



## VDSL2 PoE Ethernet Extender Kit, PSE

### **Extends Ethernet with 100-/60-Mbps downstream/upstream connections over ordinary voice-grade copper.**

Kit includes two extenders—one works as PoE power source equipment and the other is a standard extender.

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

Supports connections up to 4000 feet (1219.2 m).

Select from Fast and Interleaved modes.

Provides low latency for video/voice/data applications.

IEEE 802.3af PoE compliant.

#### **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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### 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.

### 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

**Transmission Distance (Maximum):** 4000 ft. (1219 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

**PoE Power Reception Supports:** Endpoint: via twisted-pair Pins 1, 2, 3, 6 and 320 mA @ 48V DC

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

Standard: (1) RJ-11, (2) RJ-45

**Indicators:** PSE: (5) LEDs: Power, LAN, DSL, M/S, PSE;

Standard: (5) LEDs: Power, LAN 1, LAN 2, DSL, M/S

**Power Input:** PSE: 12 VDC, 2 A;

Standard: 5 VDC, 1A

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

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

**Size:** 0.8"H x 4.7"W x 3.5"D (2 x 12 x 9 cm)

# VDSL2 PoE Ethernet Extender Kit, PSE

## 2. Overview

### 2.1 Introduction

The LBPS01A-KIT, VDSL2 (Very high-bit-rate Digital Subscriber Line) PoE Ethernet Extender Kit, provides broadband transmission rates up to 100-/60-Mbps downstream/upstream over ordinary voice-grade single-pair copper line for point-to-point Ethernet connectivity. The kit includes two extenders—one works as Power over Ethernet (PoE) power source equipment (PSE) and the other is a standard extender.

The LBPS01A-KIT is a cost-effective solution for bandwidth-hungry applications such as LAN-to-LAN connectivity, video streaming, FTTB, and MDU/MTU over single twisted-pair telephone line.

At 100-/60-Mbps downstream/upstream, LBPS01A-KIT supports transmission distances up to 500 feet (152.4 m), and at 28-/0.3-Mbps it supports up to 4000 feet (1219 m). Using power sourcing equipment (PSE), the LBPS01A-KIT provides power over the Ethernet cable to the 802.3af-compliant powered device.

The LBPS01A-KIT 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)
- Supports VDSL2 connection up to 4000 feet (1219 m) at 28-/0.3-Mbps (upstream/downstream)
- IEEE 802.3af compliant -48V PSE standard
- Minimum 15.4 watts for Class 3 output power
- Four 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 a crossover cable on the Ethernet side
- Provides low latency for video/voice/data applications
- Line surge protection

### 2.3 Application

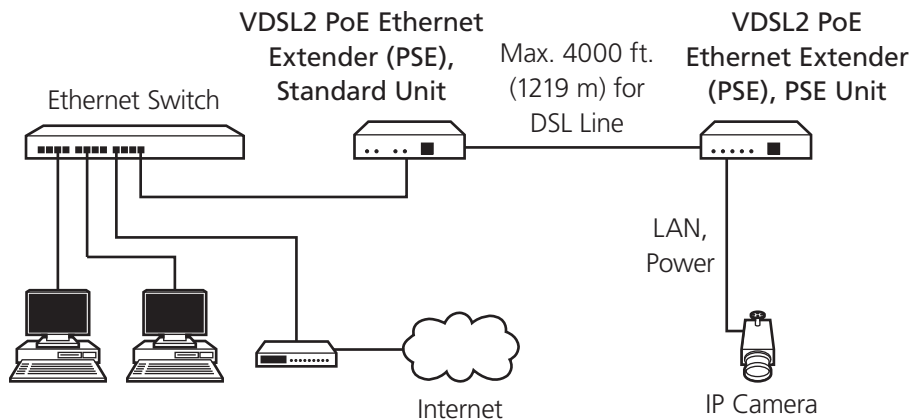


Figure 2-1. Typical application.



## 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 PoE Ethernet Extender (PSE)
- (1) VDSL2 PoE Ethernet Extender (Standard)
- (1) 12V DC, 2A Power Adapter for VDSL2 PoE Ethernet Extender PSE, PSE Unit
- (1) 5V DC, 1A Power Adapter for VDSL2 PoE Ethernet Extender PSE, Standard Unit
- This user's manual on CD-ROM

## 2.5 LED Descriptions

Table 2-1. Indicators.

LED	Color	Function
Power	Green	Lights when power is on.
DSL	Green	Lights when VDSL is connected. Blinks during VDSL handshaking.
M/S	Green	Lights when device is in master mode. Off when device is in slave mode.
LAN	Green	Lights when Ethernet connection is made. Blinks when transmitting/receiving data.
PSE	Green	Lights when unit is providing power over Ethernet. Off when unit is not providing power over Ethernet.

