Black Box Corporation
The World's Source for Cabling and Network Connectivity

CampusLIGHT™
FAST ETHERNET FIBER EXTENDERS

FEDERAL COMMUNICATIONS COMMISSION
AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
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 the Canadian Department of Communications.

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 le ministère des Communications du 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 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.

CERTIFICATION NOTICE FOR
EQUIPMENT USED IN CANADA

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility—in this case, your supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

Contents

Figures

1. Specifications

1.1 Specifications for LCL114A

Interoperability	100BaseTx, 802.3u (hubs, repeaters, stations and switches)			
Data Rate	100Mbps			
Bit Error Rate	1 in 10^9 (max.)			
Drive Distance	Fiber multimode	2km		
	Fiber single-mode	40km (Standard Power option)		
	Fiber single-mode	60km (High Power option)		
Optical Interface	Multimode	Multimode	Single-mode	Single-mode (HP*)
Launch Power	-20dBm	-20dBm	-13dBm	-3dBm
Power Budget	11dB	11dB	19dB	30dB
Connector	ST	SC	SC	SC
Copper Interface	1x Shielded RJ45 (Normal)			
	1x Shielded RJ45 (Crossover)			
Optical Safety	Class 1 AEL			
LED Indicators	Fiber Interface	Link	Fiber Integrity	
		Rx	Receive Fiber	
	Copper Interface	Rx	Receive Data	
		Link	Copper Integrity	
		Power	Power	
Environmental	Temperature	Operating 0°C to 40°C		
		Storage -10°C to 85°C		
	Humidity	Maximum 95% non-condensing		
Power Supply	External 110V or 220V AC adapter with plug-in jack			
	+12V/800mA minimum			
Case Dimensions	118mm x 75mm x 25mm (L x W x H)			
Gross (Shipping) Weight	1.2kg			
Compliance	FCC, CE, (UL, CSA - PSU)			

(*HP) denotes High Power Optics

2. Introduction

2.1 Product Overview

The CampusLIGHT™ Fast Ethernet Fiber Extender (LCL114A) is designed for 100BaseTx to multimode or single-mode fiber conversion. When used in point-to-point full duplex connections, the LCL114A Fiber Extender extends the distance of Fast Ethernet networks up to 2km using multimode fiber or up to 60km using single-mode fiber. It can be used for links between switches/routers, stations and servers.

The LCL114A features RJ45 connectors, multimode SC and ST, and single-mode SC connectors to provide the copper to fiber interfaces.

The LCL114A is rackmountable in the LCL100-RACK and RM510 rackmount frames that support either 110/220V AC or 48V DC power supplies.

Figure 1: LCL114A Fast Ethernet Extender

2.2 Features
2.2.1 Drive Distances
Single-mode
A fiber optic link of up to 60km over single-mode fiber is achievable between LCL114A Fast Ethernet Extenders using the High Power option SC optics which provide 30dB optical budget. The Standard Power option provides 19dB optical budget and will support 40km.

Multimode
A fiber optic link of up to 2km over multimode fiber is achievable using either ST or SC optics which provide 11dB of optical budget.

See Specifications for details.

2.2.2 Ergonomics
The LCL114A is packaged in a small freestanding case (118mm x 75mm x 25mm, L x W x H) complete with rackmount ears. This configuration allows the LCL114A to be rackmounted in a 19″ rack using the LCL100-RACK and RM510 rackmount frames.

The LCL100-RACK supports up to 4 CampusLIGHT™ units in a 1U high 19″ frame and the RM510 supports up to 16 units in a 3U high 19″ frame. For wall mounting a bracket that holds the LCL114A and its power supply is available, order code LCL100-WALL.

2.2.3 Power Supply
The LCL114A can be powered either from a small external power supply or from a 3U high rackmounting power supply capable of supporting 14 devices. Two variants are available: 90-264V AC (PS500) and 48V DC (LCL100-PS48).

