



1-Port T1/E1 Ethernet Network Extender Kit

Extend Ethernet with a 1.544-Mbps T1 or 2.048-Mbps E1 connection.

Bridges 10BASE-T/100BASE-TX Ethernet across full or Fractional T1 or E1 in unframed or framed mode. Ethernet Auto MDI/MDI-X function so no crossover cables are needed. DIP switches for easy configuration.



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

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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 30 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.

1-Port T1/E1 Ethernet Network Extender Kit

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

Line Code: T1: AMI B8ZS;
E1: AMI HDB3

Line Impedance: T1: 100 ohm;
E1: 75, 120 ohm

Line Rate: T1: 1.544 Mbps \pm 32 ppm;
E1: 2.048 Mbps \pm 50 ppm

Frame Format: T1: ESF, SF, Unframed;
E1: Framed, Unframed

Standards: IEEE 802.3, IEEE 802.3u, EMI, Auto MDI/MDI-X, FCC Class A, CE Mark

LAN Interface: Auto detection for 10BASE-T/100BASE-TX and full-/half-duplex

Line Interface: T1: ANSI T1.403;
E1: ITU-T G.703, G.704, ETSI ETR 152

Connectors: E1: (2) BNC;
T1/E1: (1) RJ-48;
Ethernet: (2) RJ-45;
RS-232 console port: (1) DB9 F

Indicators: (6) LEDs: Power, E1, T1, LOS, 10/100M, LAN

Power: Input: 110/220 VAC, 50–60 Hz

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

Humidity Tolerance: 5 to 95% noncondensing

Size: 1.7"H x 9.8"W x 5.9"D (4.3 x 25 x 15 cm)

1-Port T1/E1 Ethernet Network Extender Kit

2. Overview

2.1 Introduction

The LR0301A 1-Port T1/ E1 Network Extender (LR0301A-KIT) is an Ethernet extender that converts protocols and data from Fractional T1/E1 to Ethernet 10BASE-T/100BASE-TX interfaces. It's a symmetrical broadband solution for Intranet LAN-to-LAN connection with Nx64kbps bandwidth. The pair of extenders included with this kit acts as a bridge, enabling you to link two Ethernet networks across T1/E1. It supports T1/E1 framed and unframed modes with different line codes plus line build-out (LBO) capability.

Because you are using leased lines provided by your telco, there are no distance limitations—you can extend your network anywhere you can get a T1 line. It's ideal for various Ethernet LAN services (for example, videoconferencing, routing, etc.) through a fractional T1/E1 network.

2.2 Features

- Supports Fractional T1/E1 framed and unframed modes
- BNC connectors for E1 unbalanced 75 ohm
- RJ-48 connector for E1 balanced 120 ohm and T1 balanced 100 ohm
- Autosensing, autonegotiating for 10BASE-T/100BASE-TX and half-/full-duplex
- Ethernet Auto MDI/MDI-X function for auto Tx/Rx swap so you don't need a crossover cable
- 6 LED indicators for status monitoring
- DIP switches make configuration easy
- Plug-and-play

2.3 What's Included

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

- (2) LR0301A 1-Port T1/ E1 Network Extenders
- (2) Power cords
- (2) CAT5e Ethernet cables
- This user's manual on CD-ROM

2.4 LED Descriptions

Table 2-1. Indicators.

LED	Color	Function
POWER	Green	Lit when power is on.
E1	Green	Lit when E1 is selected (SW1-1 is OFF).
T1	Green	Lit when T1 is selected (SW1-1 is ON).
LOS	Red	Lit when signal is lost for selected E1/T1.
10/100M	Green	Lit when Ethernet is connected at 100 Mbps. Off when Ethernet is connected at 10 Mbps.
LAN	Green	Lit when Ethernet is connected. Blinks when transmitting/receiving data.

2.5 Front and Back Panels

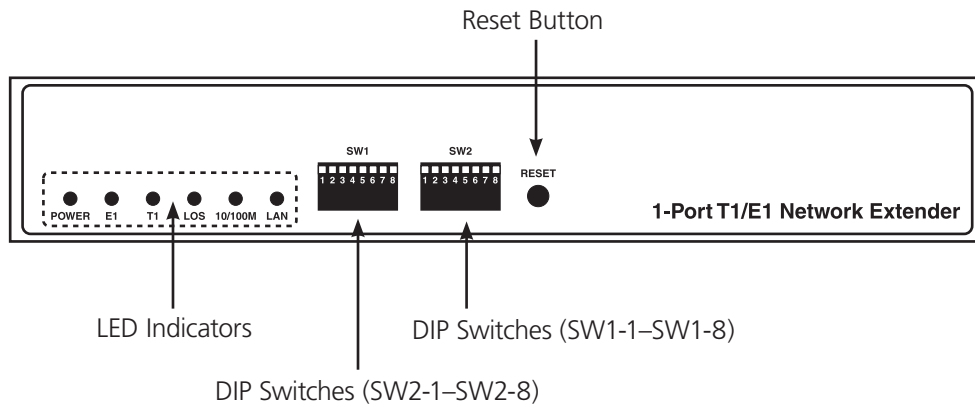


Figure 2-1. Front panel.

