

## Wireless P-T-P Ethernet Extender Quick Start Guide

# Extend Ethernet links between buildings wirelessly and with ease.

Provides affordable point-to-point wireless Ethernet extension up to 6.2 miles (10 km).



## Trademarks Used in this Manual

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### Trademarks Used in this Manual

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### About the Quick Installation Guide

This Quick Installation Guide enables a professional installer to install the Wireless P-T-P Ethernet Extender. It covers procedures to assist you in avoiding unforeseen problems.

### Related Documentation

You can download a user manual from [ftp://ftp.blackbox.com/anonymous/manuals/L/LWE100A\\_rev2\\_user.pdf](ftp://ftp.blackbox.com/anonymous/manuals/L/LWE100A_rev2_user.pdf).

We're here to help! If you have any questions about your application or our products, contact Black Box Tech Support at **724-746-5500** or go to **blackbox.com** and click on "Talk to Black Box." You'll be live with one of our technical experts in less than 30 seconds.

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### Available Models

#### LWE100A-KIT

The kit is plug-and-play. Simply remove the units from the package and connect the Wireless Ethernet Extenders to your network. Be sure to align them with each other using the LED indicators on the sides of the units to achieve the best possible link. You must have line-of-sight for the units to line up. Each unit is configured as a bridge. The software is already configured.'

You must have the default IP addresses for the Wireless Ethernet Extender Kit:

BBox\_Bridge1 (192.168.1.2), BBox\_Bridge2 (192.168.1.24).

The default username and password for the Wireless Ethernet Extender Kit is:

Username: admin

Password: password

*NOTE: If the units are factory defaulted, they will no longer retain the wireless bridge configuration and will need to be reconfigured. Contact Black Box Technical Support at 724-746-5500 or [info@blackbox.com](mailto:info@blackbox.com) for assistance.*

#### LWE100A

See the rest of this quick start guide for information about installing and configuring the unit as an access point (AP), customer premises equipment (CPE), wireless distribution system (WDS), or AP repeater.

## 1. Introduction

The Wireless P-T-P Ethernet Extender is a multimode last-mile broadband solution for customers using wireless ISPs (WISPs) and system integrators. It complies with the IEEE 802.11n standard and features high-power output. The Wireless P-T-P Ethernet Extender supports high bandwidth with long range for outdoor applications.

Use the Wireless P-T-P Ethernet Extender as an AP, CPE, WDS, or AP repeater. You can deploy the extender outdoors as an access point to provide outdoor wireless internet service. Or, use the extender as an outdoor CPE—it receives wireless signals over the last mile, helping wireless Internet service providers (WISPs) deliver internet service where wired broadband internet service, such as cable and DSL, is not possible. The easy-to-install Wireless P-T-P Ethernet Extender covers 2.4-GHz bands, providing outstanding throughput performance outdoors.

## 2. Preparing for Installation

Read this chapter before installing the extender. It describes safety precautions and needed product information.

### 2.1 Professional Installation Required

Use a professional installer who is well trained in RF installation and knowledgeable about local regulations.

### 2.2 Safety Precautions

For your safety and proper hardware installation, read and follow these safety precautions:

1. If you are installing the Wireless P-T-P Ethernet Extender for the first time, for your safety as well as others', use a professional installer who is trained on the safety hazards involved.
2. Keep safety as well as performance in mind when selecting your installation site, especially where there are electric power and phone lines.



3. When installing the Wireless P-T-P Ethernet Extender, note the following things:

Do not use a metal ladder.

Do not work on a wet or windy day.

Wear shoes with rubber soles and heels, rubber gloves, and a long-sleeved shirt or jacket.

4. When the system is operating, avoid standing directly in front of it. Strong RF fields are present when the transmitter is on.

### 2.3 Installation Precautions

Read and follow these installation precautions:

1. Users **MUST** use a proper and well-installed grounding and surge arrestor with the Wireless P-T-P Ethernet Extender; otherwise, lightning could easily cause fatal damage to the Wireless P-T-P Ethernet Extender.

*CAUTION: EMD (Lightning) DAMAGE IS NOT COVERED UNDER WARRANTY.*

2. Users **MUST** use the power cord and PoE injector shipped in the box with the Wireless P-T-P Ethernet Extender. Using other components will cause damage to the extender.

