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**Model ES1AWB**  
**802.11b Wireless**  
**Serial Server**





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# Table of Contents

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<b>CHAPTER 1: INTRODUCTION.....</b>	<b>1</b>
ABOUT YOUR ES1AWB WIRELESS SERIAL SERVER.....	1
FEATURES.....	1
COMMUNICATION MODES .....	1
<i>Direct IP</i> .....	1
<i>Virtual COM Port</i> .....	1
<i>Paired Mode</i> .....	2
<i>Other Communications Modes</i> .....	2
802.11 WIRELESS NETWORKING BASICS .....	2
802.11 Wireless Networking .....	3
<b>CHAPTER 2: HARDWARE OVERVIEW .....</b>	<b>5</b>
PACKAGE CHECKLIST .....	5
INDICATORS, SWITCHES AND CONNECTORS.....	6
<i>Link Integrity LED</i> .....	6
<i>Network Activity LED</i> .....	6
<i>Reset Switch</i> .....	6
<i>Antenna Connector</i> .....	6
<i>Power Connector</i> .....	6
CONNECTING THE HARDWARE .....	7
OTHER HARDWARE CONNECTIONS.....	8
<b>CHAPTER 3: GETTING STARTED .....</b>	<b>9</b>
1. <i>Check the contents of your ES1AWB package. It should contain</i> .....	9
2. <i>Set up the Hardware</i> .....	9
3. <i>Power it Up</i> .....	9
4. <i>Get the IP Address</i> .....	10
5. <i>Login</i> .....	10
6. <i>Configure the ES1AWB</i> .....	10
7. <i>Set up VCOM (if using the RealPort profile)</i> .....	10
8. <i>Communicate</i> .....	10
<b>CHAPTER 4: CONFIGURING THE IP ADDRESS.....</b>	<b>11</b>
USING THE DISCOVERY SOFTWARE .....	11



---

<b>CHAPTER 5: USING THE WEB CONFIGURATION AND MANAGEMENT INTERFACE.....</b>	<b>13</b>
LOGGING IN .....	13
LOGGING OUT .....	13
USING TUTORIAL AND HELP .....	14
CONFIGURING NETWORK SETTINGS .....	14
<i>IP Settings</i> .....	15
<i>Wireless LAN Settings</i> .....	15
<i>Wireless Security Settings</i> .....	17
<i>Wireless 802.1x Authentication Settings</i> .....	17
<i>Network Services Settings</i> .....	17
<i>Advanced Network Settings</i> .....	17
CONFIGURING THE SERIAL PORT .....	18
<i>Port Profile Settings</i> .....	18
<i>Basic Serial Settings</i> .....	23
<i>Advanced Serial Settings</i> .....	23
CONFIGURING ALARMS AND NOTIFICATION .....	24
<i>Alarm Notification Settings</i> .....	24
<i>Alarm Conditions</i> .....	24
<i>Alarm Destinations</i> .....	25
<b>CHAPTER 6: MANAGING THE ES1AWB.....</b>	<b>27</b>
SYSTEM SETTINGS .....	27
<i>Device Identity Settings</i> .....	27
<i>Simple Network Management Protocol (SNMP) Settings</i> .....	27
USING REMOTE MANAGEMENT .....	27
MANAGING USERS AND PERMISSIONS .....	27
<i>Changing the Root Username and Password</i> .....	28
<i>Adding New Users</i> .....	28
<i>Configuring User Access and Permissions</i> .....	28
MANAGING SERIAL PORTS AND CONNECTIONS .....	29
<i>Serial Ports</i> .....	29
<i>Connections</i> .....	29
<b>CHAPTER 7: USING ADMINISTRATIVE FEATURES .....</b>	<b>31</b>
FILE MANAGEMENT.....	31
BACKUP/RESTORE .....	31
UPDATE FIRMWARE.....	31
FACTORY DEFAULT SETTINGS .....	31
SYSTEM INFORMATION .....	32
<i>General</i> .....	32
<i>GPIO</i> .....	32