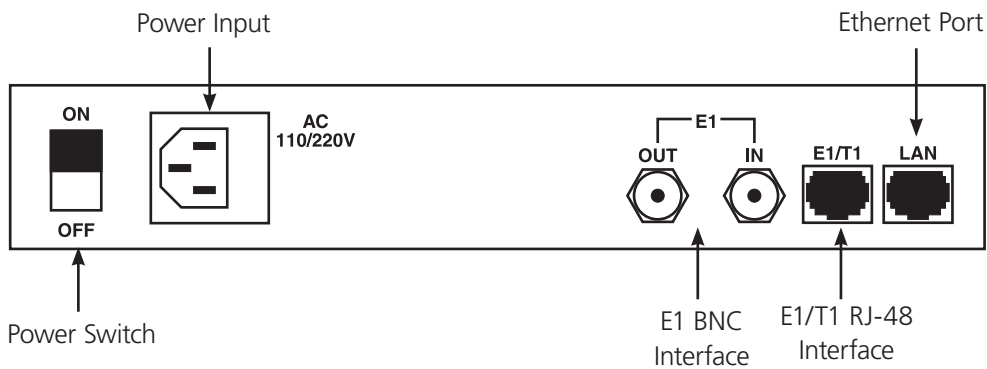


Figure 2-2. Rear panel.

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3. Installation

The 1-Port T1/ E1 Network Extender uses DIP switches for fast and easy configuration, so it can be installed quickly. Follow the steps listed below to complete the installation and configuration. There are two external DIP switches on the front of the unit and four internal DIP switches on the circuit board inside the unit. You will use the external DIP switches for both full and Fractional T1/E1. You will only use the internal DIP switches for Fractional T1/E1 configuration.

1. Select the Fractional E1/ T1 interface configurations via SW1-1–SW1-7 DIP switches. The default setup is T1. The DIP switches are on the front panel. Refer to Figure 3-1 and Table 3-1 to see the DIP switches' locations and definitions.

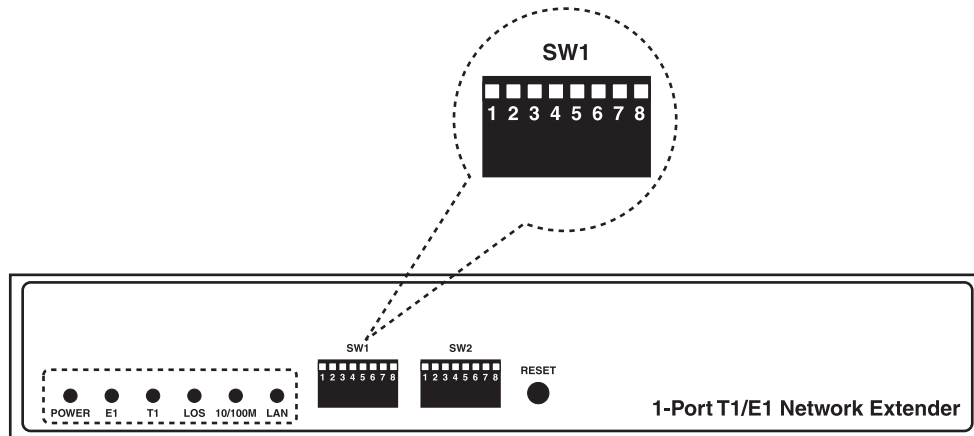


Figure 3-1. SW1-1–SW1-7 DIP switches.

NOTE: Table 3-1 describes DIP switches SW1-1–SW1-7. Tables 3-2 through 3-5 describe these switches in more detail. Table 3-5 also describes DIP switch SW2-1.

Table 3-1. SW1-1–SW1-7 DIP switches.

DIP Switches	OFF	ON	Function
SW1-1	E1	T1	E1/ T1 selection
SW1-2	See Table 3-2	See Table 3-2	Impedance
SW1-3	See Table 3-3	See Table 3-3	Frame Mode
SW1-4	See Table 3-3	See Table 3-3	Frame Mode
SW1-5	See Table 3-4	See Table 3-4	Line Code
SW1-6	See Table 3-5	See Table 3-5	LBO
SW1-7	See Table 3-5	See Table 3-5	LBO

Table 3-2. Impedance configuration.

