached to each module. Place blank covers over all the unused slots.
3. Connect the IF cable(s) to the connector(s) marked IF located on the front panel(s) of the BS-AU module(s) shown in Figure 2-5. The other side of the IF cable should already be connected to the outdoor unit.
4. Connect the DC power cord to the –48 VDC In jack (marked –48V) located on the front panel of the BS-PS power supply shown in Figure 2-6. If a redundant power supply module is installed, connect a power cable to it as well.
5. Connect the power cord(s) to the –48VDC power source. Connect the black wire to the -48VDC contact of the power source. Connect the red wire to the + (Return) contact. Connect the shield to the Ground.
6. Switch the BS-PS power supplies to ON. Verify that all the power indicator LEDs on the BS-PS front panel are ON. Refer to Table 2-3 for a description of these LEDs.
7. Set the switches on the front panel of all BS-AU modules in the rack to ON.

2.7 Installing the AU-NI Indoor Unit

1. Place the AU-NI unit in an appropriate location on a shelf or a table. The unit can be wall mounted using the installation materials provided with the unit. Use a 6mm (1/4") drill and the supplied template plate for easy and accurate marking of the holes.
2. Connect the AU -PS DC power cord to the DC In jack (marked DC-12V) located on the rear panel of the Indoor unit (shown in Figure 2-6).
3. Connect the IF cable to the IF connector (marked IF) on the rear panel of the Indoor unit. The other side of the IF cable should already be connected to the Outdoor unit.
4. Connect the mains power cord to the AU -PS. Connect the mains power plug to a mains power outlet.

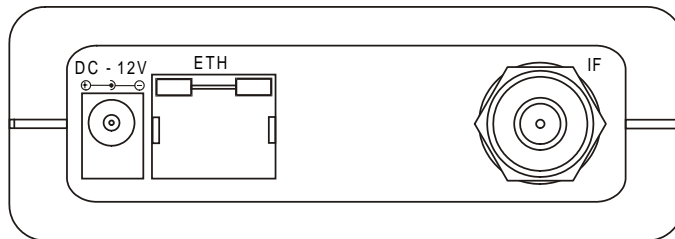


Figure 2-7. AU -NI Rear Panel

5. Verify that the Power LED (marked PWR) located on the front panel of the Indoor Unit is turned ON.

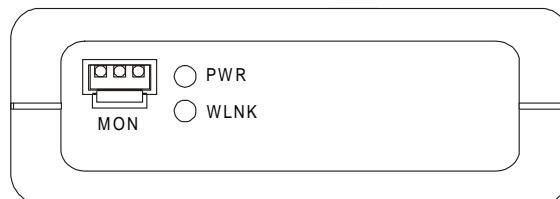


Figure 2-8. AU -NI Front Panel

6. Use a straight Ethernet 10baseT cable to connect the base station network (e.g., a hub, switch or router) to the Ethernet port (marked ETH) located on the rear panel of the AU-NI unit.

3. CONFIGURING SYSTEM PARAMETERS

After completing the installation process as described in the preceding section, proceed with configuration of the basic system parameters.

This section covers the configuration of basic installation parameters. Refer to the Administration Manual for information related to other parameters.

Note: Optionally, the product can be configured using Telnet over the Ethernet port, after setting the IP address. See Appendix A of this manual for further information.

3.1 Getting Started with the Local Terminal

1. Connect one end of the Monitor cable to the MON jack on the front panel of the BS-AU module or the AU-NI unit. Connect the second end of the cable to the COM port of the terminal. The COM port connector on the Monitor cable is a 9 pin D-type plug.
2. Run a terminal emulation program (e.g., ProComm or Windows HyperTerminal) using the following setup:

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

3. Press **Enter**. The *Select Access Level* menu appears. Select the access level according to your authorized access level. You will be requested to enter your password. After entering the correct password press the Enter key. The *main menu* appears as shown in Figure 3-1

