



## VDSL2 Line Power Ethernet Extender Kit

### **Extend Ethernet with 100-/60-Mbps downstream/ upstream connections over copper.**

Bridges 10BASE-T/100BASE-TX Ethernet interface.

Supports connections up to 1000 feet (304.8 m).

Select from Fast and Interleaved modes.

Provides low latency for video/voice/data applications.

Conforms to Safety-Extra-Low-Voltage (SELV) standard.

#### **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](http://www.blackbox.com) • E-mail: [info@blackbox.com](mailto:info@blackbox.com)

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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 20 seconds.

### 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 J 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.

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## 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 a 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 debe 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 conectado 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 física 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 líneas de energía.
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 objetos líquidos 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: Objetos 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.

### European Community (CE) Electromagnetic Compatibility Directive

This equipment has been tested and found to comply with the protection requirements of European Emission Standard EN55022/EN61000-3 and the Generic European Immunity Standard EN55024.

EMC:

EN55022(2003)/CISPR-2(2002): Class A

IEC61000-4-2(2001): 4 KV CD, 8 KV AD

IEC61000-4-3(2002): 3 V/m

IEC61000-4-4(2001): 1 KV (power line), 0.5 KV (signal line)

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### 1. Specifications

**Data Rate (Maximum):** 100/60 Mbps (downstream/upstream)

**Transmission Distance (Maximum):** 1000 ft. (304.8 m)

**Flow Control:** Half-/full-duplex, autodetects for 10BASE-T/100BASE-TX

**MDI-X:** Automatic

**Standards:** ITU-T G.993.1/2, SG15Q4 DMT compliant, trellis code with 1024 DMT bins, EMI emissions compliant, FCC Class A, CE, IEEE 802.3/IEEE 802.3u Ethernet, 10BASE-T/100BASE-TX, IEEE 802.3af PoE

**Connectors:** (1) RJ-11, (1) RJ-45

**Indicators:** (9) LEDs: (5) Master: Power, LAN, DSL, Master, PM;  
(4) Slave: Power, LAN, DSL, Slave

**Power Input:** Master: 12V DC, 2A;  
Slave: Powered over RJ-11 connection

**Temperature Tolerance:** Operating: 32 to 122° F (0 to 50° C)

**Humidity Tolerance:** 5 to 95% noncondensing

**Size:** Master and Slave: Each unit: 1.1"H x 4.7"W x 3.5"D (2.8 x 12 x 9 cm)

# VDSL2 Line Power Ethernet Extender Kit

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## 2. Overview

### 2.1 Introduction

The LBLP01A-KIT, a line power pair of VDSL2 (Very high-bit-rate Digital Subscriber Line) Ethernet Extenders, provides broadband transmission rates up to 100/60 Mbps downstream/upstream over single-pair copper line for point-to-point Ethernet connectivity. It's a cost-effective line power solution for high-bandwidth applications such as LAN-to-LAN connectivity, video streaming, FTTB, and MDU/MTU.

The LBLP01A-KIT supports transmission distance up to 500 feet (152.4 m) for line power connection at 100/60 Mbps downstream/upstream and up to 1000 feet (304.8 m) at 98/53 Mbps downstream/upstream. The LBLP01A-KIT is always configured as one master unit for the central side, and one slave unit for the remote side. The line power is supplied from the master to slave unit and conforms to the Safety-Extra-Low-Voltage (SELV) standards. The Ethernet extender kit is also plug-and-play and is easy to install.

The LBLP01A-KIT also conforms to the ITU-T G.993.1 and G.993.2 to meet VDSL/VDSL2 and SG15Q4 DMT for network requirements.

### 2.2 Features

- ITU-T G.993.1, G.993.2 VDSL/VDSL2 and SG15Q4 DMT compliance
- 100-/60-Mbps downstream/upstream for distances up to 500 feet (152.4 m); 98-/53-Mbps downstream/upstream for distances up to 1000 feet (304.8 m)
- Supports line power with VDSL2 connection
- Conforms to Safety-Extra-Low-Voltage (SELV) standards
- RJ-11 connector for DSL interfaces plus RJ-45 connector for Ethernet LAN port
- 5 LED indicators for master unit, 4 LED indicators for slave unit
- 4 DIP switches for configuration settings
- Trellis coding support for up to 1024 discrete multi-tone (DMT) bins
- Auto MDI-X for 10BASE-T/100BASE-TX Ethernet LAN ports, so you don't need crossover cable on the Ethernet side
- Low latency for video/voice/data applications
- Line surge protection
- Selectable Fast and Interleaved modes
- Selectable fixed data rate and fixed SNR margin