SW1-1	SW1-2	Impedance
OFF	ON	75 ohm
OFF	OFF	120 ohm
ON	OFF	100 ohm
ON	ON	100 ohm

Table 3-3. Frame mode configuration.

SW1-1	SW1-3	SW1-4	Frame Mode
OFF	OFF	OF	E1 Unframed
OFF	ON	OFF	E1 CRC4
OFF	OF	ON	E1 CAS
OFF	ON	ON	E1 CRC4+CAS
ON	OFF	OFF	T1 Unframed
ON	ON	OFF	T1 SF
ON	OFF	ON	T1 ESF

Table 3-4. Line code configuration.

SW1-1	SW1-5	Line Code
OFF	OFF	HDB3
OFF	ON	AMI
ON	OFF	B8ZS
ON	ON	AMI

Table 3-5. DS-1 LBO and DSX-1 transmit pulse template.

SW1-1	SW1-6	SW1-7	SW1-8	SW2-1	E1 or DS1/DSX-1 LBO
OFF	X	X	X	X	E1
ON	OFF	OFF	OFF	OFF	DS-1, 0 dB, LBO
ON	ON	OFF	OFF	OFF	DS-1, 7.5 dB, LBO
ON	OFF	ON	OFF	OFF	DS-1, 15 dB, LBO
ON	ON	ON	OFF	OFF	DS-1, 22.5 dB, LBO
ON	X	X	ON	OFF	DSX-1, 0–133 feet
ON	X	X	OFF	ON	DSX-1, 133–266 feet
ON	OFF	OFF	ON	ON	DSX-1, 266–399 feet
ON	ON	OFF	ON	ON	DSX-1, 399–533 feet
ON	X	ON	ON	ON	DSX-1, 533–655 feet

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2. Connect the T1/E1 line to the BNC or RJ-48 connectors on the back panel. Figure 3-2 describes the RJ-48 pin assignment.

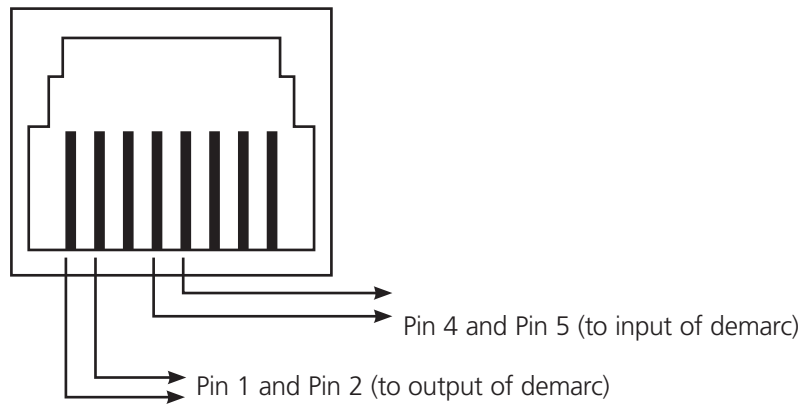


Figure 3-2. RJ-48 port pin assignment.

3. Connect the Ethernet cable to the RJ-45 LAN connector.
4. Connect the power cord to the AC outlet and turn on the power switch.
5. The T1/E1 and LAN LED indicators will light and the LAN indicator will flash to show the Ethernet data activity. The LOS LED indicator will light RED when E1/T1 is in Loss of Signal.

4. DIP Switches

4.1 Definition of DIP switches

Table 4-1 describes the DIP switches that are located on the extender's front panel. You will use these switches for either full or Fractional T1/E1.

Table 4-1. Description of DIP switches for full or Fractional T1/E1.

DIP Switches	OFF	ON	Function
SW1-1	E1	T1	T1/E1 selection
SW1-2	See Table 3-2	See Table 3-2	Impedance
SW1-3	See Table 3-3	See Table 3-3	Frame Mode
SW1-4	See Table 3-3	See Table 3-3	Frame Mode
SW1-5	See Table 3-4	See Table 3-4	Line Code
SW1-6	See Table 3-5	See Table 3-5	LBO
SW1-7	See Table 3-5	See Table 3-5	LBO
SW1-8	See Table 3-5	See Table 3-5	DSX-1
SW2-1	See Table 3-5	See Table 3-5	DSX-1
SW2-2	Reserved	Reserved	Reserved
SW2-3	Reserved	Reserved	Reserved
SW2-4	Reserved	Reserved	Reserved
SW2-5	Nx64	Nx56(T1 only)	64K/56K Channel
SW2-6	Full	E1/T1 Fractional	E1/T1 Fractional
SW2-7	All zeros	All ones	Stuff bits
SW2-8	Internal	External	E1/T1 Clock Mode

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The SW4-1–4-8, SW5-1–5-8, SW6-1–6-8, SW7-1–7-8 DIP switches are on the PC board. You need to open the top of the case to configure these DIP switches. Refer to the Figure 4-1 to see the DIP switches' locations. DIP switch "ON" means selected, and "OFF" means unselected.

