LS900A-R2

BLACK BOX NETWORK SERVICES

LongSpan™ 900-MHz Wireless Ethernet Indoor/Outdoor Radio

Industrial-grade, long-range wireless Ethernet.

Use a wireless link between two radios to replace an Ethernet cable.



Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500) • FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746 • Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018 • Web site: www.blackbox.com • E-mail: info@blackbox.com

FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Normas Oficiales Mexicanas (NOM) Electrical Safety Statement INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Distance — 40 miles line of sight with 15-dBi antenna

Environmental — Operating temperature: -40 to +158° F (-40 to +70° C)

Radio Channels/Bandwidth — 12 non-overlapping with 2.0833-MHz spacing and 1.75-MHz occupied bandwidth

Radio Link Budget — 148 dB with 15 dBi antenna

Receive Sensitivity — -97 dBm at 10e-4 BER (-112 dBm with 15-dBi antenna)

Speed — RF Transmission Rate: 1.536 Mbps;
Ethernet Throughput: 935 kbps

Connectors — (1) RJ-45 PoE 10BASE-T/100BASE-TX, (1) RP TNC female

Indicators — LEDs: (1) Power, (1) Ethernet Link, (1) RF RX, (1) RF TX, (4) Channel, (6) Link Quality

Power — Input: 100–240 VAC, 50–60 Hz, 0.2 A external power adapter or PoE injector;
Output: 12 VDC, 0.5 A, 6 W

Size — Each radio: 2.2"H x 7.8"W x 3.2"D (5.71 x 20 x 8.25 cm)

Weight — 1.76 lb. (0.8 kg)

2. Overview

2.1 Introduction

With the LongSpan 900-MHz Wireless Ethernet Extender Indoor/Outdoor Radio (LS900A-R2), you can create a long-range, wireless Ethernet network with up to 16 subscriber units per access point (AP). The configuration may include any combination of LS900A-R2 or LS900PKA extenders (Integrated Radio and Directional Antenna).

To configure a wireless link using LS900A-R2 or and/or LS900PKA radios, your system must meet the folllowing conditions:

- Each radio must be set as an AP or a subscriber unit (SU).
- Each radio must have an IP address that is unique among all others on the same network.
- The AP must know how many SUs are expecting to communicate with it.
- The AP and any given SU must agree on which radio-frequency channel they are using. The radios set this automatically.
- You must assign the SU a unique subscriber ID to specify which time-division slot it will use when communicating with the AP.
- The AP and any given SU must share a common 128-bit encryption key.

You can configure the radios via computer connected to a a Web browser, setting parameters via their built-in browser interfaces.

The AP automatically scans for the best of 12 available radio-frequency channels, encrypts Ethernet data received from the network, and transmits it wirelessly to the SU. The AP constantly monitors the radio link and automatically changes the channel if performance is degraded because of interference. If two AP units are very close to one another, they may interfere if operating on adjacent frequency channels. Place them at least 10 feet apart or manually select non-adjacent channels for their operation. Also, place the radios at least 10 feet apart to avoid overloading the radio's receiver. Also, place the SU at least 10 feet from the AP to avoid overloading the radio's receiver.

You can connect any 10/100BASE-T Ethernet client device (ECD) to an Indoor/Outdoor Radio SU. Each SU encrypts Ethernet traffic it receives from the attached ECD and transmits the data wirelessly to its AP. You can plug each SU directly into an ECD without adding drivers or loading software. Once the AP/SU pair is configured and running, it behaves like a continuous Ethernet cable.

2.2 What's Included

Your package should include the following items. If anything is missing or damaged, please contact Black Box at 724-746-5500.

- (1) indoor/outdoor PoE radio in black metal chassis
- (1) chassis label (Black Box applied)
- (1) 2.5-db black omni antenna in bag
- (1) PoE mid-span injector in bag
- (1) 12V power supply in box
- (1) pole-mount bracket in box
- This user's manual
- (1) cardboard box
- (1) box sticker (Black Box applied)

2.3 Hardware Description

Figure 2-1 shows the LS900A-R2 and the PoE power injector.

