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KarlNet

KarlNet Inc.

Networking your Wireless World

KarlNet Customer Premise Equipment (CPE) Outdoor Family of Products

Setup and Installation Manual (Rev. A)

Small-Office Subscriber Units
(Model Number SSU-0124BR-SG4260)

Corporate Subscriber Units
(Model Numbers CSU-0124BR-SG4200 and CSU-0124BR-SG4201)

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TABLE OF CONTENTS

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FCC NOTICE

KarlNet, Inc. wireless networking equipment described herein complies with FCC radiation exposure limits set forth for an uncontrolled environment when installed as directed. The equipment should be installed and operated as fix-mounted antennas such that the main lobe(s) of these antennas are located a minimum of 2 meters between the antenna and all persons during normal operation.

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 Notice

This antenna/transmitter device must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meters from all persons. Users and installers must adhere to the antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance set forth under Part 15 of the FCC regulations.

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WARRANTY

KarlNet offers a warranty covering a period of 90 days from the date of purchase by the retail customer. If a product is found defective during the warranty period, KarlNet will repair or replace the product with the same or a similar model, which may be a reconditioned unit, without charge for parts or labor.

IN NO EVENT SHALL KARLNET BE LIABLE TO YOU OR ANY OTHER PARTY FOR ANY DIRECT, INDIRECT, GENERAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OF OTHER DAMAGE ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION OR ANY OTHER PECUNIARY LOSS, OR FROM ANY BREACH OF WARRANTY, EVEN IF KARLNET HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.) IN NO CASE SHALL KARLNET'S LIABILITY EXCEED THE AMOUNT YOU PAID FOR THE PRODUCT.

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PRODUCT DESCRIPTION

Thank you for purchasing KarlNet's Customer Premise Equipment (CPE) Outdoor wireless networking devices. This guide explains how to install the hardware devices, and provides power and cabling guidelines.

KarlNet offers two high-speed outdoor CPE networking systems that provide point-to-multipoint and point-to-point connectivity to enterprise and service providers.

- The TurboCell Small Office Subscriber Unit (SSU) is designed specifically for medium-to-large fixed wireless networks that demand higher performance because of high traffic. The SSU is used as a remote station that connects to a KarlNet WISP base station (WBS), and can be used in either a point-to-point or point-to-multipoint network. The SSU supports up to 12 users (SG-4260), providing a low cost, easy to install solution that is ideal for residential or small office locations. This cost effective, FCC approved unit provides higher gain and better performance.

- The TurboCell Corporate Subscriber Unit (CSU) is designed specifically for large fixed wireless networks that demand higher performance and security. The CSU comes complete with KarlNet's firewall software, and supports an unlimited number of users. The CSU is used as a remote station that connects to a KarlNet WISP base station (WBS), and can be used in either a point-to-point or point-to-multipoint network. The CSU supports an unlimited number of users (SG-4200 and SG-4201), and provides a low cost, easy to install unit designed for businesses or other large networks.

Featuring KarlNet's powerful circuit boards, radios, and systems, and KarlNet's award-winning industry standard TurboCell™ software, the SSU and CSU offer the best value in the outdoor wireless industry.

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PACKING LIST

Your package contains the following items:

- A KarlNet Customer Premise Equipment (CPE) Outdoor wireless hardware unit (either SSU or CSU) and associated mounting bracket
- A Power over Ethernet (PoE) Injector
- A DC power supply
- An Ethernet coupler
- A "Getting Started" CD that contains the KarlNet Configurator, online help for the Configurator, and various documents.

Note: You will need to provide (and possibly customize) an Ethernet extension cable (CAT5E or better).