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<i>Serial</i> .....	32
<i>Network</i> .....	33
REBOOT .....	34
<b>CHAPTER 8: USING REALPORT .....</b>	<b>35</b>
<i>Configuring the IP Address</i> .....	35
<i>Configuring the Serial Port for RealPort</i> .....	35
<i>Adding a Virtual COM Port using RealPort</i> .....	36
<i>Removing a Virtual COM Port using RealPort</i> .....	36
<i>Updating RealPort</i> .....	37
<b>APPENDIX A: DEFAULT CONFIGURATION SETTINGS .....</b>	<b>39</b>
<b>APPENDIX B: PRODUCT SPECIFICATIONS .....</b>	<b>41</b>
<b>APPENDIX C: ES1AWB DIMENSIONAL DIAGRAM.....</b>	<b>43</b>
<b>APPENDIX D: RS-232 CONNECTIONS.....</b>	<b>45</b>





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## Chapter 1: Introduction

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**Thank you for purchasing an ES1AWB Wireless Serial Server.** Like all B&B Electronics products, your serial server has been manufactured to high standards of quality and performance to ensure your complete satisfaction. Please read this manual and carefully follow the instructions to achieve best results. For additional information on this and other products and for technical support, contact B&B Electronics.

### About Your ES1AWB Wireless Serial Server

**ES1AWB Wireless Serial Servers** are part of B&B Electronics' growing family of device servers, products that allow you to connect equipment with available serial connections into existing networks. ES1AWB wireless serial servers connect RS-232 devices to a wireless network via wireless access points, eliminating the need for network cabling. Based on the 802.11b wireless standard, ES1AWB servers operate at up to 11 Mbps over the 2.4 GHz band, which does not require licensing.

A serial device connected to the serial port on your ES1AWB can be accessed from any node on the LAN using **virtual COM port, console management, TCP and UDP socket, serial bridge, modem emulation and custom connections**. Network addresses can be obtained dynamically or manually. Simple Network Management Protocol (SNMP) is supported. Configuration is accomplished through a web-based user interface.

### Features

- Wireless networking at up to 11 Mbps on the 2.4 GHz band, as specified by the 802.11b standard
- Serial port supports RS-232 using a standard DB-M connector
- Supports TD, RD, TRS, CTS, DTR, DCD, DSR and GND RS-232 lines
- LAN and WAN Communications via wireless access point
- TCP or UDP Client or Server operation - configurable



- Software Support - Windows 98/ME/2000/XP/NT 4.0 or Vista
- Firmware upload for future revisions/upgrades
- Small compact case
- LEDs indicate link integrity and data transfer activity
- Web Configuration and Management user interface
- Email event notification

## Communication Modes

**ES1AWB Wireless Serial Servers** allow you to connect serial devices over a wireless network. The connection can be configured in several modes.

### ***Direct IP***

**Direct IP Mode** allows applications using TCP/IP or UDP/IP socket programs to communicate with the asynchronous serial ports on the serial server. In this mode the ES1AWB is configured as a TCP or UDP server. The socket program running on the PC establishes a communication connection. The data is sent directly to and from the serial port on the server.

- **TCP Server Mode** allows network devices to initiate a TCP connection to the serial device connected to the serial port on the ES1AWB. This is also referred to as reverse telnet.
- **UDP Server Mode** allows network devices to initiate a UDP connection to the serial device attached to the serial port of the ES1AWB. When using UDP protocol the ES1AWB can be configured to broadcast data to and receive data from multiple IP addresses.

### ***Virtual COM Port***

**Virtual COM Port** mode (also called COM port redirection) allows you to map a COM port on your PC to the serial port on your ES1AWB. Using the RealPort software (included with the ES1AWB) you create virtual COM ports on your PC. When your application sends data to this port, RealPort redirects the data across the network to serial device connected to the ES1AWB serial port. The network is transparent to the user application and the serial device connected to the ES1AWB.