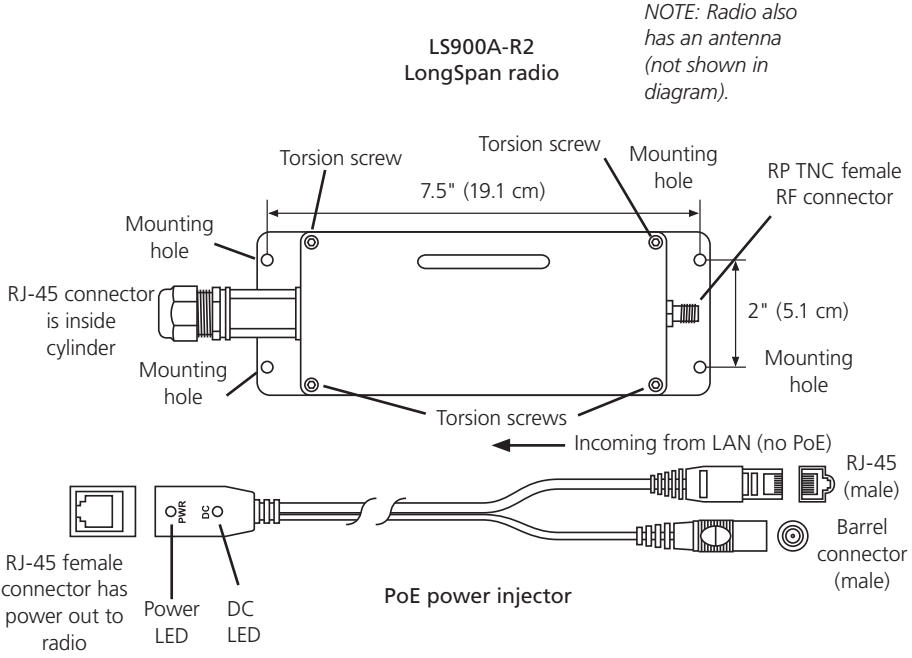


Figure 2-1. LongSpan 900-MHz radio and PoE power injector.

3. Installation

3.1 Digital Setup

1. The radio's built-in browser interface enables you to configure it digitally.

2. Download the Black Box Discovery Utility from our Web site:

   http://www.blackbox.com/go/LongSpan/LongSpan_Finder

This link will prompt you to either Run or Save the application. Press Run to start it immediately; press Save to save the application before running.

NOTE: This utility only runs on Microsoft® Windows®, not Linux® or Mac®. If you must use a non Windows computer for configuration, make sure your subnet mask allows your computer to see 192.168.17.17. Connect to that default IP address with your Web browser, continuing the setup procedure with Step 6.

3. Run the IP Discovery Utility, ipfinder.exe and you should see a window similar to Figure 3-1.

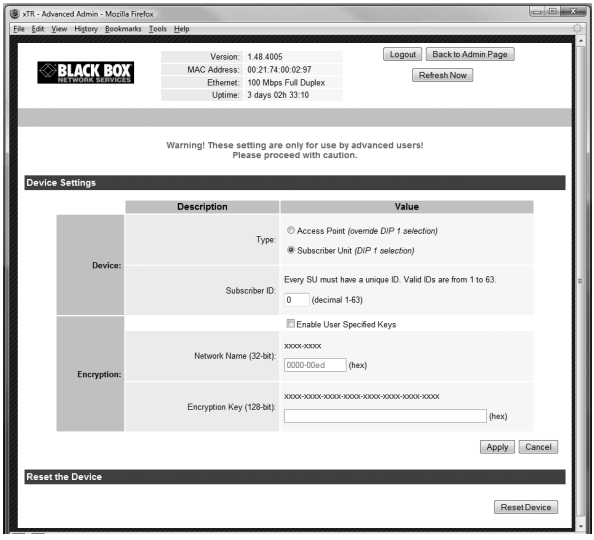


Figure 3-1. IP Discovery screen.

The LS900A-R2 should appear in the list as the default address of 192.168.17.17. If it does not, click "Search" to regenerate the list. If it still does not appear, you might have a connection issue and need to re-examine the cabling or you might have a firewall issue on your computer.

4. Double-click the item in the list that refers to the radio being configured. You will see a second window similar to Figure 3-2.

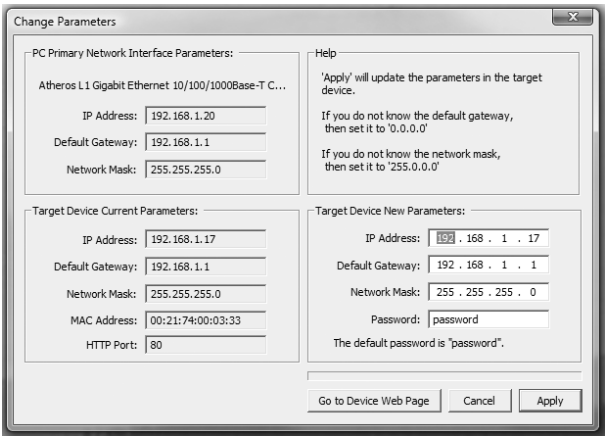


Figure 3-2. Radio IP Configuration screen.

