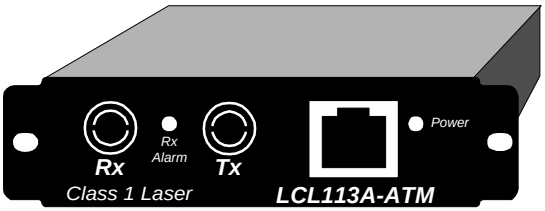
Black Box Corporation
*The World's Source for Cabling and Network Connectivity™*

**FEBRUARY 1999**
**LCL113A-ATM**

# CampusLIGHT™ ATM 25.6-Mbps FIBER EXTENDER




**CUSTOMER SUPPORT INFORMATION** Order toll-free in the U.S. 24 hours, 7A.M. Monday to midnight Friday: 877-877-BBOX
FREE technical support, 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746
Mail order: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
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## 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

**Chapter** **Page**

1. Specifications ..... 7
1.1 Specifications for LCL113A-ATM ..... 7

2. Introduction ..... 8
2.1 Product Overview ..... 8
2.2 Features ..... 8
2.2.1 Drive Distances ..... 8
2.2.2 Station Count ..... 8
2.2.3 Connection Process ..... 8
2.2.4 Ergonomics ..... 8
2.2.5 Power Supply ..... 9

3. Typical Applications ..... 10
3.1 Remote Station ..... 10
3.2 Switch to Switch ..... 10

4. Installation ..... 11

5. Troubleshooting ..... 12

6. Accessories ..... 13

**Figures**

Figure 1: LCL113A-ATM Front and Rear Panels ..... 9
Figure 2: Remote Station Link ..... 10
Figure 3: Switch to Switch Link ..... 10
Figure 4: Rackmount Metalwork ..... 13

# 1. Specifications

## 1.1 Specifications for LCL113A-ATM

| | | |
|---|---|---|
| Environments | ATM25.6 | |
| Data Rate | 25.6Mbps | |
| Fault Recovery Time | <1ms (milliseconds) | |
| Bit Error Rate | 1 in $10^9$ maximum | |
| Drive Distance | Fiber | 2km (1.6 miles) on 62.5/125 multimode |
| | Copper | 100m (nominal) |
| Optics | Transmit Power | -15dBm typical (62.5/125, 0.26NA) |
| | Receive Sensitivity | -32dBm (minimum) |
| Power Budget | 17dB (typical) | |
| Connectors | Fiber | 2 x ST |
| | Copper | 1 x shielded RJ45 |
| Pinouts | Rx+ 1, Rx- 2, Tx+ 7, Tx- 8 | |
| | For STP cable use: | |
| | Black - 1, Red - 7, Green - 8, Orange - 2 | |
| Cable | UTP | 100Ω CAT 5 |
| Temperature | Operating | 0°C to 40°C |
| | Storage | -20°C to 70°C |
| | Humidity | Max. 95% non-condensing |
| Power Supply | 12V DC, external 110V or 220V AC adapter with plug-in jack | |
| Dimensions | Single Unit | 100mm x 140mm x 25mm (W x L x H) |
| | Power Supply | 100mm x 75mm x 60mm (W x L x H) |
| Gross Shipping Weight | 1.5 kg | |
| Compliance | EMC | CE Directive 89/336/EEC |
| | | FCC Part 15 Subpart J |
| | Safety | CE Directive 73/23/EEC |
| | | UL 1950, cUL 1950 |

# 2. Introduction

## 2.1 Product Overview

The CampusLIGHT™ ATM 25.6-Mbps Fiber Extender (LCL113A-ATM) allows you to interconnect ATM stations, hubs, and switches over multimode fiber optic links up to 2km in length. The Fiber Extender operates with standard ATM25.6 products in switch to switch and station to switch applications.

Examples of common applications are shown in Section 3.

## 2.2 Features

### 2.2.1 Drive Distances

A fiber optic link of up to 2km is permitted between extenders. This figure assumes that the maximum link budget is not exceeded. The link budget is a maximum of 12dB (worst-case lifetime figure).

The copper link can be up to 100m.
See Specifications for details.

### 2.2.2 Station Count

The Fiber Extender does not affect station count.

### 2.2.3 Connection Process

The Fiber Extender automatically maintains the fiber link between units. The mechanism is transparent to the attached devices.

### 2.2.4 Ergonomics

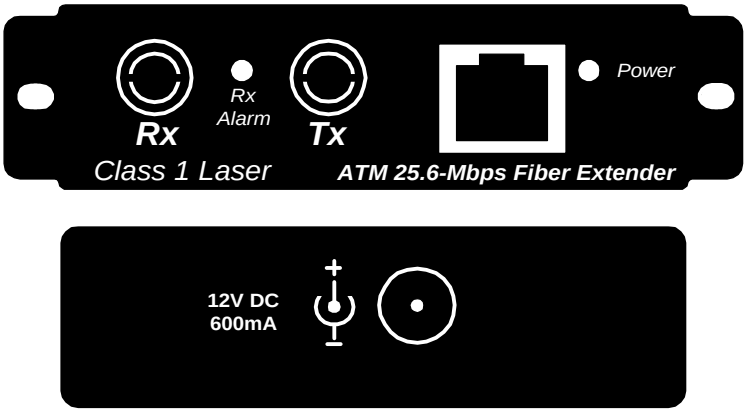
The Fiber Extender is packaged in a small freestanding case 140mm x 100mm x 25mm (L x W x H). This can be mounted in a 19" rack using the rackmount metalwork. There are two variants: the LCL100-RACK supporting up to 4 units in a 1U high 19" frame and the RM510 supporting up to 16 units in a 3U high 19" frame. For wallmounting a bracket that holds the Fiber Extender and its power supply is available; order code LCL100-WALL.