### 2.3 Application

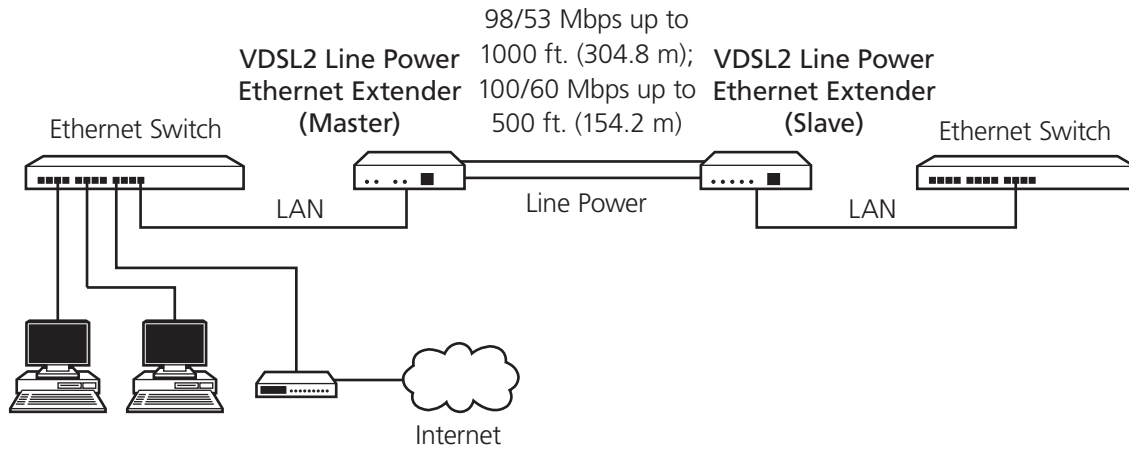


Figure 2-1. Typical application.

### 2.4 What's Included

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

- (1) VDSL2 Line Power Ethernet Extender (Master)
- (1) VDSL2 Line Power Ethernet Extender (Slave)
- (1) 12V DC, 2A Power Adapter for VDSL2 PoE Ethernet Extender (Master)
- This user's manual on CD-ROM

### 2.5 LED Description

Table 2-1. LED indicators.

LED	Color	Function
POWER	Green	Lights when power is on.
DSL	Green	Lights when VDSL connection has been established. Blinks when VDSL is in handshaking mode.
LAN	Green	Lights when Ethernet is connected. Blinks when transmitting/receiving data.
Master/Slave	Green	Lights when device is in Master or Slave mode.
PM	Green	Lights when unit is providing line power. Off when line power is off.

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## 2.6 Front and Back Panels

Figures 2-2 and 2-3 show the master unit's front and back panels and describe their components.

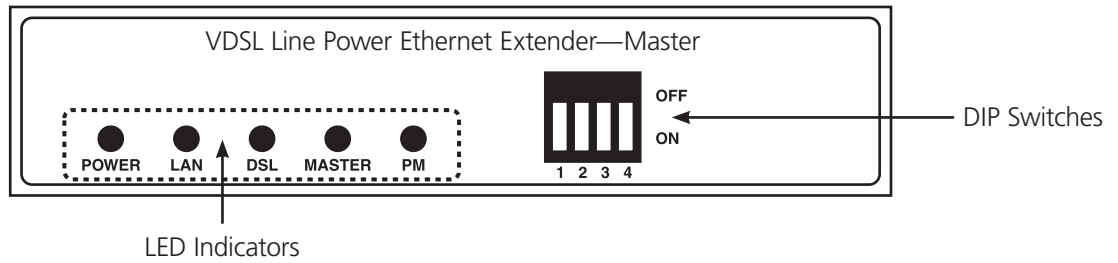


Figure 2-2. Master front panel.



Figure 2-3. Master rear panel.

Figures 2-4 and 2-5 show the front and back panels of the slave unit and describe their components.