The information on the left in Figure 3-2 is the current status of the radio; the boxes on the right allow you to change it. Make sure that the radio's IP address is in the same subnet as your computer. For example, if the subnet mask is 255.255.255.0 (a Class C network), the first three number groups of the IP address must match. Choose your desired parameters and click "Apply."

5. Write down the IP address and password you just chose, then click "Go to Device Web Page." Your default Web browser will launch with the device IP address in the browser address bar. Or, you may launch the browser on your own and enter the Web page address manually: http://[the IP address you just set].

6. The browser page that loads first shows the current device information and QoS statistics and provides a login at the upper right. Log in using the password you just specified (or "password" if you kept the default). If the login is successful, you will see the Admin page similar to Figure 3-3.

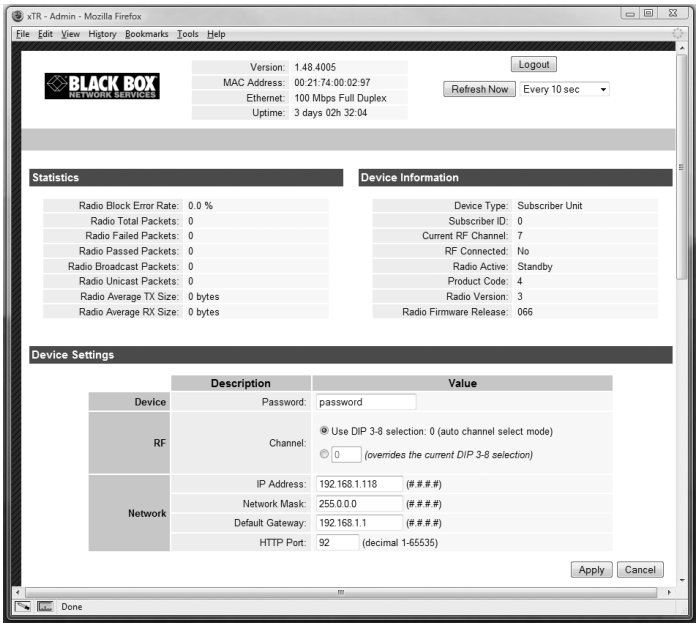


Figure 3-3. Admin screen.

7. This page has sections similar to the login page showing radio statistics and device information plus it adds several new sections. The Device Settings section allows you to set the network information and choose an RF frequency channel. The default is to allow the radio to choose its own frequency based on minimizing interference. If you set a fixed channel, make sure the AP and all SUs use the same one. References to DIP switches on this and the next Web page refer to switches inside the radio that are used in the legacy method of configuration. You may ignore the DIP switches when using the Web browser method.

If you scroll down in the Admin browser page, you will come to three more sections:

- A graphical spectrum analyzer display that may help you select radio channels that avoid interference.
- A section you will use to update the radio's firmware.
- An advanced links section with a warning that it's for advanced users only.

Despite the warning, you will need to click the "Advanced Admin" button to set the device type, ID, and encryption key. You will then see a page similar to Figure 3-4.

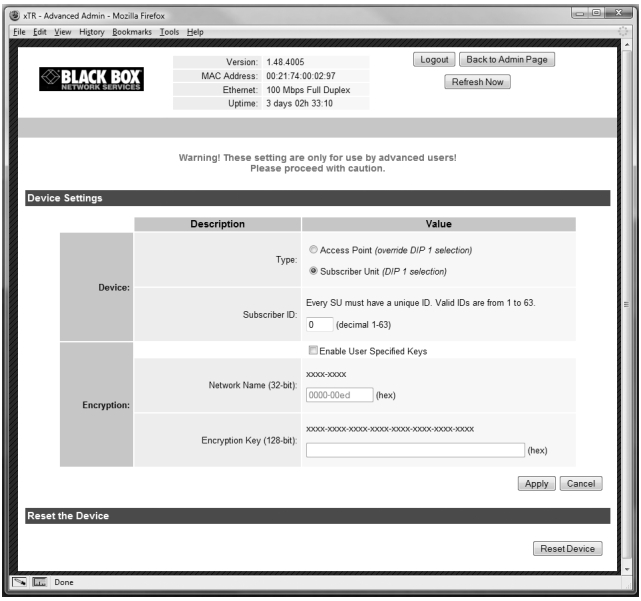


Figure 3-4. Advanced Admin screen.