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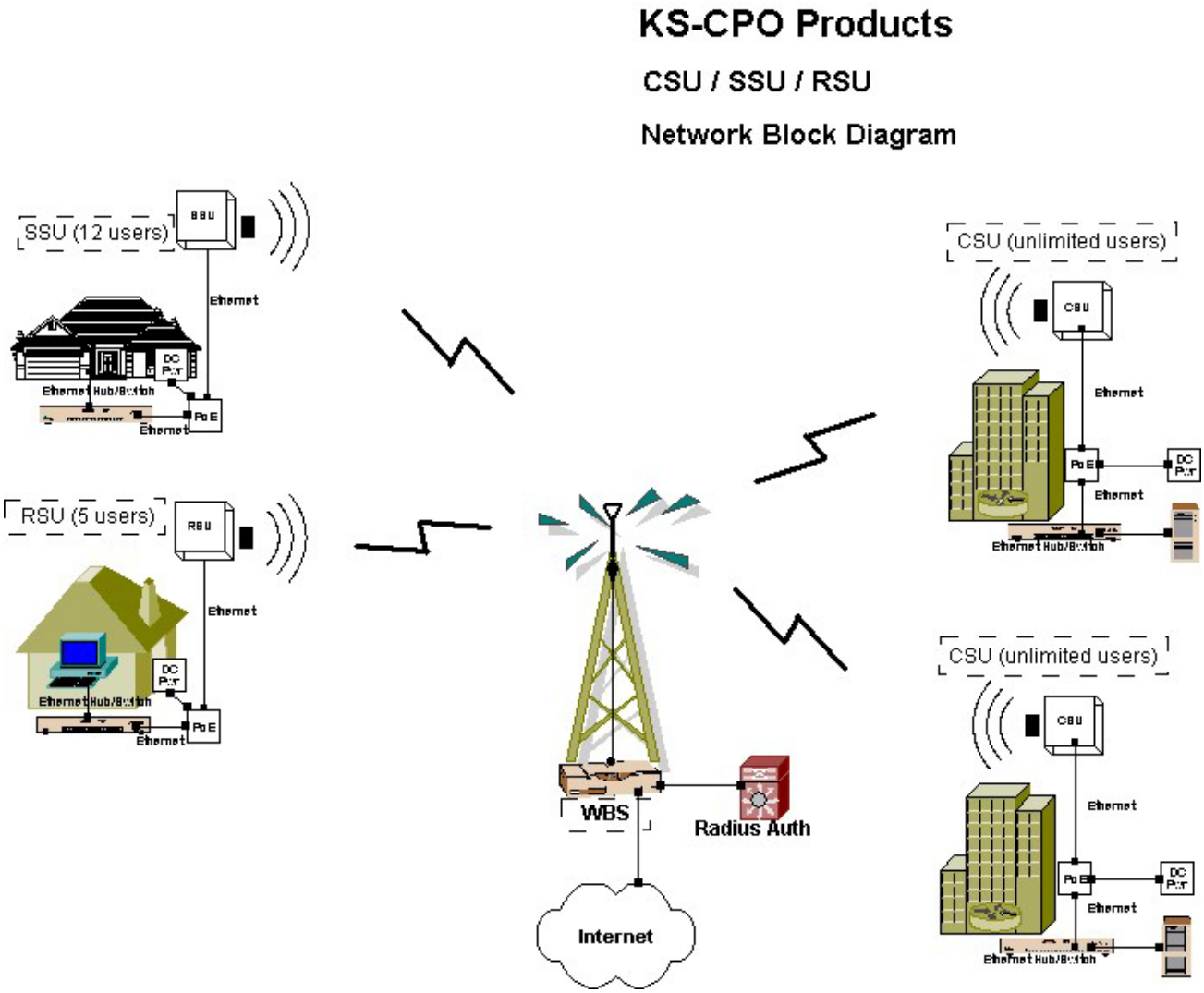
THEORY OF OPERATIONS

KarlNet's CPE Outdoor wireless devices are used as remote stations that connect to a base station or repeater, and are used in both point-to-point and point-to-multipoint networks. They provide low cost, easy to install solutions for small office or large business locations. The following diagram illustrates how KarlNet's CPE outdoor devices are used within the wireless network.



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FEATURES

Software Features	**Small Office Subscriber Unit (SSU)**	**Corporate Subscriber Unit (CSU)**
Users Supported	12	Unlimited
SNMP Support	✓	✓
NAT and DHCP	✓	✓
Password-based Security	✓	✓
WEP+ Encryption	✓	SG-4200 -- No SG-4201 -- Yes
Adaptive Dynamic Polling	✓	✓
Bandwidth Control/Data Rate Throttling	✓	✓
Superpacket Aggregation	✓	✓
Solution for Hidden Node Problem	✓	✓
Routing	✓	✓
Simple Firewall	✓	✓
Full Firewall	Optional	✓
Hardware/Environmental Features		
Operating Temperatures	(-40C to 40C/-40F to 120F)	(-40C to 40C/-40F to 120F)
Humidity	95%	95%
Environmental Test/Certification	NEMA 3R	NEMA 3R
FCC Class B	✓	✓
FCC Part 15 Certified	✓	✓
Coverage Range	Up to 6 Miles	Up to 6 Miles
Continuous Signal Quality Monitoring	✓	✓

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INSTALLATION

Follow the steps below to install your KarlNet CPE Outdoor wireless device:

1. Mount the unit.
2. Power up the unit.
3. Configure the unit.
4. Align and test the unit.

Each step is described in more detail below.