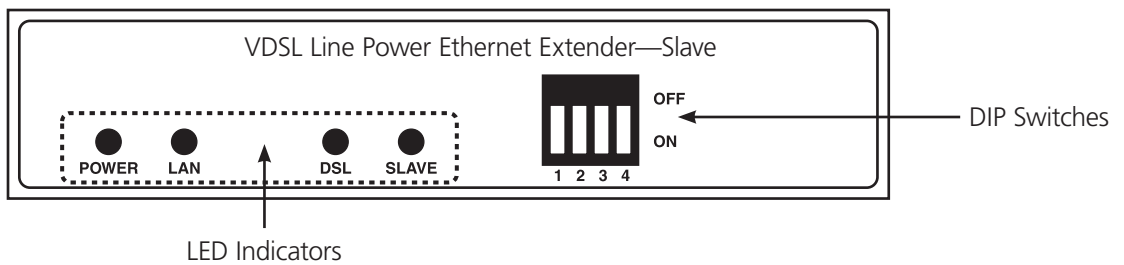


Figure 2-4. Slave front panel.

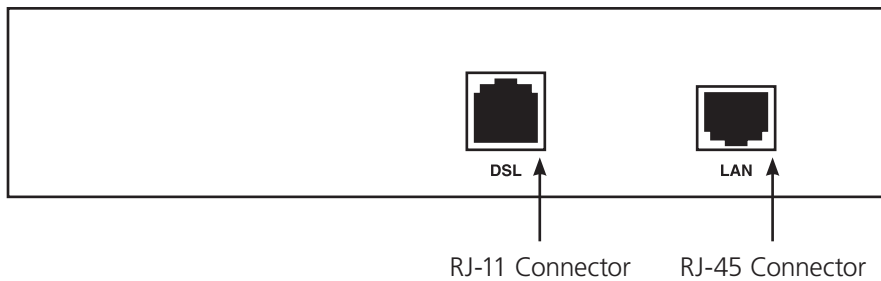


Figure 2-5. Slave rear panel.

### 3. Installation

Because the VDSL2 Line Power Ethernet Extender units require no configuration, they can be installed quickly. Follow these steps:

1. Connect the line interface between the units via RJ-11 cable.
2. Connect the Ethernet interface using RJ-45 cable.
3. Connect the power plug to the master unit with the 12V/2A DC power adapter.

CAUTION: Verify that the AC-DC adapter conforms to your country's AC power requirement and then insert the power plug.

NOTE: The interconnecting cables should be acceptable for external use and rated for the proper application considering voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Table 3-1 shows the data rate and transmission distance information via 26 AWG cable at 6 dB without a rate limit.

Table 3-1. Data rate and transmission distance.

Downstream Data Rate (Mbps)	Upstream Data Rate (Mbps)	Distance (feet)
100	60	500
98	53	1000

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## 4. DIP Switches

Table 4-1 shows the definition of the DIP Switches. Select the switches for optimal configuration.

Table 4-1. DIP switches and their functions.

DIP Switches	SW-1	SW-2	SW-3	SW-4
Definition	CO/Remote	Impulse Noise Protection Mode	Data Rate	SNR
Off	CO	Interleaved	50/20 Mbps	9 dB
On	Remote	Fast	Full Rate	6 dB



Figure 4-1. Default value of DIP switches.

### SW-1: CO/Remote

Off: VDSL2 Line Power Ethernet Extender will act as at the Central Office (Master) side.

On: VDSL2 Line Power Ethernet Extender will act as at the Customer Premise Equipment (CPE) or Remote side.

### SW-2: Mode for impulse noise protection

Off: Interleaved mode provides impulse noise protection for any impulse noise with a duration less than 250  $\mu$ s. Interleaved mode has a maximum end-to-end latency of 10 ms. Interleaved mode is the default mode.

On: Fast mode guarantees a minimum end-to-end latency less than 1 ms.

### SW-3: Rate limit control

Off: Line rate limited to 50-/20-Mbps.

On: Provides up to 100-/60-Mbps line rate for distances up to 500 feet (152.4 m).

### SW-4: Signal to Noise Ratio (SNR)

Off: Higher SNR margin (9 dB) will result in fewer errors with a more stable VDSL link.

On: Original and normal channel noise protection with 6 dB SNR.

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way it should be.



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