3. Users **MUST** power off the Wireless P-T-P Ethernet Extender first before connecting the external antenna to it. Do not switch from the built-in antenna to the external antenna via Web management without physically attaching the external antenna onto the Wireless P-T-P Ethernet Extender; otherwise, the extender might be damaged.

### 2.4 What's Included

Your package should contain the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500 or [info@blackbox.com](mailto:info@blackbox.com).

- Wireless P-T-P Ethernet Extender
- Pole-mounting ring
- Power cord and PoE injector
- This Quick Installation Guide

*NOTE: You can access the user manual at [ftp://ftp.blackbox.com/anonymous/manuals/L/LWE100A\\_rev2\\_user.pdf](ftp://ftp.blackbox.com/anonymous/manuals/L/LWE100A_rev2_user.pdf).*

### 2.5 Component Descriptions

Figure 2-1 shows the LWE100A. Figure 2-2 illustrates the pole mounting ring, and Figure 2-3 shows the power cord and PoE injector.



Figure 2-1. LWE100A Ethernet extender.



Figure 2-2. Pole-mounting ring.



Figure 2-3. Power cord and PoE injector.

*WARNING: Users MUST use the power cord and PoE injector shipped in the box with the Wireless P-T-P Ethernet Extender. Using other options will damage the extender.*

### 3. System Installation

#### 3.1 Installation Steps

1. On the bottom of the Wireless P-T-P Ethernet Extender is a removable cover. Grab the cover and pull it back gently to remove it as shown in Figure 3-1.

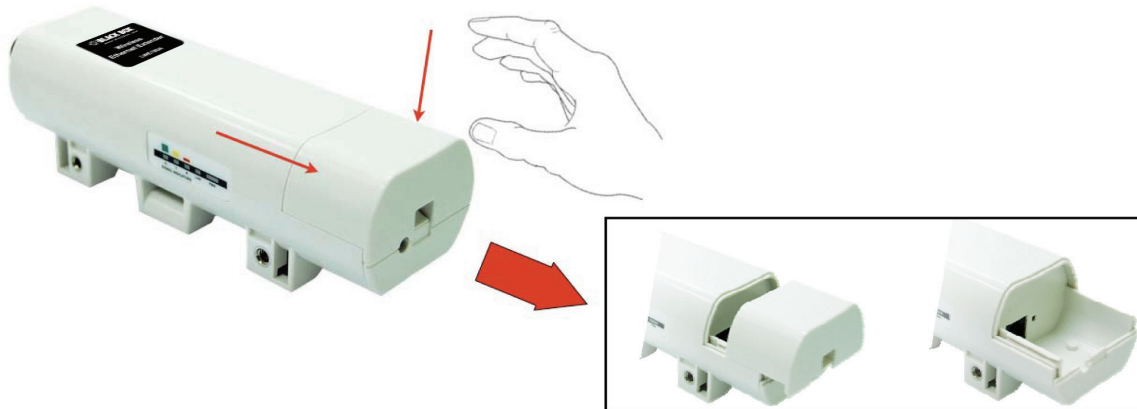


Figure 3-1. Removing the bottom cover.

2. Plug a standard Ethernet cable into the RJ-45 port. See Figure 3-2.



Figure 3-2. Plugging in the cable.

3. Slide the cover back to seal the bottom of the Wireless P-T-P Ethernet Extender.



Figure 3-3. Replacing the cover.

4. Take out the power cord and PoE injector, and plug the power cord into the DC port of the PoE injector.
5. Connect what you assembled in Steps 3 and 4 together by plugging the other side of the Ethernet cable from Step 3 into the PoE port of the PoE injector in Step 4.
6. Turn over the Wireless P-T-P Ethernet Extender. Put the pole mounting ring through the middle hole of the Wireless P-T-P Ethernet Extender.