Mount the Unit

Each SSU or CSU unit ships with a mounting bracket and associated hardware that can be used to mount the unit on a pole. The bracket should be used on poles that support standard U-mounts (2.5" in diameter). You can use other mounting brackets at your own discretion.

General Mounting Considerations

- Mount the SSU or CSU to a secured pole in the shade, with unobstructed line of sight to the Wireless Base Station (WBS).
- Stainless steel hose-clamps, or any suitable equivalent, may be used to secure the unit to the mast.
- Leave the unit mounting loose enough to allow for movement when performing the alignment/testing procedure. The unit should be tightened only after the alignment/testing procedure is completed.

Power up the Unit

Power for the SSU/CSU is provided either through a Teletronics PoE Injector (or another approved PoE injector) or through a Jameco 14V DC power wall-wart (or another approved DC power supply). The SSU/CSU ships with both a PoE injector and DC power supply.

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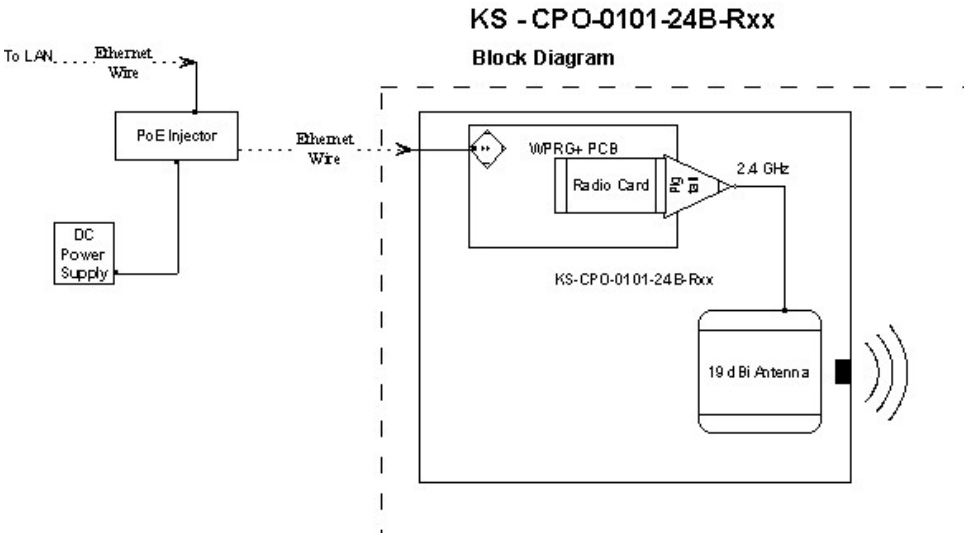
To power the unit:

1. Run a straight Ethernet coupler and an Ethernet wire (not to exceed 200 feet) to an indoor wall outlet to the PoE injector and DC power supply (both included with your SSU or CSU unit).
2. Connect the Ethernet cable to the unit at location "ODU" (OutDoor Unit) on the PoE injector.
3. Connect a straight Ethernet cable from the "NET" location on the PoE injector to a hub or switch.

The following diagram illustrates the basic power configuration.



KarlNet CPE Outdoor products operate with the included Power over Ethernet (PoE) injector. When planning an installation using PoE, it is important to consider the power requirements of the CPE Outdoor system and the length of the Ethernet cable that will carry the power. The table shown below specifies the injector specifications required to deliver power to the CPE Outdoor device over various lengths of Ethernet Cable.

If the Ethernet cable length is less than or equal to:	Then the PoE injector[1] should be rated for at least:	
0 – 200 ft (0 - 61 m)	14V	11W
200 – 328 ft (61 – 100 m)	Contact KarlNet Customer Support	Contact KarlNet Customer Support

[1] Included in the SSU/CSU packaging.