8. On the Advanced Admin page, set the parameters as follows:

- Choose Device Type: Access Point or Subscriber Unit.
- For an AP, enter the number of SUs that will be communicating with it.
- For SUs, assign unique ID numbers in numeric order from 1 to 63.
- Click the box labeled "Enabled User Specified Keys."
- Choose an 8-digit hex (0–9 and A–F) Network Name that will be common among the AP and the SUs and enter it. The hyphen is required.
- Choose a 32-digit hex Encryption Key and enter it. Again, the hyphens are required. This key must match between the AP and the SU. Write down the key.

After entering the parameters, click the "Apply" button to save them to the radio.

9. When all the radios are keyed and operating, connect them to your network and Ethernet devices as desired and cycle the radio's power to begin normal operation. You can manage the SUs via a browser over the wireless network.

NOTE: Do not plug actively linked radios into the same switch because this will corrupt its routing table and may cause network problems just as if you plugged a CAT5 cable directly between two ports of a switch.

3.2 Physical Setup

1. Before mounting the radio in its final location, follow the digital setup instructions in Section 3.1.
2. Mount the radio securely. Maximize lightning resistance by providing a strong DC ground connection to the metal housing.
3. Connect the radio's TNC RF connector to a suitable antenna. A simple omni-directional dipole unit is included—you can use this antenna for testing and for relatively undemanding applications. If your application requires greater distance and/or a wider range of direction, choose either the LongSpan Long-Distance 900-MHz Directional 15-dBi Yagi antenna (LS900-15Y) or the LongSpan Medium-Range 900-MHz Omnidirectional 5-dBi antenna (LS900-5M).
4. The unit receives power via an Ethernet cable, so you can place the power supply in a convenient location. The included power over Ethernet injector (PoE) enables you to add DC power to unused wires in the cable. Decide where to place the PoE based on its proximity to AC power at some point along the desired path of the Ethernet cable. Plug the included power supply into an appropriate electrical outlet and into the PoE. Connect an Ethernet cable between your network and the "DATA IN" port on the PoE. Connect a second cable from the "P + DATA OUT" port on the PoE and the radio. The radio has a cable clamping device that allows an RJ-45 plug on the cable to pass through it. You can then tighten the cable clamping device around the cable to provide a weatherproof seal. Figure 3-5 shows a typical installation.

NOTE: Make sure you install the power injector correctly (see Figure 3-5).

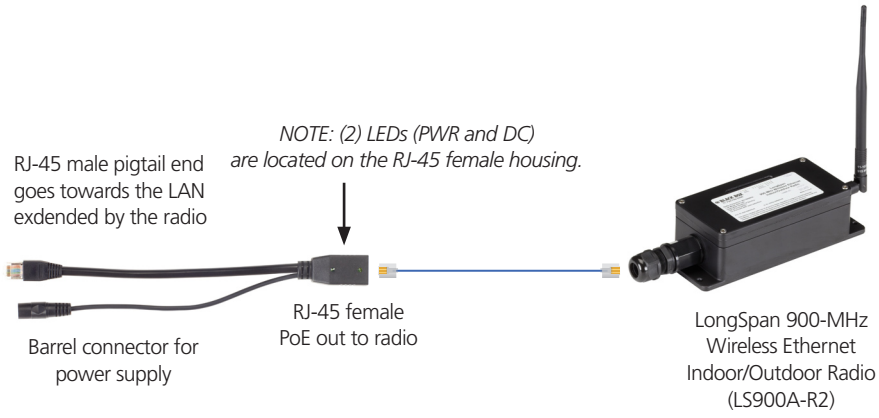


Figure 3-5. Typical installation.

3.3 LEDs

You can view the LS900A-R2 unit's LED indicators through the window on the top panel of the unit. LEDs include (1) Power, (1) Ethernet Link, (1) RF RX, (1) RF TX, (4) Channel, and (6) Link Quality.

4. 900-MHz Channels

Each radio automatically selects its frequency.

Table 4-1. Radio frequencies.

Channel	Center Frequency
0	Auto Mode
1	903.12500 MHz
2	905.20833 MHz
3	907.29167 MHz
4	909.37500 MHz
5	911.45833 MHz
6	913.541167 MHz
7	915.62500 MHz
8	917.70833 MHz
9	919.79167 MHz
10	921.87500 MHz
11	923.95833 MHz
12	926.04167 MHz

Appendix. Troubleshooting

A.1 Contacting Black Box

If you determine that your LongSpan 900-MHz Indoor/Outdoor Radio is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

A.2 Shipping and Packaging

If you need to transport or ship your LongSpan 900-MHz Indoor/Outdoor Radio:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

Black Box Tech Support: FREE! Live. 24/7.



Great tech support is just 30 seconds away at
724-746-5500 or blackbox.com.

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Black Box Network Services is your source for 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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