## **Paired Mode**

**Paired Mode** (also called **Serial Tunneling** or **Serial Bridge** mode) allows serial devices connected to two ES1AWB serial servers to communicate across a network. The two ES1AWB serial servers automatically connect to each other.

In Paired Mode the **heartbeat feature** ensures reliable communications by restoring the connection if communications are temporarily lost at either end due to loss of power or Ethernet connection.

## **Other Communications Modes**

ES1AWB Wireless Serial Servers also feature the following communications profiles:

**Modem Emulation Mode** allows you to configure the serial port to operate as if it is a modem. For legacy applications where a serial device is set up to communicate through a modem, the serial device can now be connected to the ES1AWB and communication occurs over the network. The ES1AWB emulates modem responses to and from the serial device.

In **Console Management Mode** the ES1AWB can be configured for connection to the management port typically found on network devices such as routers, switches and servers. This allows remote management of the network device. Communication can be accomplished using telnet to a specific port in the serial server.

**Custom Mode** allows you to custom configure the ES1AWB serial port and is used if your application does not fit into any other predefined modes.

## **802.11 Wireless Networking Basics**

**ES1AWB wireless serial servers** allow you to connect non-network-enabled serial devices into a wireless network, giving you the capability to gather more data and implement remote programming and management. Serial devices no longer are limited to a physical connection to a PC. The serial device can be connected to an ES1AWB wireless serial server anywhere within range of an 802.11b-compatible wireless access point. Communication occurs transparently using TCP/IP or UDP/IP over a wireless link. This allows traditional Windows PC software access to serial devices anywhere on the wireless network.

The enabling technology for ES1AWB wireless serial servers is based on the IEEE 802 standard. Some background on the standard follows.

### **802.11 Wireless Networking**

**IEEE 802.11** is a set of standards that defines how multiple devices can communicate on a wireless network. The standard has grown into a set of several standards that define various features and functions. The 802.11b standard defines the physical and data link layers for a wireless network using the 2.4 GHz frequency band, a band that does not require licensing. As a part of the IEEE family of standards, 802.11 WLANs are easily connected to 802.3 (Ethernet) LANs. Higher layer LAN protocols, network operating systems and internetworking protocols such as TCP/IP integrate seamlessly.

Under the IEEE 802.11 standard there can be two different types of devices on the wireless network: *stations* and *access points (AP)*. A **station** may be a PC equipped with a wireless network adapter or it can be a wireless serial server such as the ES1AWB. An 802.11 **access point** is a radio with an interface that allows connection to a wired LAN. Access points run bridging software to facilitate the connection from wireless to wired network. The access point becomes the base station for the WLAN. It aggregates access to the wired network for multiple wireless stations. An access point may be a standalone device, such as a wireless router or switch, or a card in a PC.

### **Wireless Network Configurations**

The 802.11 standard defines two modes of operation: *infrastructure mode* and *ad hoc mode*. **Infrastructure mode** makes use of one or more access points connected to a wired LAN. Wireless stations communicate with access points to gain access to each other and/or the LAN. In the Basic Service Set (BSS) several stations communicate with one access point, which is connected to a wired LAN. In the Extended Service Set (ESS) two or more access points connect to the LAN creating a sub network.

In **ad hoc mode**, also called Independent Basic Service Set (IBSS), access points are not used. Wireless stations communicate directly with each other in a peer-to-peer fashion. This mode allows individual computers to set up a network where wireless infrastructure does not exist.

ES1AWB wireless serial servers can be configured to operate in infrastructure or ad hoc mode. From the Web Configuration and Management Interface you can set up the type of network, naming the network (specifying the SSID, or service set identifier) and other parameters.

## ***IEEE 802.11b***

IEEE 802.11b standard specifies a WLAN that operates on the 2.4 GHz band at data rates up to 11 Mbps. Equipment that conforms to the 802.11b standard can interoperate with equipment conforming to faster (up to 54 Mbps) 802.11g equipment and they will interoperate. However, when connected into the same network the 802.11g equipment will operate at the 11 Mbps limitation of the 802.11b equipment.