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Configure the Unit

The KarlNet Kbridge Configurator handles configuration. Both the executable file needed to launch the Configurator (kbwin.exe) and the online help for the Configurator (kbwin.chm) are included on the Getting Started disk that you received with your hardware device. Refer to the online help for instructions on how to configure your device.

Align and Test the Unit

The KarlBridge Configurator's Wireless Link Test screen is used to diagnose the wireless link quality between a WISP Base Station (WBS) and your SSU or CSU unit.

The Wireless Link Test displays the diagnostic counters that apply to the selected radio interface (Slot A or B) and a single remote station connected to this base station. To assess the overall wireless performance in the wireless area served by the base station you might need to run Remote Link Tests with multiple stations (one by one).

Before Running the Link Test

Your SSU or CSU must be associated with a Wireless Base Station (WBS) before running the Wireless Link Test. Therefore, before you proceed you must know the following information about the base station to which you will be linking:

- SNMP R/W Password
- Channel Frequency
- Network ID
- Network Name
- WEP Key (if applicable)
- System Access Password

You must now make sure that this information is the same for both your remote unit (the SSU or CSU) and your WBS.

Note: If you are already familiar with how to associate your remote unit and base station, skip to the Running the Link Test section.

To ensure that you have matching information:

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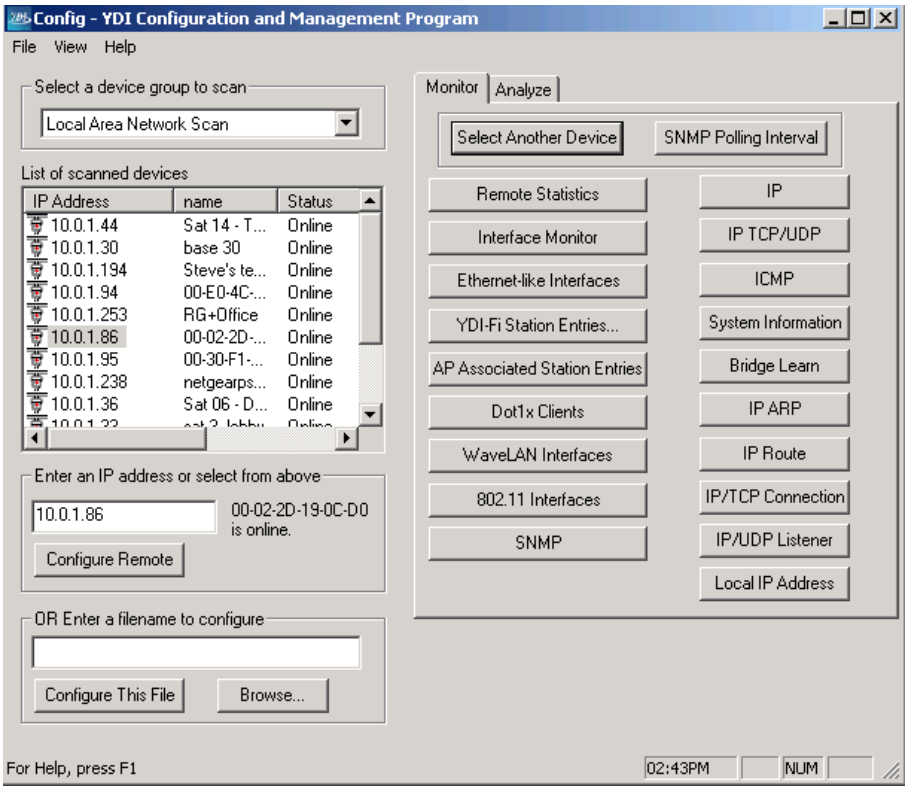
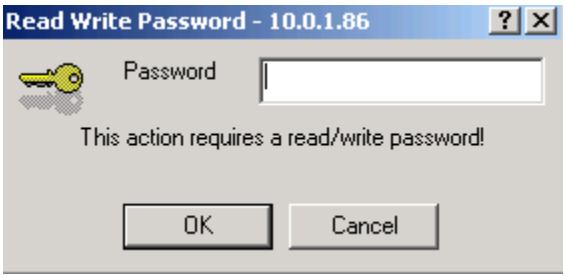
1. Launch the Configurator (file kbwin.exe on your Getting Started CD). The IP Address for your SSU or CSU (and the IP addresses for any other devices in your network) appears in the Configurator window, as shown below.



2. Select the IP Address, click the right mouse button, and select Configure This Device. The Read/Write Password screen is displayed, as shown below.