Note:
Units ordered for use with the rackmounting power supply will not contain a separate power supply; this must be ordered separately.

3. Connectors & Cables

3.1 100BaseTx RJ45 Connectors

Two RJ45 connectors are provided on the LCL114A for 100BaseTx connection. One is a standard straight-through MDI jack labelled "II" and the other is the MDI-X jack labelled "X" which provides an internal crossover function.
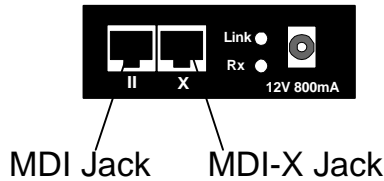

MDI Jack   MDI-X Jack

Figure 2: MDI/MDI-X Jack

RJ45 Pin	MDI-X Jack	MDI Jack
1	Rx+	Tx+
2	Rx-	Tx-
3	Tx+	Rx+
6	Tx-	Rx-

Only one jack can be selected for the 100BaseTx interface. This design allows you to simplify connections to any remote device using a standard straight-through UTP cable without the need for a crossover cable. Just make sure the "X-to-II" connection rule is followed.
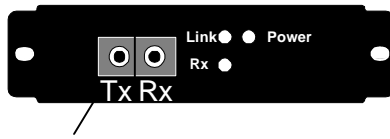
3.2 100BaseTx UTP Cable

Cable: Category 5 UTP
Maximum Cable Distance: 100 meters (328 feet)

3.3 Fiber Optic Connectors

Two fiber optic connectors are provided for fiber optic cable connection. One is labelled "Tx" for transmitting operation and the other is labelled "Rx" for receiving operation.

Fibre Optic Connectors
Figure 3: Fiber Optic Connectors

The ST model provides a duplex ST connector. The SC model provides a
duplex SC connector.

3.4 Fiber Optic Cable

a) Cable: Multimode 62.5/125μm fiber (at 1300nm)
Maximum Cable Distance: 2km for full duplex connection

b) Cable: Single-mode 9/125μm fiber (at 1300nm)
Maximum Cable Distance: 60km using the High Power SC option

4. Installation

1. Install the LCL114A with the DC power adapter provided (+12 VDC, 800mA).

2. Connect the power adapter cable to the LCL114A before connecting the adapter to the AC outlet.

## 4.1 Making Network Connections
4.1.1 PC Station to Switch
The following example illustrates a connection from a network interface card (NIC) inside a PC station to a 100BaseFx port of a switch unit through the LCL114A. The NIC jack type is MDI.
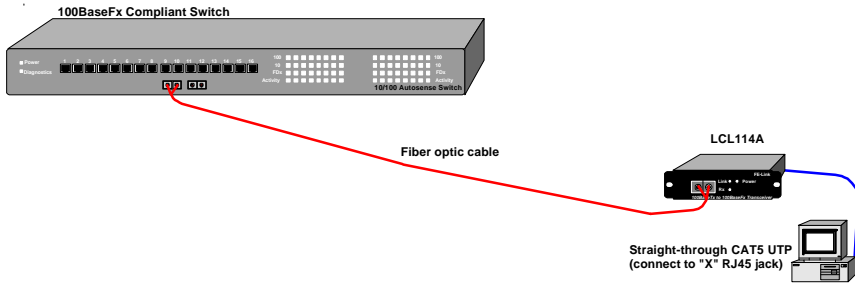

4.1.2 Hub to Switch
The following example illustrates a connection from a 100BaseTx port of one hub to a 100BaseFx port of a switch unit through the LCL114A Fast Ethernet Fiber Extender. A hub port is MDI-X type normally.
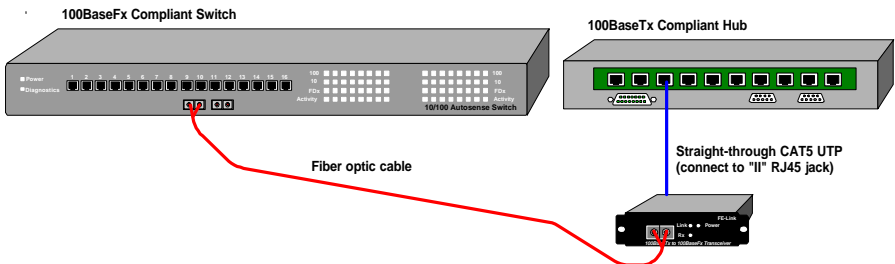
4.1.3 Switch to Switch