For media access, 802.11 wireless networks use CSMA/CA, a scheme in which a station that intends to transmit 'listens' for traffic on the radio carrier frequency and sends data packets if the frequency is clear. If the receiving station receives the packet intact it sends an acknowledgement (ACK) to confirm the packet has been received. If the transmitting station does not receive an ACK it assumes a collision occurred and transmits again after a random delay period.

Communication distances vary depending on the type and thickness of material around a wireless node. The transmitter power output, the type of antenna used and the amount of attenuation through materials also affects the useable range. Electromagnetic noise, reflections, the amount of network traffic, other radio devices operating in the same frequency band also affect range and overall performance. In an infrastructure network the number of access points and their coverage pattern also affect how well the system operates. Typically an 802.11 device operating indoors will have a range from 100 feet minimum to about 500 feet maximum. Outdoors, some products, using high gain antennae may achieve line-of-sight ranges of five miles or more.

Security is a significant concern for WLAN users. Whether security threats originate intentionally or unintentionally, wireless systems are more susceptible than wired systems. ES1AWB serial servers offer several security options including WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access), PEAP (Protected EAP) w/EAP-MS-CHAPv2 and others.



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## Chapter 2: Hardware Overview

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### Package Checklist

**ES1AWB Wireless Serial Servers** are shipped with the following items included:

- ✓ The ES1AWB module
- ✓ A printed version of this user manual
- ✓ A printed version of the ES1AWB Quick Start Guide
- ✓ CD-ROM disc with
  - B&B discovery software
  - RealPort drivers for Windows 98/ME/2000/XP/NT 4.0 /Vista
  - This manual in PDF format
  - The ES1AWB Quick Start Guide in PDF format



Figure 1. Front View of the ES1AWB Serial server

## Indicators, Switches and Connectors

### **Link Integrity LED**

- When the **yellow LED** is illuminated it indicates that a **connection (link integrity) has been established** between the serial server and an access point.
- If this LED is blinking slowly the ES1AWB is in **ad hoc** mode.
- If this LED is blinking quickly the ES1AWB is **scanning for a network**.

### **Network Activity LED**

When the **green LED** is flashing it indicates data is being sent across the network.

### **Reset Switch**

The **Reset** switch is a recessed switch located on the side of the ES1AWB. The Reset switch operates as follows:

- **Press for at least 1 second, release in less than 10 seconds:** reset serial server operating system
- **Press and hold 10+ seconds(during power-up):** reset serial server to factory default settings.

### **Antenna Connector**

The antenna connector is a reverse SMA connector.

*An omni-directional antenna is supplied with ES1AWB wireless serial servers. All ES1AWB serial servers are FCC-certified when the supplied antenna is used.*

### **Power Connector**

The power connector is a 5.5mm by 2.1mm barrel jack the out side is negative (-) power supply. The tip or inside is positive (+) power supply. The power supply voltage range is 5 VDC.

## Connecting the Hardware

A typical connection for the **ES1AWB Wireless Serial Server** is infrastructure mode operation, in which the ES1AWB communicates with a PC on a wired network via an access point, which is often a wireless switch or router.

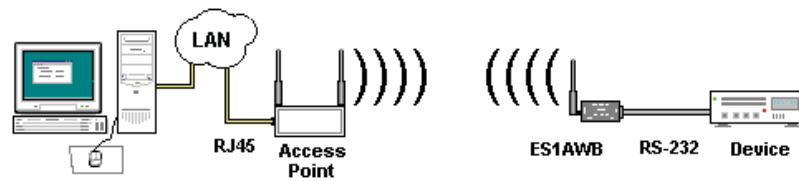


Figure 2. Connection via the Wireless LAN

## Other Hardware Connections

The ES1AWB Wireless Serial Server also can communicate directly with a PC equipped with a wireless card (in ad hoc mode).