3. Enter your SNMP password, then click the OK button. The Configurator window is redisplayed, this time with the Setup tab highlighted, as shown below.

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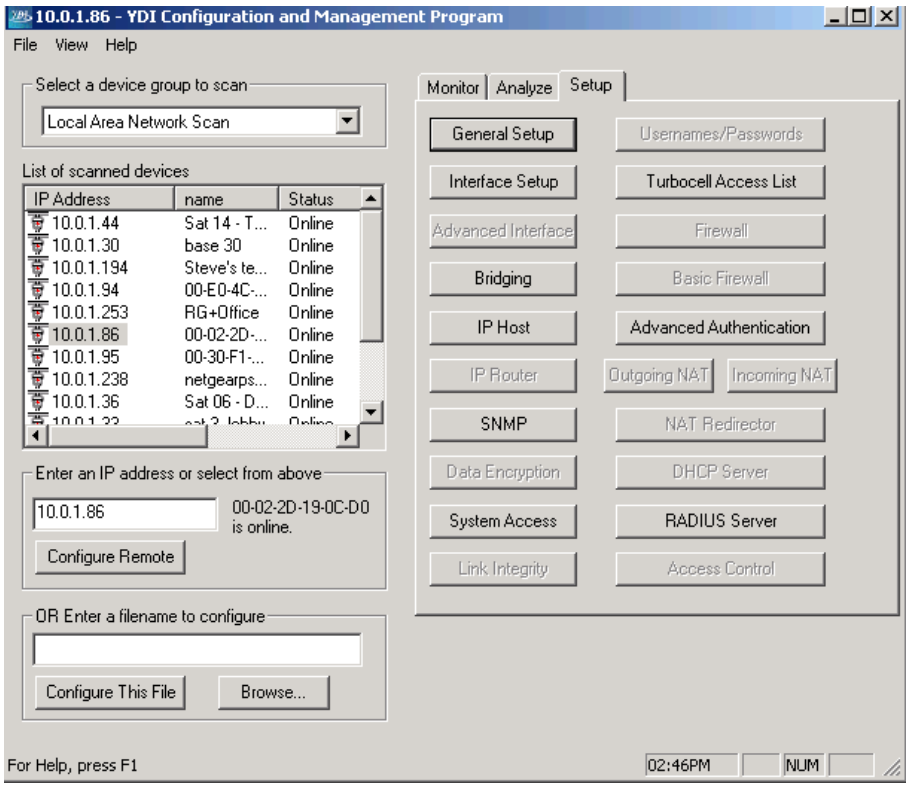
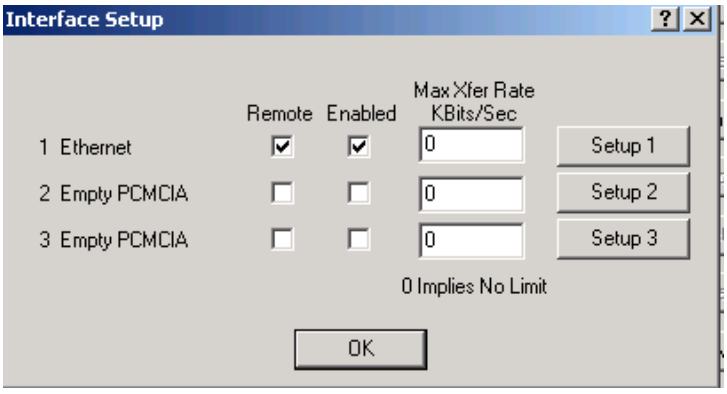