*NOTE: Use a screwdriver to unlock the pole-mounting ring before putting it through the Wireless P-T-P Ethernet Extender as shown in the right picture in Figure 3-4.*

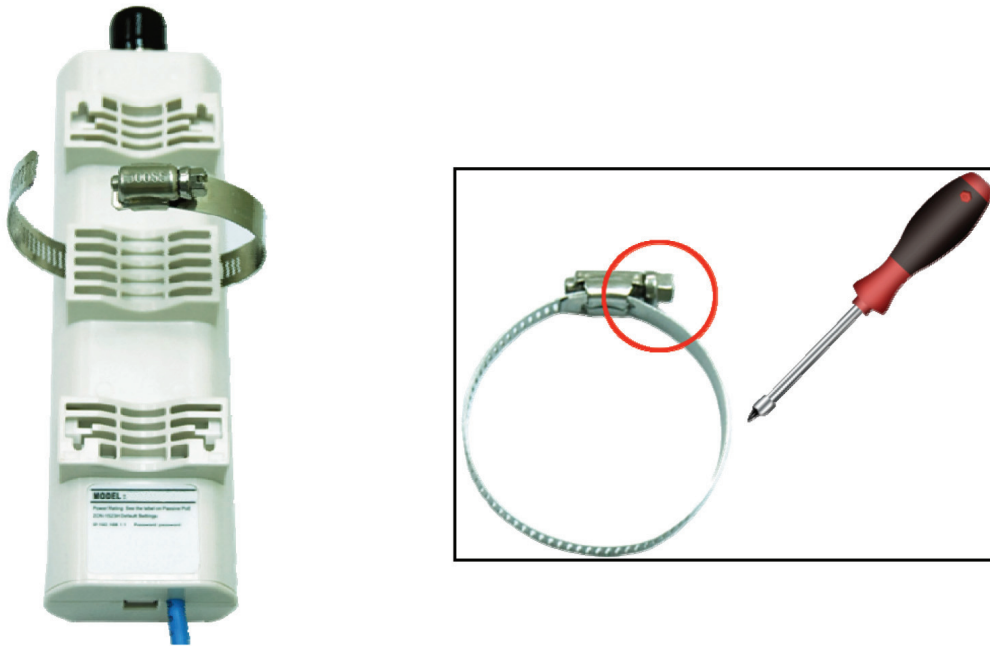


Figure 3-4. Unlocking the pole-mounting ring.

7. Mount the Wireless P-T-P Ethernet Extender securely to the pole by locking the pole mounting ring tightly.



Figure 3-5. Mounting the extender to a pole.

8. When installation is complete, the extender should look like Figure 3-6.



Figure 3-6. Extender installed outdoors on a pole.

### 3.2 Using the External Antenna

If you prefer to use the external antenna with N-type connector for your application instead of the built-in directional antenna, follow the steps below.

1. Grab the black rubber on the top of the Wireless P-T-P Ethernet Extender, and slightly pull it up as shown in Figure 3-7. The metal N-type connector will appear.



Figure 3-7. Installing the external antenna.

2. Connect your antenna with the N-type connector on the top of the Wireless P-T-P Ethernet Extender.

#### NOTES:

1. Before connecting the external antenna with the N-type connector to the Wireless P-T-P Ethernet Extender, users should prepare the cable in advance, if needed.
2. While connecting the N-type connectors, users should be careful not to damage the connectors.

**WARNING:** Users **MUST** power off the Wireless P-T-P Ethernet Extender first before connecting the external antenna to it. Do not switch from the built-in antenna to the external antenna from Web management without physically attaching the external antenna onto the Wireless P-T-P Ethernet Extender. Otherwise, the Wireless P-T-P Ethernet Extender might be damaged.



### 3.3 Using the Grounding Wire

The Wireless P-T-P Ethernet Extender is shipped with a grounding wire. Properly ground the unit to protect against power surges.

1. Loosen and remove the metal O-ring on the N-type antenna connector.
2. Put the grounding wire into the connector and tighten it with the O-ring.



Figure 3-8. Installing the grounding wire to the connector.

3. Connect the other end of grounding wire to the earth ground.



Figure 3-9. Installing the grounding wire to the ground.

### 4. Configuration Steps

Connect the Wireless P-T-P Ethernet Extender to your PC by plugging in an Ethernet cable to the PoE injector's LAN port on one side and into the PC's LAN port on the other side. Power on the Wireless P-T-P Ethernet Extender using PoE from the PoE injector.

1. Assign a static IP address to your PC. This address should be in the same network segment as the Wireless P-T-P Ethernet Extender. The default IP address of the Wireless P-T-P Ethernet Extender is 192.168.1.2, but you may choose from 192.168.1.2 to 192.168.1.254. Then click "OK."