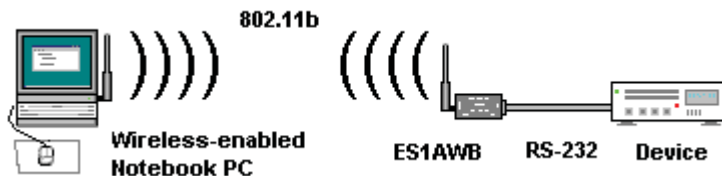


Figure 3. Wireless Ad Hoc Connection

In Serial Tunneling mode two serial devices can communicate via two ES1AWB Wireless Serial Servers.

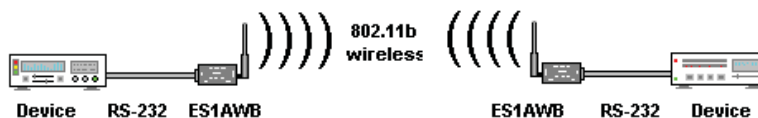


Figure 4. Serial Tunneling Ad Hoc Connection

Serial tunneling also can occur between two ES1AWB serial servers communicating with individual access points and across a wired network.

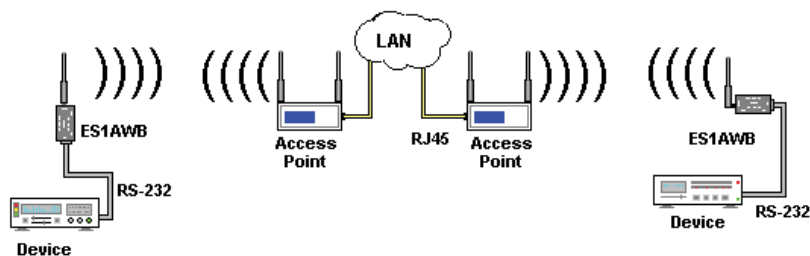


Figure 5. Serial Tunneling via Infrastructure

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## Chapter 3: Getting Started

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### 1. Check the contents of your ES1AWB package. It should contain...

- The ES1AWB module with SMA antenna
- A 5VDC power supply
- A printed version of this user manual
- A printed version of the ES1AWB Quick Start Guide
- CD-ROM disc with discovery software, RealPort software, this manual and Quick Start guide

### 2. Set up the Hardware

- Connect your PC to the network
- Connect the antenna to the ES1AWB
- Connect the ES1AWB serial port to the serial port on your serial device

*For RS-232 operation, your ES1AWB is configured as a DTE and uses a DB-9M connector. Use a straight through RS-232 cable if your serial device is configured as a DCE. If your serial device is configured as a DTE you will have to use a null modem (crossover) cable.*

### 3. Power it Up

- Connect the 5VDC power supply to the ES1AWB
- The yellow LED will blink while looking for a wireless network. When a connection is established with the network the yellow LED will remain on steadily.
- The ES1AWB will automatically try to obtain an IP address (dynamically). If it cannot find a DHCP server, it will generate an IP address itself. It will look for a wireless network with the name (SSID) *Connect* first. If it does not find the SSID it will connect to the first unsecured network it finds.

*If you are configuring your own access point (a wireless switch or router) ensure that it is configured as a DHCP server with the Wireless Network Name (SSID): **Connect***

#### **4. Get the IP Address**

- Use the discovery software on your CD (finder.exe) to get the IP address for your ES1AWB

#### **5. Login**

- In a web browser on your PC, type in the IP address and access the Web Configuration and Management Interface
- Login using the username 'root' and password 'dbps'

#### **6. Configure the ES1AWB**

- In the Configuration, Network page configure your Wireless LAN, Security and other settings required to work on the type of wireless network you will be connecting to.
- In the Configuration, Serial Ports page select the Port Profile you require for use with your application (E.g. RealPort for virtual COM port, TCP Server, UDP server, Serial Bridge, etc)
- Configure the serial port settings for the selected Port Profile (e.g. In TCP Sockets select client or server, TCP port numbers, etc. Also configure baud rate, data bits, etc in Basic Serial Settings.
- Configure any required alarms and notification
- If RealPort profile was selected (virtual COM port) do the next step (Set up VCOM)