The following example illustrates a connection from a 100BaseTx port of one switch to a 100BaseTx port of another switch unit through two LCL114A.
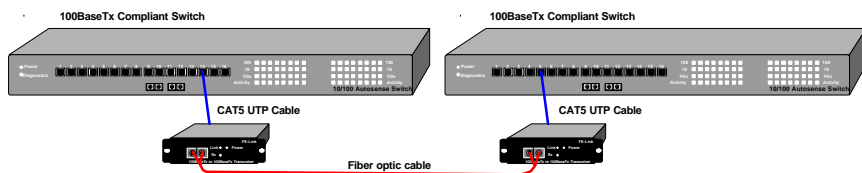
5. LED Indicators

LED	Status	State	Interpretation
Power	Power Status	On Off	Converter is ON Converter is OFF
Link	Fiber Link	On Off	The fiber link is OK No link or the link is faulty
Rx	Receiving Status	Blink Off	Data is being received No data reception

Figure 4: Fiber Interface LEDs

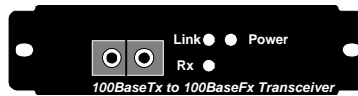| LED	Status	State	Interpretation
Link	UTP Link	On Off	The UTP link is OK No link or the link is faulty
Rx	Receiving Status	Blink Off	Data is being received No data reception

Figure 5: Copper Interface LEDs

If, after going through the troubleshooting section, you fail to resolve your problem and require more help, please contact Black Box Technical Support at: 724 746 5500 with the following information:

1.   Unit type.
2.   Unit serial number.
3.   Environment lay-out. Include hubs, bridges and routers (with model numbers), estimated cable lengths (between equipment) and type of cable used.
4.   A description of the problem you are experiencing.
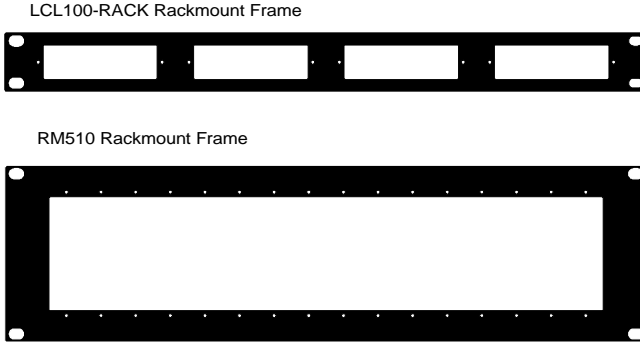5.   List of tests performed.

6. Accessories

LCL100-RACK Rackmount Frame

RM510 Rackmount Frame

Figure 6: Rackmount Metalwork

Ordering Information

Product Number	Description
LCL114A-FEMM	Fast Ethernet (100Mbps) Fiber Extender Multimode ST
LCL114A-FESM	Fast Ethernet (100Mbps) Fiber Extender Single-mode ST
LCL114A-FESMC	Fast Ethernet (100Mbps) Fiber Extender Single-mode SC
LCL100-RACK	Rackmount Frame for 1U/19", holds 4 units
RM510	Rackmount Frame for 3U/19", holds 14 units
PS500	Power Supply for RM510 Rackmount Frame, 110/220V
LCL100-PS48	Power Supply for RM510 Rackmount Frame, 48V
LCL100-WALL	Wallmount Bracket for all CampusLIGHT™ and power supply

Black Box Corporation
The World's Source for Cabling and Network Connectivity℠