*NOTE: Preconfigured units will have default IP addresses of BBox\_Bridge1 (192.168.1.2) and BBox\_Bridge 2 (192.168.1.24).*

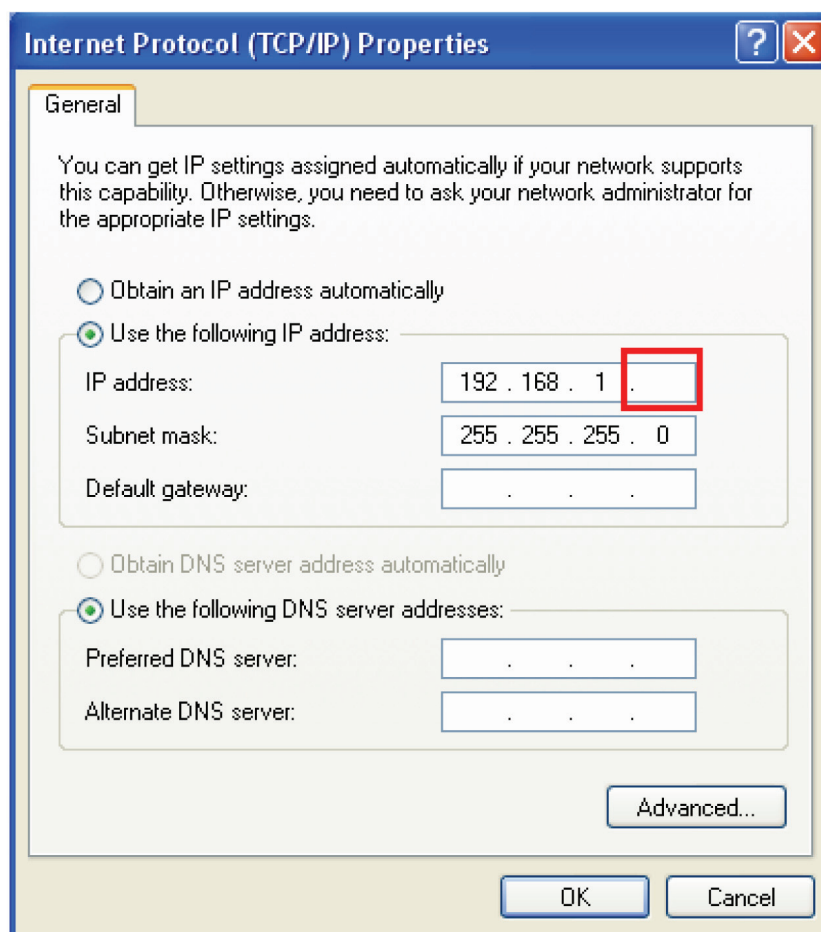


Figure 4-1. TCP/IP Properties screen.

2. Open the Web browser on your PC, key in the IP address (192.168.1.2) of the Wireless P-T-P Ethernet Extender CPE in the address bar, then press the "Enter" key.

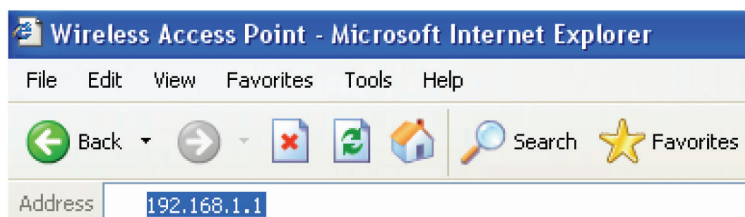


Figure 4-2. Address bar.

3. Next, you will see the extender's log-in page. The default name and password are "admin" and "password," respectively. Enter them and then click "Login."

*NOTE: Preconfigured units will have the same default name and password: default name: admin and default password: password.*



Wireless Broadband Access Point

Name

Password

Figure 4-3. Login screen.

*NOTE: Since the Wireless P-T-P Ethernet Extender covers AP mode, wireless client mode, bridge mode, and AP repeater mode, follow the relevant steps below to set each mode after successful log-in.*

### 4.1 AP Mode

1. Choose "Wireless > Basic Settings." You'll see the screen in Figure 4-4. The default is AP mode. Set the parameters to optimize your application, or leave them as the default. Click "Apply" to save the parameters.

*NOTE: For better coverage of the AP, you may also use an external antenna. If so, remember to change the antenna setting from "Internal (8 dBi)" to "External (N-Type)" after you install your external antenna.*

*CAUTION: Make sure you choose "External (N-Type)" only when you have installed the external antenna; otherwise, the Wireless P-T-P Ethernet Extender might be damaged.*



Figure 4-4. Wireless Basic Settings screen.