4. Click the Interface Setup button. The Interface Setup screen is displayed, as shown below:



5. Click the Setup 2 button. The 802.11b Setup screen is displayed, as shown below:

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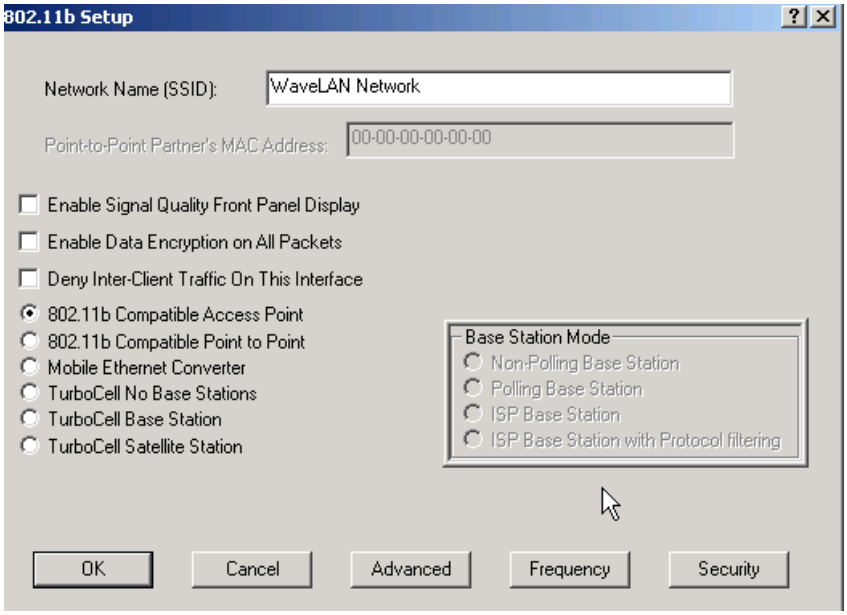
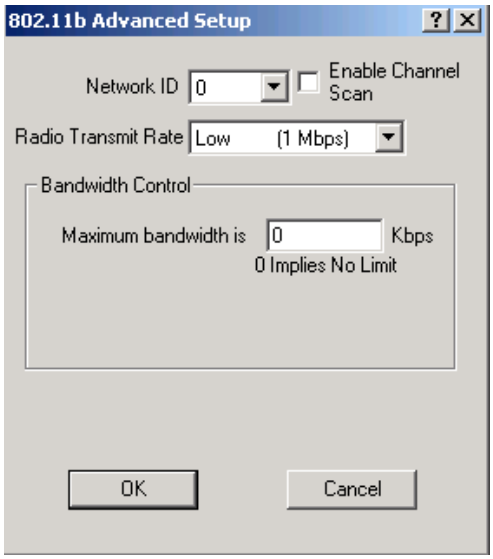


6. Click the TurboCell Satellite Station radio button.
7. Click the Advanced Button. The 802.11b Advanced Setup screen is displayed, as shown below:



8. In the Network ID field, select the Network ID that matches your WBS. Then click the OK button. The 802.11b Setup screen is redisplayed.
9. Click the Frequency button. The Frequency Setup screen is displayed, as shown below.

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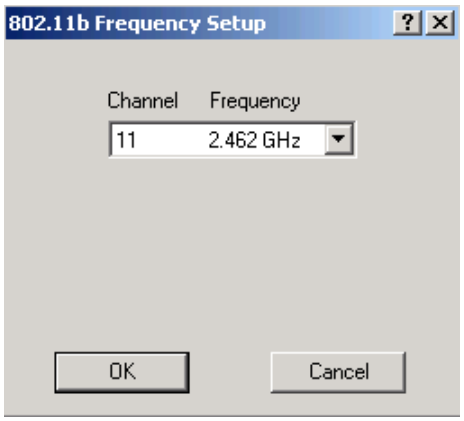
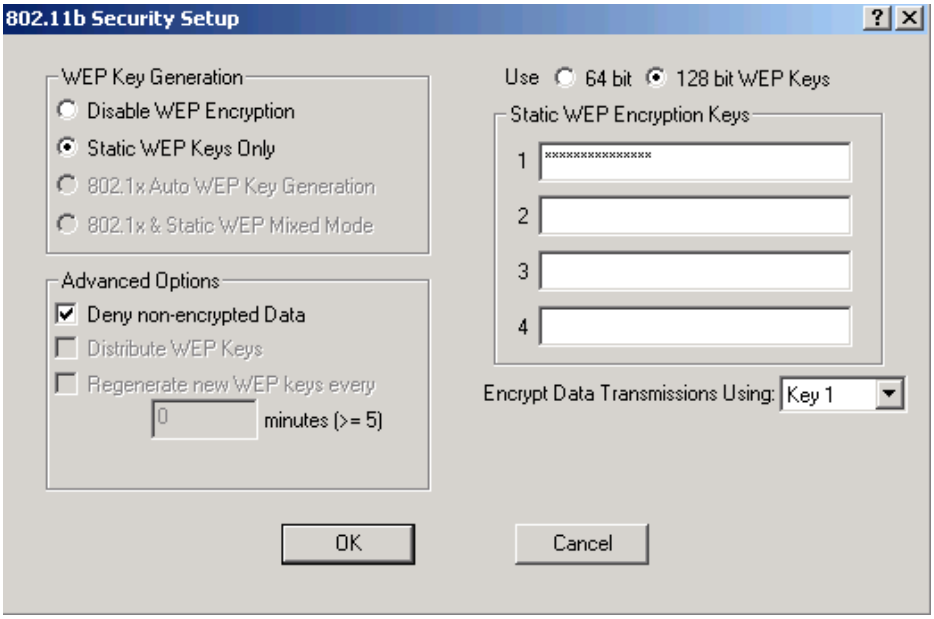