#### **7. Set up VCOM (if using the RealPort profile)**

- Start the RealPort software wizard (located on the included CD)
- Select Add a New Device
- Select your ES1AWB from the list
- Select an unused COM port number
- Follow the wizard to set up a virtual COM port

#### **8. Communicate**

- Configure and then start your application

## Chapter 4: Configuring the IP Address

Before you can begin the configuration of your ES1AWB you must know its IP address to access it with a web browser. Once you have access to the **Configuration and Management Interface** via a web browser you can reset the IP address using static IP addressing, if necessary.

Your ES1AWB comes from the factory configured to obtain an IP address dynamically, or failing that, to generate its own IP address using the APIPA protocol. You can determine the current IP address using the discovery software included on the CD with your ES1AWB.

### Using the Discovery Software

1. Power up the ES1AWB. The yellow LED will blink while looking for a wireless network. When a connection is established with the network the yellow LED will remain on steadily. The ES1AWB will then obtain or generate an IP address.
2. To determine the initial IP address of your ES1AWB, start the *finder.exe* utility included on the included CD.

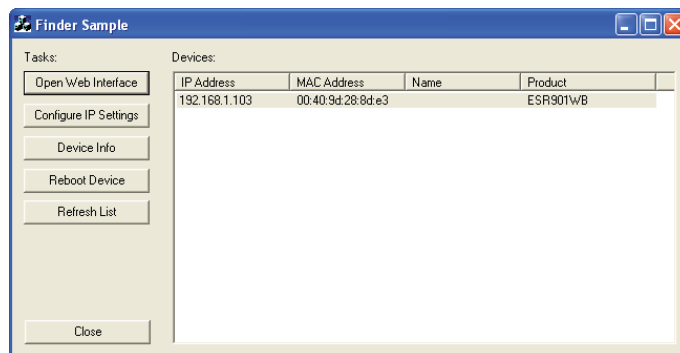


Figure 6. Discovery Utility Dialog

3. The finder.exe utility scans the network for devices and then lists each device's **IP Address**, **MAC Address**, **Name** and **Product ID**.



Identify your ES1AWB by its MAC address (printed on a label on the ES1AWB).

If you need to change the IP address of the ES1AWB, you can accomplish this using the Discovery software, or you can open the Web Configuration and Management Interface and do it there. (See **Configuring Network Settings** later in the next chapter.)

1. To change the IP address of the ES1AWB from the discovery software, click **Configure IP Settings**.
2. In the dialog that appears, select **Manually configure network settings**.
3. Type the new **IP Address**, **Subnet Mask**, **Default Gateway** and system password (initially *dbps*) in the appropriate boxes, then click **Apply**.
4. Click **Reboot Device**. This may take a minute or more to complete.
5. Click **Refresh List** to confirm the new IP address has been accepted.

---

## Chapter 5: Using the Web Configuration and Management Interface

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The **ES1AWB Serial Server** can be configured using the **Configuration and Management Interface** via a standard web browser such as Internet Explorer or Firefox.

### Logging In

1. Before you can begin configuring your ES1AWB Serial server, you must login to the **Configuration and Management Interface**. To **login**, open your browser, type the IP address of your ES1AWB serial server into the address bar and press **Enter**. The **Login** page will appear.
2. Enter your **Username** and **Password**, then click **Login**.

The first time you login, type the default (root) username and password.

- **Username: root**
- **Password: dbps**

*The default username and password are preconfigured to give you full administrator permissions, allowing you to add and configure permissions for additional users. For security purposes, you may want to change the username and password after you have accessed the interface for the first time. To change usernames and passwords, and to add and configure new users, see **Managing Users and Permissions** in Chapter 6.*

When the username and password are accepted the **Configuration and Management Interface** homepage will appear.