2. If security is required, click "Profile Settings" and enter "VAP Profile 1 Settings" as shown in Figure 4-5. For better security, set the "Network Authentication" and "Data Encryption." Click "Apply" to save the parameters.

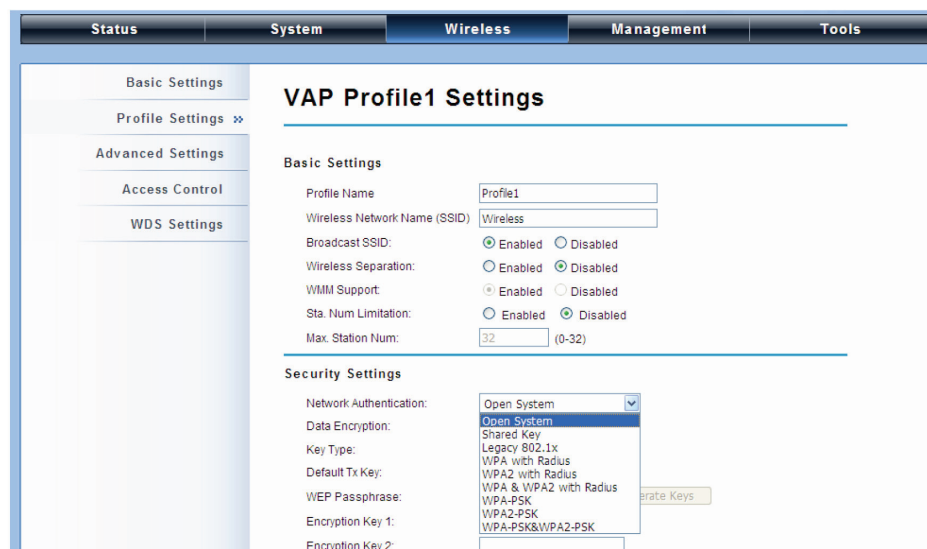


Figure 4-5. VAP Profile 1 Settings page.

### 4.2 Wireless Client Mode

1. Choose "Wireless > Basic Settings." Then you will see the "Wireless Basic Settings" page as in Figure 4-6. Choose "Wireless Client" from Wireless Mode, and click "Apply" to save it. You can also change the other parameters to optimize your application before clicking "Apply."

**CAUTION:** For longer transmission, you may also use an external antenna; if so, remember to change the antenna setting from "Internal (8 dBi)" to "External (N-Type)" after you install the external antenna. Otherwise, do not set the antenna to "External (N-Type)" without physically attaching the external antenna. The extender could be damaged.

**Wireless Broadband Access Point** Logout

**Status   System   Wireless   Management   Tools**

**Basic Settings** »

Use this page to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless mode as well as wireless network parameters.

☐ **Disable Wireless LAN Interface**

Wireless Mode: Wireless Client Site Survey

Wireless Network Name (SSID): Wireless

802.11 Mode: 802.11B/G/N

Channel Mode: 20 MHz

Antenna: ☒ Internal (8 dBi) ☐ External (N-Type)

Maximum Output Power (per chain): 12 25 26 dBm

Data Rate: Auto

Extension Channel Protection: None

☐ Enable MAC Clone: 00:19:70:27:eb:ea

Apply Cancel

Figure 4-6. Wireless Basic Settings screen.

- Click the "Site Survey" button beside Wireless Mode. (See Figure 4-6.) The switch will scan all the available access points within its coverage. Select the one you prefer to connect to, and click "Select" to establish the connection. (See Figure 4-7.)

**Wireless Site Survey**

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

Select	SSID	Frequency/Channel	MAC Address	Wireless Mode	Signal Strength	Security
<input type="radio"/>	aeap17	2412MHz(1)	00:24:01:df:67:8e	802.11B/G	-78	WPA
<input type="radio"/>	aeap18	2412MHz(1)	00:21:91:f6:f7:55	802.11B/G	-77	NONE
<input type="radio"/>	FRITZ!Box Fon WLAN 7270	2412MHz(1)	00:24:fe:46:b9:c8	802.11B/G/N	-75	WPA2
<input type="radio"/>	RT-G32	2437MHz(6)	20:cf:30:d6:5a:d0	802.11B/G	-62	WEP
<input type="radio"/>	MIS-AP2	2437MHz(6)	00:13:f7:8e:8d:d3	802.11B/G/N	-49	WPA2
<input type="radio"/>	HTC	2437MHz(6)	90:21:55:c2:3f:9c	802.11B/G	-81	NONE
<input type="radio"/>	DIR-635	2462MHz(11)	00:24:a5:b4:cf:77	802.11B/G	-64	WPA
<input type="radio"/>	Apple Network 873e69	2417MHz(2)	10:9a:dd:87:3e:69	802.11B/G/N	-75	WPA2
<input type="radio"/>	ASIX_WIFI	2422MHz(3)	00:1e:58:29:28:27	802.11B/G	-65	NONE