## 2.6 Front and Back Panels

Figures 2-2 through 2-4 show the front and back panels of the extenders and describe their components.

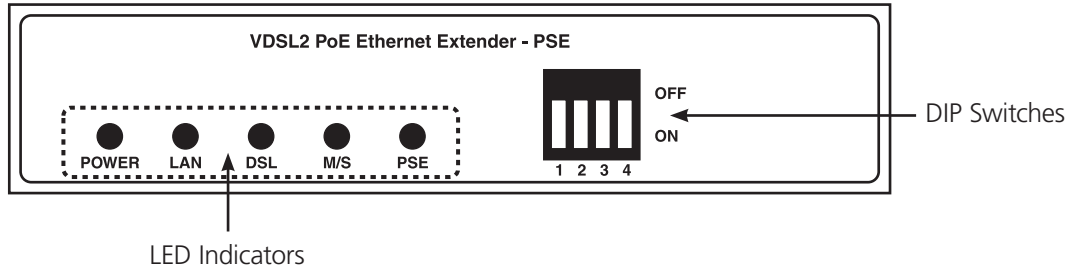


Figure 2-2. Front panel, VDSL2 PoE Ethernet Extender (PSE), PSE unit.



Figure 2-3. Rear panel, VDSL2 PoE Ethernet Extender (PSE), PSE unit.

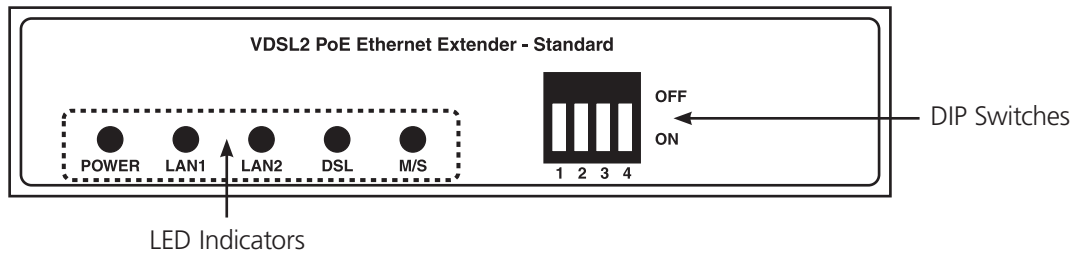


Figure 2-4. Front panel, VDSL2 PoE Ethernet Extender (PSE), Standard unit.

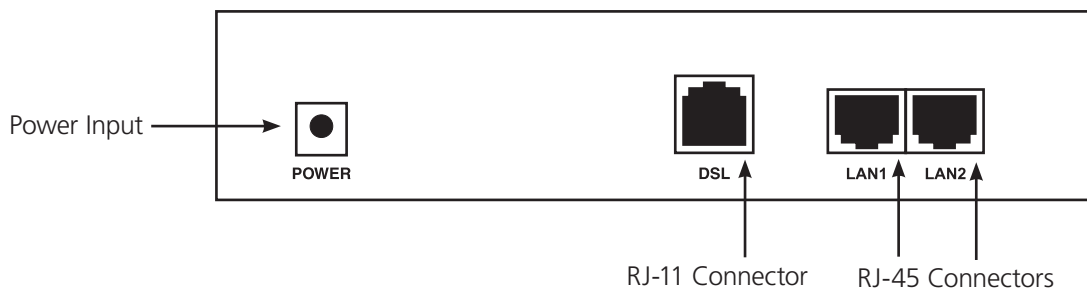


Figure 2-5. Rear panel, VDSL2 PoE Ethernet Extender (PSE), Standard unit.

### 3. Installation

Because the VDSL2 PoE Ethernet Extenders are preconfigured for standard applications, 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. The PSE extender uses a 12-VDC/2-A power adapter, and the Standard extender uses a 5-VDC/1-A power adapter.

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

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

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

Table 3-1. Supported data rates and transmission distances.

Downstream Data Rate (Mbps)	Upstream Data Rate (Mbps)	Distance (feet)
100	60	500
98	53	1000
90	44	1250
80	36	1500
70	27	1750
60	18	2000
48	11	2500
39	8	3000
35	3.5	3500
28	0.3	4000

NOTE: Depending on your application, you might need to change the DIP switch settings for optimum performance.

## 4. DIP Switches

Table 4-1. DIP switches and their functions.

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

Standard extender



PSE extender



Figure 4-1. DIP switches' default settings.

Table 4-2. DIP switches' descriptions.

### SW-1: CO/Remote

Off: VDSL2 PoE Ethernet Extender will act as the Central Office (CO) or master side.

On: VDSL2 PoE Ethernet Extender will act as 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.

### 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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