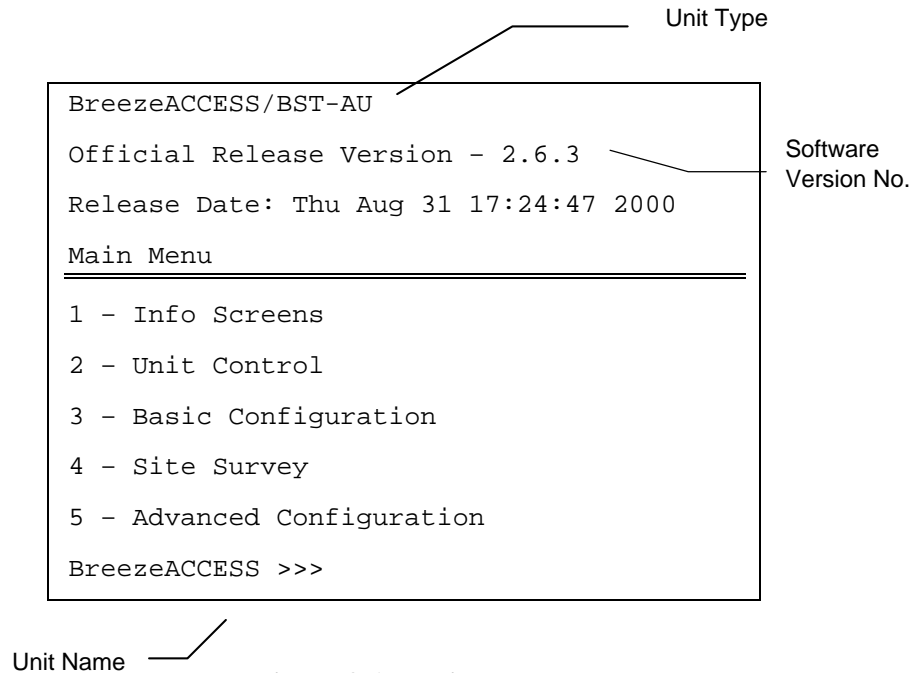


Figure 3-1. Main Menu

The appearance of the displayed *Main Menu* varies in accordance with the access level.

- For users with read only access rights, only the *Info Screens* option is displayed. Users with this access level cannot access the *Unit Control*, *Basic Configuration*, *Site Survey* and *Advanced Configuration* menus.
- For users with Installer access rights, the first four menu items (*Info Screens*, *Unit Control*, *Basic Configuration* and *Site Survey*) are displayed. Users with this access level cannot access the *Advanced Configuration* menu.
- For users with Administrator access rights, the full *Main Menu* will be displayed. These users can access all the menu items.

4. Operate the monitor program as follows:
 - Type an option number to open/activate the option. You may need to press the Enter key in some cases.
 - Press the Esc key to exit a menu or an option.
 - You can log-out and exit the monitor program at any time by simultaneously pressing the **Ctrl** and **X** keys.
 - Reset the unit after making configuration changes for the new values to take effect.
 - You can view the current parameters' configuration by selecting 1 in the Main Menu to Access the Info Screens menu, and then selecting 2 in the Info Screens menu to view the Basic Configuration parameters.

3.2 Configuring Basic Parameters

The following system parameters must be configured for each Access Unit:

- *ESSID*
- *IP Address*
- *Subnet Mask*
- *Default Gateway Address*
- *Hopping Sequence*
- *Hopping Set*
- *Hopping Sync* (if using two or more AUs)

Note: *You must select Reset Unit in the Unit Control menu for the changes to take effect.*

See Appendix B for more details on the basic parameters.

1. From the *main menu*, type **3** to access the *Basic Configuration* menu.
2. From the *Basic Configuration* menu, type **1** to access the *IP Address* selection screen. Enter the required IP address.
3. Type **2** to access the *Subnet Mask* selection screen. Enter the required subnet mask.
4. Type **3** to access the *Default Gateway Address* selection screen. Enter the required default gateway address.
5. Type **4** to access the *ESSID* selection screen. Enter the required ESSID.
6. Type **7** to access the *Hopping Sequence* menu. Enter the required hopping sequence.
7. Type **9** to access the *Hopping Set* selection screen. Enter the required hopping set.
8. If more than one AU-BS is used, they should be synchronized for optimal spectrum utilization. Type **8** to access the *Hopping Sync* selection screen. Enter the required hopping sync status (Master or Slave).

Note: *Only one AU should be defined as a Master. The other units should be defined as slaves. If only one AU is used, it should be defined as Idle.*

3.3 Reset Unit

1. From the *main menu*, type **2** to access the *Unit Control* menu.
2. Type **1** to access the *Reset Unit* menu. Type **1** to reset the unit so that new configuration settings are applied.

Note: *Should you make any mistakes during configuration or encounter any problems associated with system configuration parameters, you may configure the unit back to the factory defaults, as follows:*

*Type **2** in the Unit Control menu to access the Set Factory Defaults menu. Type in **2** (Set Factory defaults-Full) to load the default values. Reset the unit for the factory defaults values to take effect.*

4. VERIFYING CORRECT OPERATION

4.1 Verifying Correct Operation of the AU-A/E-BS

After completing the installation as described above, the system starts operation. To verify correct operation, view the LED indicators located on the front panel of the BS-AU modules as shown in Table 2-2 on page 11.

Note: *If the Access Units are not synchronized, reset the Master BS-AU unit and then the Slave units to re-synchronize them.*

4.2 Verifying Correct Operation of the AU-A/E-NI

To verify proper operation, view the LED indicators located on the front and rear panels of the AU-NI unit as described in Table 4-1.