### Logging Out

To log out of the Web Configuration and Management Interface, click **Logout** on the menu bar. To finish logging out of the web server, and prevent access by other users, you also must close the browser.

## Using Tutorial and Help

You can access the **ES1AWB Tutorial** by clicking **Tutorial** on the Configuration and Management homepage. Clicking **Help** on any page of the Configuration and Management Interface opens topics specific to that page.

*After logging in, if there is no activity for a period of time your session may time out. Clicking on any link will return you to the Web Login page where you will have to log in again to continue your session.*

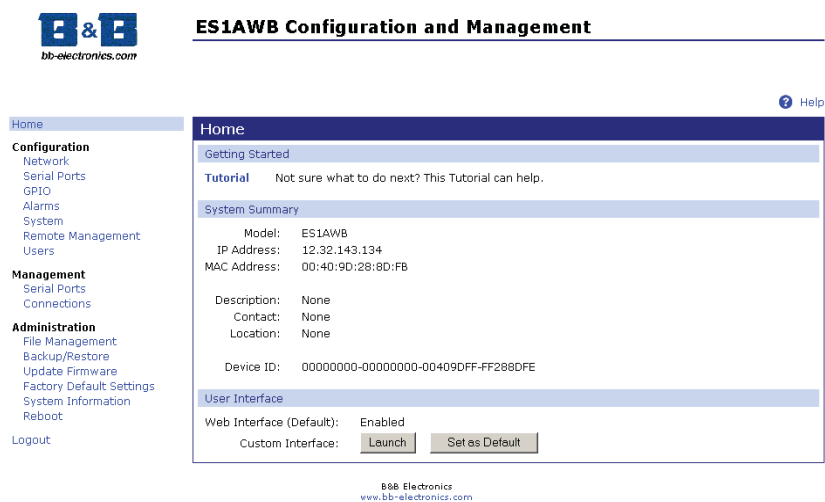


Figure 7. The ES1AWB Configuration and Management Homepage

## Configuring Network Settings

The **Network Configuration** page contains six sections with hyperlinked menu bars.

- IP Settings
- Wireless LAN Settings
- Wireless Security Settings
- Wireless 802.1x Authentication Settings
- Network Services Settings
- Advanced Network Settings

Network Configuration

▼ IP Settings

Obtain an IP address automatically using DHCP \*

Use the following IP address:

\* IP Address:

\* Subnet Mask:

Default Gateway:

\* Changes to DHCP, IP address and Subnet Mask require a reboot to take effect.

- ▶ Wireless LAN Settings
- ▶ Wireless Security Settings
- ▶ Wireless 802.1x Authentication Settings
- ▶ Network Services Settings
- ▶ Advanced Network Settings

Figure 8. Network Configuration, IP Settings Page

## IP Settings

The **IP Settings** section allows you to select between dynamic or static IP addressing. The ES1AWB's default setting is **Obtain an IP address automatically using DHCP**, or dynamic IP addressing.

*When the ES1AWB is first connected it will try to obtain an IP address automatically. If it fails, it will assign an IP address to itself using the **Automatic Private IP Addressing (APIPA)** protocol. You can re-configure the ES1AWB for static IP address by selecting **Use the following IP address** and assign the IP address yourself.*

If **Use the following IP address:** is selected, you are choosing static IP addressing. When this option is selected the **IP Address**, **Subnet Mask** and **Default Gateway** text boxes become available. You must determine the appropriate parameters and enter them yourself. (If you do not know what to enter ask your network administrator for assistance.)

To implement any changes in this section, click **Apply**. A page will appear asking you to **Reboot** the ES1AWB so that the changes can take effect.

## Wireless LAN Settings

The **Wireless LAN Settings** section allows you to specify the **Network Name** or **SSID** (Service Set Identifier). Multiple wireless networks sometimes exist. Specifying the network name allows your ES1AWB serial