NOTE: SW4-1–4-8, SW5-1–5-8, SW6-1–6-8, and SW7-1–7-8 DIP switches are active only in Fractional T1 or Fractional E1 mode. Tables 4-2 and 4-3 describe their functions.

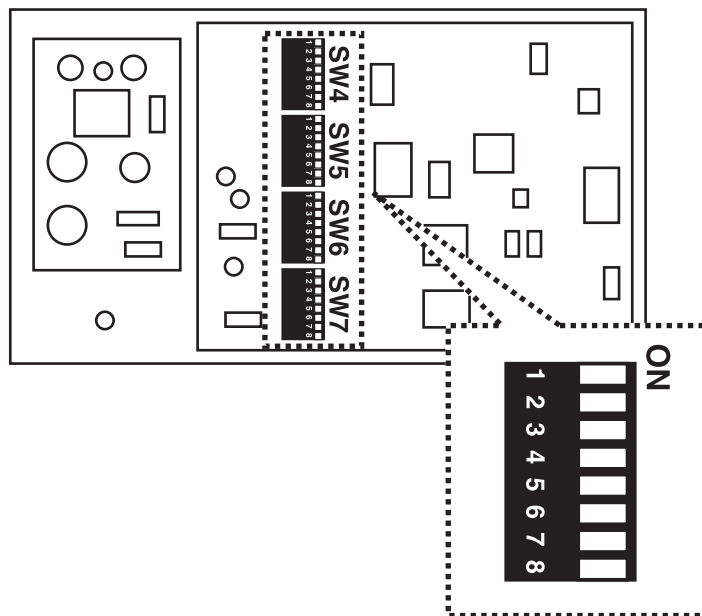


Figure 4-1. SW4-1–4-8, SW5-1–5-8, SW6-1–6-8, and SW7-1–7-8 DIP switches.

Table 4-2. Fractional T1 (24 channels) selections.

Fractional T1	SW4-1	SW4-2	SW4-3	SW4-4	SW4-5	SW4-6	SW4-7	SW4-8
Channel No.	1	2	3	4	5	6	7	8
	SW5-1	SW5-2	SW5-3	SW5-4	SW5-5	SW5-6	SW5-7	SW5-8
Channel No.	9	10	11	12	13	14	15	16
	SW6-1	SW6-2	SW6-3	SW6-4	SW6-5	SW6-6	SW6-7	SW6-8
Channel No.	17	18	19	20	21	22	23	24

Table 4-3. Fractional E1 (31 channels) selections.

Fractional E1	SW4-1	SW4-2	SW4-3	SW4-4	SW4-5	SW4-6	SW4-7	SW4-8
Channel No.	OFF	2	3	4	5	6	7	8
	SW5-1	SW5-2	SW5-3	SW5-4	SW5-5	SW5-6	SW5-7	SW5-8
Channel No.	9	10	11	12	13	14	15	16
	SW6-1	SW6-2	SW6-3	SW6-4	SW6-5	SW6-6	SW6-7	SW6-8
Channel No.	17	18	19	20	21	22	23	24
	SW7-1	SW7-2	SW7-3	SW7-4	SW7-5	SW7-6	SW7-7	SW7-8
Channel No.	25	26	27	28	29	30	31	32

NOTE: SW4-1 (Channel 1) is NOT available, and must be set to "OFF". SW6-1 (Channel 17) can be selected "ON" only when E1 CRC4 framing mode is selected. SW4-SW7 DIP switches defaults are set to "OFF."

4.2 Factory Default DIP Switch Configuration

The factory default DIP switches setting are shown in Table 4-4. Before you change any settings, make sure every parameter and all the configurations for both pairs of T1/E1 Ethernet Network Extenders are the same. Call Black Box Tech Support for details.

Table 4-4. Factory default configuration.

DIP Switches	ON/OFF	DIP Switches	ON/OFF
SW1-1	ON (T1)	SW2-1	OFF
SW1-2	OFF (100 ohm)	SW2-2	OFF
SW1-3	OFF (Unframed)	SW2-3	OFF
SW1-4	OFF (Unframed)	SW2-4	OFF
SW1-5	OFF (B8ZS)	SW2-5	OFF (Nx64)
SW1-6	OFF (DS1)	SW2-6	OFF (Full T1)
SW1-7	OFF (0 db)	SW2-7	OFF (All zeros)
SW1-8	OFF (LBO)	SW2-8	OFF (Internal)

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