Table 4-1: AU-NI LEDs

Name	Description	Functionality
PWR	Power Supply 12VDC	On – 12VDC power is supplied to the AU-NI Off – Power is not supplied to the AU-NI
WLNK	Wireless link activity	Blinking – Receiving packet from the wireless link Off – No reception of packets from the wireless link
ETH connector embedded LED	Ethernet activity	On – Receive/transmit on Ethernet port Off – No receive/transmit on Ethernet port
ETH connector embedded LED	Ethernet integrity	On – Unit is connected to Ethernet segment Off – Unit is not connected to Ethernet segment

4.3 Verifying Correct Operation of the Outdoor Unit

To verify proper operation, view the LED indicators located on the bottom panel of the Outdoor unit as shown in Figure 2-3 on page 8.

Table 4-2 lists the various LED states.

Table 4-2: AU-RA/RE LEDs

Name	Description	Functionality
ALARM	Alarm Indication	On – A problem with the power amplifier or in the locking process of any of the synthesizers Off –Normal operation
12V IN	12V DC power supply	On – 12VDC power is supplied to the unit Off – 12VDC is not available
ETH	Ethernet activity	Blinking – Data received from or transmitted to Ethernet LAN Off – No activity on the Ethernet LAN

Note: Verifying proper operation of the outdoor unit using the LEDs as described above is possible only after completion of the configuration process.

5. SPECIFICATIONS

5.1 Radio

Frequency	2.4GHz ISM band	
Radio Access Method	FH-CDMA	
Operation Mode	Time Division Duplex	
Channel Bandwidth	1 MHz	
Output Power (at antenna port)	26 dBm (HP) or 2 dBm (LP) typical. Power Control range: 20 dB	
Sensitivity (dBm at antenna port, BER 1E10 ⁻⁶)	1Mbps	-87
	2Mbps	-81
	3Mbps	-73
Data Rate	3Mbps max	
Modulation	Multilevel GFSK	

5.2 Outdoor Unit to Indoor Unit Communication

IF Frequency	440 MHz
IF cable Impedance	50 ohm
Maximum IF cable Attenuation	15dB
Maximum IF cable DC Resistance	1.5 ohm

5.3 Configuration and Management

Local Management	Via MON port, Monitor program using terminal emulation
Remote Management	SNMP, Telnet, TFTP
Remote Management Access	From Wired LAN, Wireless Link
SNMP Agents	MIB II, Bridge MIB, Private MIBs
Security	Authentication and filtering
Software upgrade	TFTP download

5.4 Interfaces

Interface	Outdoor Unit	Indoor Equipment
RF (AU-E)	N-Type jack lightning protected	
IF	TNC jack, lightning protected	TNC jack, lightning protected
Ethernet		10BaseT (RJ-45) with two embedded LEDs
Monitor		3 pin low profile
Power	12 VDC via the IF cable	4-pin power connector (BS-PS), DC plug for the AU-PS power supply (AU-NI)

5.5 Electrical

Outdoor Unit	12 VDC via the IF cable
Indoor Modular Shelf Equipment	-48 VDC, 200 W for a fully equipped shelf. AU (Indoor + Outdoor): 25W
Indoor AU-NI Unit	AU-NI: 12VDC/2.5A from AU-PS AU-PS: 100 - 240 VAC, 47-63 Hz

5.6 Mechanical

Outdoor Unit	AU-RE: 30cm x 12cm x 5cm, 2.2 kg. AU-RA: Depending on specific model.
Indoor Modular Shelf Equipment	BS-SH: 19",3U, depth 26cm, 6 kg. Fully loaded
Indoor AU-NI Unit	AU-NI: 13cm x 8.6cm x 3cm, 0.5 kg. AU-PS: 10cm x 6.5cm x 3.5cm, 0.4 kg.

5.7 Environmental

	Outdoor Unit	Indoor Equipment
Operating Temperature	-40 ⁰ C to 60 ⁰ C	0 ⁰ C to 45 ⁰ C
Operating Humidity	5%-95% non condensing Weather protected	5%-95% non condensing

5.8 Standards Compliance, General

EMC	FCC part 15, EN 300 826
Safety	UL 1950, EN 60950
Environmental	GR - 63 - CORE (Bellcore), ETS 300 019
Surge Immunity	EN 61000-4-5, test level 3 (2kV)

APPENDIX A. USING TELNET

Use the following procedure to connect to BreezeACCESS units via a Telnet session.