10. Select the Channel/Frequency to match your WBS from the dropdown list. Then click the OK button. The 802.11b Setup screen is redisplayed.
11. If your unit supports encryption (models SG4260 and SG4201, but not SG4200), then click the Security button. The 802.11 Security Setup screen is displayed, as shown below.



12. The Static WEP Keys Only field is enabled by default. Enter a WEP Encryption key in one of the four fields on the right side of the screen, then select the corresponding Key field from the Encrypt Data Transmission Using … dropdown list. For example, if you enter a key in field 1, then make sure that Key 1 is selected in the dropdown list. Then click the OK button.

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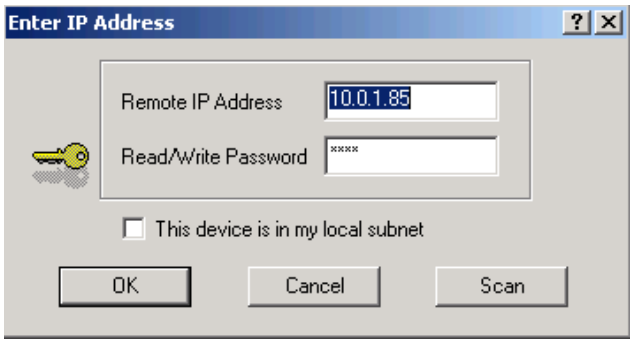
You have now completed the preliminary steps, and you are now ready to run the wireless link test. Click OK to close the Security window, click Cancel to close the 802.11b Setup screen, and then click OK to close the Interface Setup screen. You should now be back at the main Configurator window, ready to run the wireless link test.

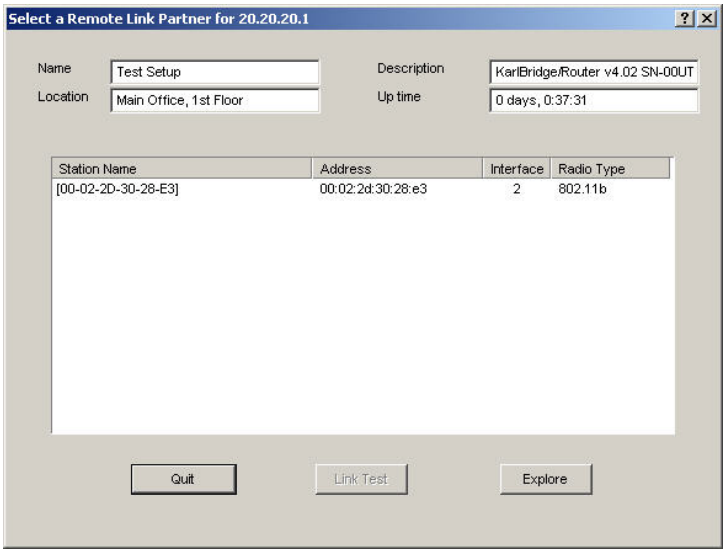
Running the Link Test

To run a link test:

1. If you have not already done so, launch the Configurator (the file kbwin.exe on the enclosed "Getting Started" CD), and select Wireless Link Test from the Analyze Tab. The Enter IP Address screen is displayed, as shown below.



2. Enter the Remote IP Address and Read/Write password for the wireless station you wish to test. The Select a Remote Link Partner screen is displayed, as shown below.