Figure 4-7. Wireless Site Survey page.

- If the AP you connect to requires authentication or encryption keys, click "Profile Settings" in the left column, fill out the corresponding items, and click "Apply" for data encryption.



The screenshot shows the 'Wireless Broadband Access Point' configuration interface. The top navigation bar includes 'Status', 'System', 'Wireless', 'Management', and 'Tools'. The 'Wireless' tab is selected. On the left, a sidebar lists 'Basic Settings', 'Profile Settings', 'Advanced Settings', 'Access Control', and 'WDS Settings'. The 'Basic Settings' section is active, showing fields for 'Profile Name' (Profile1), 'Wireless Network Name (SSID)' (Wireless), and 'WMM Support' (Enabled). Below this is the 'Security Settings' section, which includes a dropdown for 'Network Authentication' (Open System), a dropdown for 'Data Encryption' (Open System), and a dropdown for 'Key Type' (Legacy 802.1x). Other fields include 'Default Tx Key', 'WEP Passphrase', and four 'Encryption Key' fields. A 'Generate Keys' button is located next to the 'WPA2-PSK' option in the 'Key Type' dropdown.

Figure 4-8. Wireless Profile Settings screen.

### 4.3 Bridge Mode

1. Choose "Wireless > Basic Settings." Then you will see the "Wireless Basic Settings" page as in Figure 4-9. Choose "Bridge" for Wireless Mode, and click "Apply" to save it. To optimize your application, change the other parameters before clicking "Apply."



The screenshot shows the 'Wireless Basic Settings' page. The top navigation bar is the same as in Figure 4-8. The 'Wireless' tab is selected. The left sidebar lists 'Basic Settings', 'Profile Settings', 'Advanced Settings', 'Access Control', and 'WDS Settings'. The 'Basic Settings' section is active, showing the 'Wireless Basic Settings' title and a description: 'Use this page to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless mode as well as wireless network parameters.' Below this is a checkbox for 'Disable Wireless LAN Interface'. The 'Wireless Mode' dropdown is set to 'Bridge'. Other fields include '802.11 Mode' (802.11B/G/N), 'Frequency/Channel' (2437MHz (6)), 'Extension Channel' (None), 'Channel Mode' (20 MHz), 'Antenna' (Internal (8 dBi)), 'Maximum Output Power (per chain)' (12 dBm), 'Data Rate' (Auto), and 'Extension Channel Protection' (None). A 'Site Survey' button is located next to the 'Wireless Mode' dropdown.

Figure 4-9. Wireless Basics Settings screen.



- Click "WDS Settings" in the left column, type the MAC address of the remote bridge into the "Remote AP MAC Address 1" field and click "Apply." See Figure 4-10.

**Wireless Broadband Access Point** Logout

**Status** **System** **Wireless** **Management** **Tools**

Basic Settings  
Profile Settings  
Advanced Settings  
Access Control  
WDS Settings »

### WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does. To do this, you must set these APs in the same channel and set MAC addresses of other APs which you want to communicate with in the table and then enable the WDS. This function can work only in Bridge and AP Repeater mode.

Local MAC Address:

Remote AP MAC Address1:

Remote AP MAC Address2:

Remote AP MAC Address3:

Remote AP MAC Address4:

Figure 4-10. WDS Settings screen.

*NOTE: Bridge mode uses the WDS protocol that is not defined as the standard, so you might experience compatibility issues between equipment from different vendors. Use tree or star shape network topology in all WDS use-cases. For example, if AP2 and AP3 are specified as the WDS peers of AP1, AP2 should not be specified as the WDS peer of AP3, and AP3 should not be specified as the WDS peer of AP2. Avoid using mesh and ring network topologies, because they are not supported by WDS.*

- Repeat the above procedures to configure the remote Wireless P-T-P Ethernet Extender.
- Use ping to check whether the link between the two bridges is OK.
- For better wireless connectivity, align the antennas on both bridges that are installed a long distance apart.
- Open "Antenna Alignment" in Tools. See Figure 4-11. Choose the remote peer and click on the "Start" button.