1. Connect the PC to the Ethernet port of the unit (or the hub to which the unit is connected) using a straight Ethernet cable. If you connect the PC directly to a unit that is normally connected to a hub, use a crossed Ethernet cable. You may also connect the PC to any Ethernet port on the network and communicate with the unit to be managed via the wired or wireless media.
2. Make sure that the IP parameters of the PC are configured to enable connectivity with the unit.
3. Run a Telnet application and use the IP address of the unit to be managed as the Host Name.
4. Set Port to *Telnet* (this is the default).
5. Set Terminal Type to *VT100* (this is the default).
6. Enter the Service Provider password.
7. When the password is recognized, the following message is displayed:

You have entered.
8. Press **Enter**, the Breeze ACCESS Monitor is displayed on the screen.
9. To exit the Telnet session, choose *Disconnect* from the *Connect* menu. (The session is terminated automatically, after a specific time of inactivity determined by the Log-out Timer).

APPENDIX B. BASIC PARAMETERS

- **IP Address** – Displays the current IP address of the unit and allows entry of a new IP address (4 x 3 digit octets, separated by dots). The default IP Address is 010.000.000.001.
- **Subnet Mask** – Displays the current subnet mask of the unit and allows entry of a new subnet mask (4 x 3 digit octets, separated by dots). The default mask is 255.000.000.000.
- **Default Gateway Address** – Displays the current address of the default gateway of the unit and allows entry of a new default gateway address (4 x 3 digit octets, separated by dots). The default gateway address is 000.000.000.000.
- **ESS ID** – The ESSID (Extended Service Set ID) of the unit (up to 32 printable ASCII characters). The ESSID is a string used to identify a wireless network. It prevents the unintentional merging of two co-located wireless networks. An SU can only associate with an AU that has an identical ESSID. Use different ESSIDs to segment the wireless access network and add security to your network. The default value is *ESSID1*.

Note: *The ESSID string is case-sensitive.*

- **Hopping Sequence** – Displays the Hopping Sequence of the unit. A hopping sequence is a pre-defined series of channels (frequencies) that are used in a specific, pseudo-random order as defined in the sequence. The unit “hops” from frequency to frequency according to the selected sequence. When more than one AU is co-located in the same area, it is recommended to assign different hopping sequences to each AU.

Hopping Sequences are grouped in three hopping sets (see *Hopping Set* parameter below). When setting up multiple AUs in the same site, always choose hopping sequences from the same *Hopping Set* to reduce the possibility of collisions on the wireless media. This parameter is only set in the AU. All the SUs learn it from the AU during the association process.

The permitted range depends on the applicable hopping standard (see Table 5-3). The default value is 1.

- **Hopping Set** – Displays the selected hopping set. Each hopping standard has 3 hopping sets. The hopping set selected in this screen determines which hopping sequences are available in the Hopping Sequence screen. Always use the same hopping set per site (with different hopping sequences) to minimize the possibility of collisions on the wireless media. The default value is 1.

This parameter is set only in the AU. All the associated SUs learn its value from the AU during the association process.

Table 5-3. Hopping Sequences

Hopping Standard	Number of Hopping Sequences per Hopping Set
Australia	20
Canada	10
Europe ETSI	26
France	11
Israel	11
Japan	4
Korea	4
Netherlands	5
Spain	9
US FCC	26

- **Hopping Sync** (BS-AU only) – Displays the current Hopping Sync status of the unit and allows defining a new status. When several AUs that use the same hopping set and different hopping sequences are co-located, their operation should be synchronized in terms of hopping sequence initialization and timing. One unit must be specified as a Master Unit and all other units must be specified as Slave units. Available options are:
 - ⇒ **Idle** – No synchronization (stand-alone operation)
 - ⇒ **Master** – The AU that serves as a Master unit providing synchronization signals to the Slave units
 - ⇒ **Slave** – An AU that operates as a Slave.

Certified Antennas

BreezeCOM Catalog Number	Gain; H and V coverage
AN1079	17.5dBi; 60 x 7 degree
UNI-24	24dBi; 6 x 10 degree
UNI-16	16dBi; 28 x 28 degree
UNI-13	13dBi; 46 x 28 degree
OMNI-8	8dBi; 360 x 13 degree
OMNI-6	6dBi; 360 x 20 degree

NOTE: according to FCC rules 15.247 (3), when operating the equipment in a multi-point system, the RF output power must be adjusted per the gain of the antenna to limit the EIRP to 36dBm. Refer to the table below:

Antenna Gain*	RF power (at port)	Transmit Power Control setting
23.5	12	6
17	19	9
15.5	20	10
7.5	26 (max. level avail.)	15 (default)

* Antenna gain includes 0.5dB loss in antenna jumper cable.

NOTE: transmit power control parameter is available in installer menu ONLY [requires installer password]. Range is 0-15, 15 is max. and 0 is min. Each value less than 15 is 1.5dB less transmit power.