### 2.2.5 Power Supply

The Fiber Extender can either be powered from a small external power supply or from a 3U high rackmounting power supply capable of supplying 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.

**Figure 1: LCL113A-ATM Front and Rear Panels**

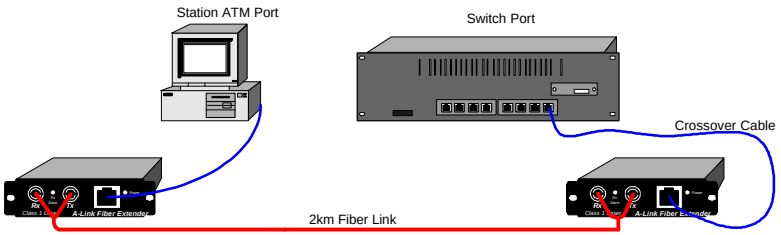


# 3. Typical Applications

## 3.1 Remote Station

A site has a remote station, which is to be connected to a switch via fiber.

**Figure 2: Remote Station Link**

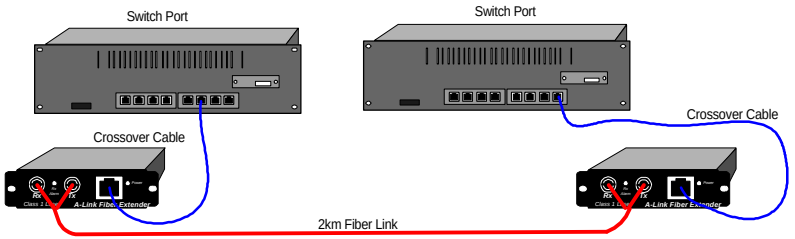



The total copper link length can be up to 100m; the fiber link can be up to 2km. This configuration is also applicable to remote server to switch architecture.

## 3.2 Switch to Switch

For those switches that support ATM 25.6 inter-switch links, the Fiber Extender can be used to provide a point-to-point link as shown below.

**Figure 3: Switch to Switch Link**



# 4. Installation

Installation of Fiber Extender units requires the following tools and accessories:

**Tools**
- 850nm loss set (light source and power meter)
- Screwdriver

**Accessories**
- Rackmount kit (optional)
- Rackmounting screws/cage nuts
- Patch cables and/or crossover cables

## STEP BY STEP GUIDE

1. Decide which application suits your installation and choose patch/crossover cables accordingly.

2. Using a fiber optic loss set, measure the loss of the fiber link. Check that it is less than 15dB.

3. If the Fiber Extender is to be rackmounted, fasten the rackmount frame (Order Codes: LCL100-RACK or RM510, not supplied) into the rack. Otherwise place the unit on to a suitable desk or shelf ensuring adequate space is left around the unit for convection cooling.

4. With appropriate fiber patch cords connect the ST connectors of the Fiber Extender to the local fiber patch panel, Tx to Rx for each Fiber Extender.

5. If the Fiber Extender is to be connected to a non-like device on the fiber interface, check that the receive power is less than -12dBm. If the receive power is greater than -12dBm, an optical attenuator should be used. Attenuate the received signal to -18dBm ± 3dB.

6. Connect the remote site in the same manner.

7. Connect the power connector and power up the Fiber Extender.

**NOTE:** Following power on, the LEDs displayed on Fiber Extender will vary with application. See Section 5.

# 5. Troubleshooting

| Power LED | Rx Alarm LED | Condition |
|---|---|---|
| OFF | D/C | The ATM 25.6-Mbps Fiber Extender is not receiving power. Check that the external PSU is powered up and correctly connected to the Fiber Extender. If swapping the PSU does not correct the fault check that the local AC supply is working. If the Fiber Extender power LED is still extinguished, return the Fiber Extender to your supplier. |
| ON | ON | The Fiber Extender cannot see the unit at the far end of the link. Either the remote Fiber Extender is unpowered (see above) or the receive path is faulty. Check that the receive power at this Fiber Extender is greater than -32dBm. |
| ON | OFF | The Fiber Extender can see the far end device, however, the Fiber Extender may not be carrying data on either interface. Check that the remote end station is powered up and that its drivers have loaded correctly. |

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

**Figure 4: Rackmount Metalwork**

LCL100-RACK Rackmount Frame

RM510 Rackmount Frame

Ordering Information

| Product Number | Description |
|---|---|
| LCL113A-ATM | ATM25.6Mbps Fiber Extender Transceiver, Single, RJ45-Multimode ST, w/PSU and Lead |
| 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™ Extenders and power supply |

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