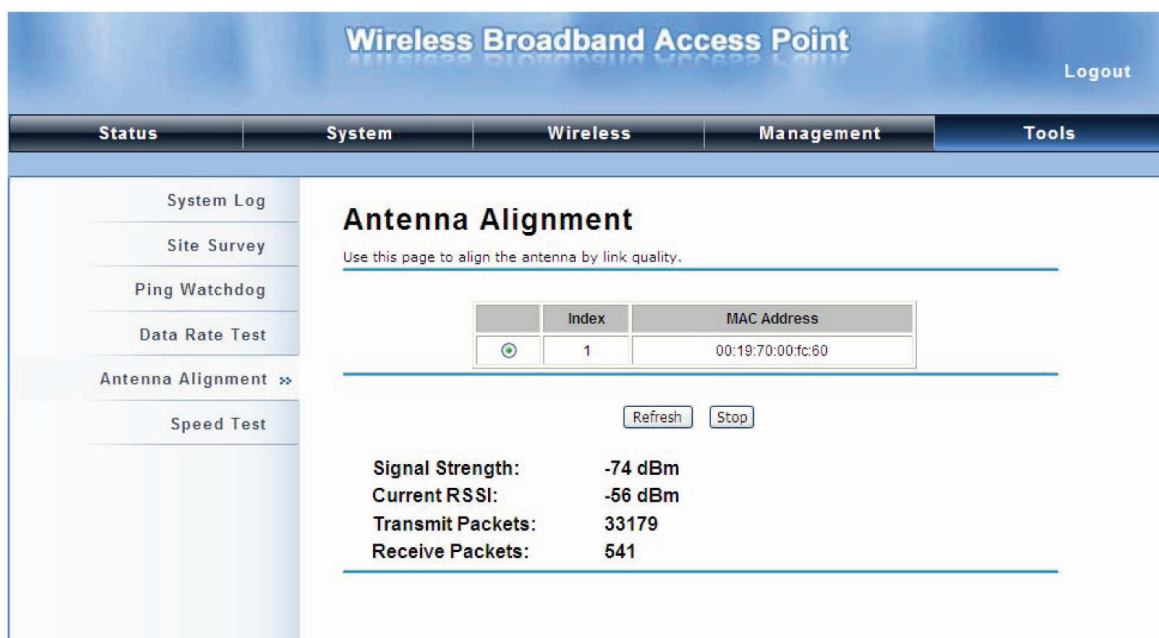


Figure 4-11. Antenna Alignment screen.

### 4.4 AP Repeater Mode

1. Choose "Wireless > Basic Settings" (see Figure 4-12). Choose "AP Repeater" from Wireless Mode, and click "Apply" to save it. To optimize your application, change the other parameters before clicking "Apply."

*NOTE: For longer transmission of the Wireless P-T-P Ethernet Extender, you may also use an external antenna; if so, remember to change the antenna setting from "Internal (8 dBi)" to "External (N-Type)" after your external antenna is installed. Otherwise, do not set the antenna to "External (N-Type)" if an external antenna is not attached. The Wireless P-T-P Ethernet Extender could be damaged.*



Figure 4-12. Wireless Basic Settings screen.



2. To establish a point-to-point bridge connection, follow the procedures described in Section 4.3: Bridge Mode. To connect the wireless client to the AP, follow the procedures described in Wireless Client mode.

You have primarily completed configuration of the Wireless P-T-P Ethernet Extender and it's ready to operate. For more advanced configurations, refer to the user manual.

*NOTE: You can download the user manual from [ftp://ftp.blackbox.com/anonymous/manuals/L/LWE100A\\_rev2\\_user.pdf](ftp://ftp.blackbox.com/anonymous/manuals/L/LWE100A_rev2_user.pdf).*





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### About Black Box

Black Box provides an extensive range of networking and infrastructure products. You'll find everything from cabinets and racks and power and surge protection products to media converters and Ethernet switches all supported by free, live 24/7 Tech support available in 30 seconds or less.

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