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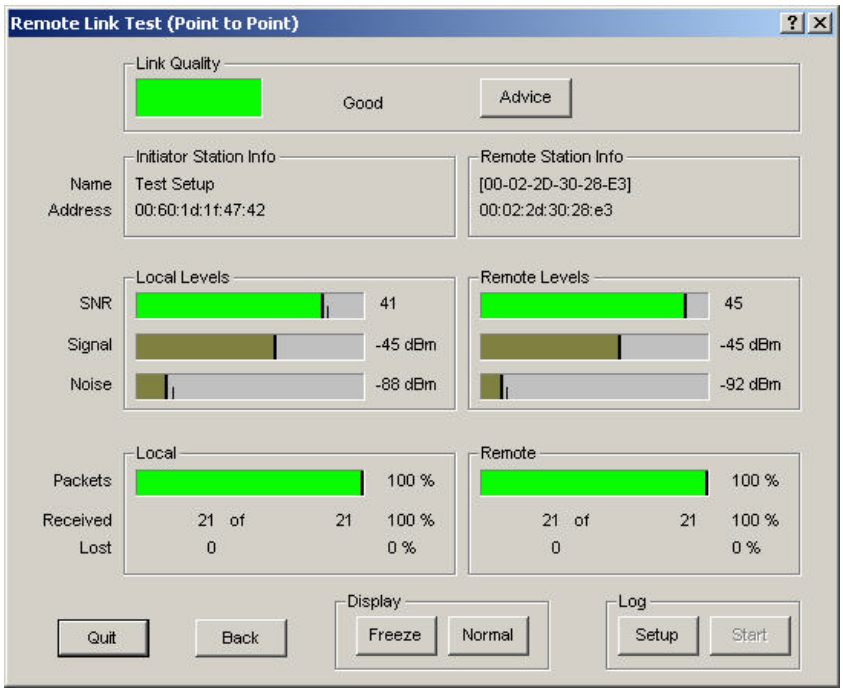
3. From the list of station names, select the remote station or client you wish to test. Select a station from the list, and then click on the Link Test button to perform a link test.

   Note: Clicking the Explore button refreshes the list of stations that can be selected.

4. Click the Link Test button to start the link test.

   Note: When you open this screen, the base station will need approximately 20 seconds to build the list of stations and forward this information to your Configurator station. Due to the dynamic characteristics of mobile wireless stations, the base station will rebuild the list of connected stations each time you select a different station, or after clicking the Explore button. If this screen does not display any station, there might be no wireless station up and running in the vicinity of the selected base station.

The Remote Link Test screen displays the results of your wireless link test, as shown below.



5. The Advice button enables you to investigate the outcome of the Remote Link Test assessment in more detail and provides you with troubleshooting hints to

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improve the quality of the link between the two remote nodes. The following table summarizes the possible results of clicking the Advice button, and what action is warranted based on the results:

Status	Risk	Action
Excellent	None	▪ You do not need to perform further diagnostics.
Good	None	▪ Run your radio's Client Manager tool (for example, ORiNOCO™ Client Manager) and walk throughout the network environment. The indicators from the Site Monitor screens should enable you to see whether you could optimize the unit placement. ▪ You may try to optimize antenna placement to see whether this will improve the Link Quality result.
Marginal	Communication is still possible, but this situation may affect the unit's performance.	▪ View Link Test Details to verify. The unit may have to retransmit lost packets. ▪ Verify the Signal Level indicator. A low Signal Level indicates the unit has moved away from the base station. ▪ View Link Test Details to verify the Noise Level indicator. A high Noise Level indicates a source of interference in the signal path between the unit and the base station. ▪ Select another unit to verify if the base station is functioning properly. ▪ Try to optimize antenna placement to improve the Signal Level or move it away from the source of interference.

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"No Connection"	Communication is no longer possible. If the unit was in the process of transferring files, data may not have arrived at the intended destination, or it may have been corrupted.	▪ View Link Test Details to verify the Signal Level indicator. A low Signal Level indicates the unit has moved away from the base station. ▪ View Link Test Details to verify the Noise Level indicator. A high Noise Level indicates a source of interference in the signal path between the unit and the base station. ▪ Select another unit to verify if the base station is functioning properly. ▪ Try to optimize antenna placement to improve the Signal Level or move it away from the source of interference.
Quality Indicator is Black	None. The base station may be busy collecting diagnostic measurement results from the unit.	▪ If the indicator remains blank, click the Other button to return to the Select a Remote Link Partner screen. Click the Explore button to refresh the list of Link Test Partners. If the initial partner no longer appears, it may have been switched off, or have been moved outside the range of the selected Initiator Station. ▪ Select another Link Test Partner to verify if the base station is functioning properly.

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