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NOVEMBER 2001
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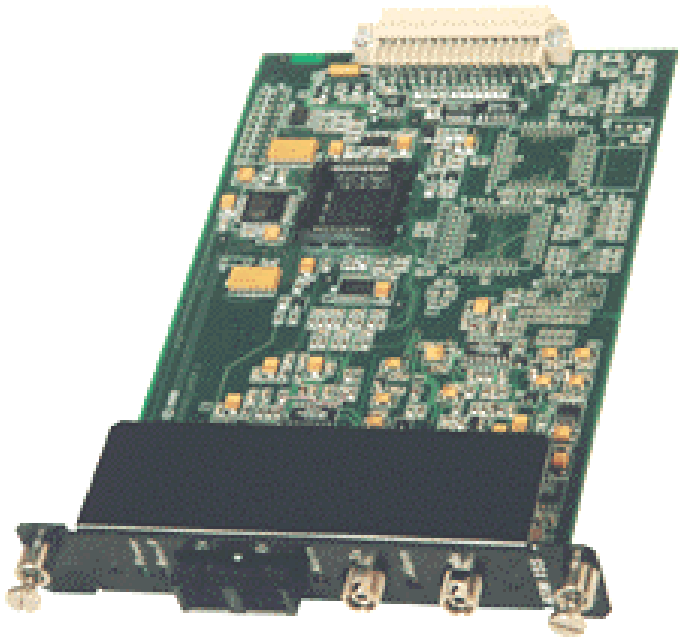
CityLIGHT® ATM 155 Card



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S. 24 hours, 7 A.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
Web site: **http://www.blackbox.com** E-mail: **info@blackbox.com**

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**

Figures

1. SPECIFICATIONS

Specifications for LCL632/639A CityLIGHT ATM 155 Card

DATA RATE		155.52 Mbps
SINGLE-MODE LINK		
TYPICAL POWER BUDGET		17 dB STANDARD POWER; 25 dB HIGH POWER
TYPICAL LAUNCH POWER		-11 dBm STANDARD POWER;
		-1.5 dBm HIGH POWER
MINIMUM LAUNCH POWER		-13 dBm STANDARD POWER;
		-3 dBm HIGH POWER
MINIMUM RECEIVE POWER		-28 dBm
LINK LENGTH (TYPICAL)		
OPTICAL	SINGLE-MODE 9/125 μm FIBER	UP TO 50 km; 31.3 MILES (25 dB)
		UP TO 35 km; 21.3 MILES (17 dB)
	MULTIMODE 62.5/125 μm FIBER	UP TO 2 km; 1.24 MILES
FIBER USER INTERFACE		
TYPICAL LAUNCH POWER		-16.5 dBm (62.5/125 μm FIBER)
MINIMUM RECEIVE POWER		-31 dBm
OPTICAL POWER BUDGET		14.5 dB
WAVELENGTH		1300 nm
CONNECTORS		
OPTICAL		SC/ST SINGLE-MODE
		SC MULTIMODE

CITYLIGHT ATM 155 CARD

ENVIRONMENTAL	
TEMPERATURE	OPERATING: 32 to 104°F (0 to 40°C);
	STORAGE: 14 to 158°F (-10 to +70°C)
HUMIDITY	MAX 95% (NON-CONDENSING)
STANDARDS SUPPORTED	ATM 155 (OC3) STM1
WEIGHT	0.15 kg; 0.33 lb.
ELECTRICAL INFORMATION	
MAXIMUM CURRENT	LESS THAN 2A @ 5V
POWER CONSUMPTION	LESS THAN 10W
COMPLIANCE	UL1950
	CUL1950
	CE 73/23/EEC
	CE 89/336/EEC
	FCC PT 15 LIMIT B
CARD VARIANTS	
LCL632A	ATM 155 CARD, MMSC TO SMSC, 35 KM
LCL633A	ATM 155 CARD, SMSC TO SMSC, 35 KM
LCL634A	ATM 155 CARD, MMSC TO SMSC, 50 KM
LCL635A	ATM 155 CARD, SMSC TO SMSC, 50 KM
LCL636A	ATM 155 CARD, MMSC TO SMST, 35 KM
LCL637A	ATM 155 CARD, SMSC TO SMST, 35 KM
LCL638A	ATM 155 CARD, MMSC TO SMST, 50 KM
LCL639A	ATM 155 CARD, SMSC TO SMST, 50 KM

2. PRODUCT OVERVIEW

The CityLIGHT ATM 155 Card is part of the CityLIGHT system and is designed to provide a basic transport service for ATM 155 attached devices. It converts multimode fiber signals for transmission on single-mode fiber between connected devices over distances up to 35 km on single-mode fiber using standard optics or 50 km using high-power optics. Distances up to 2 km are supported on the multimode interface.

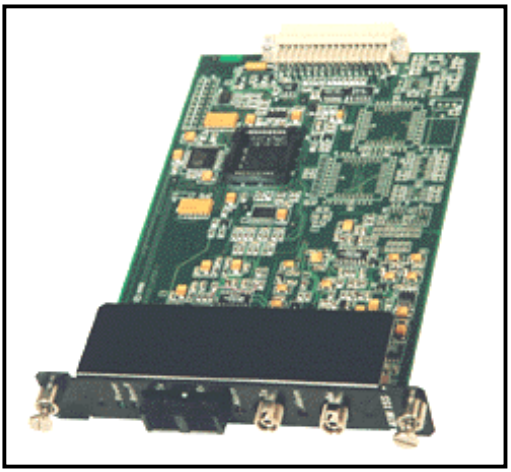


Figure 1 - CityLIGHT ATM 155 Card

2.1 Data Rate

The CityLIGHT ATM 155 Card transmits at a data rate of 155 Mbps for any OC3 or STM1 system.

2.2 Drive Distance

The CityLIGHT ATM 155 Card allows a user to connect LAN interfaces over extended distances. Each multimode fiber link has a maximum drive distance of 2 km. Every CityLIGHT ATM 155 Card single-mode fiber link can be up to 35 km using standard optics or 50 km using high-power optics. Two launch power options are available; a standard-power unit typically launching at -11 dBm and a high-power unit typically launching at -3 dBm. All units receive to a minimum light level of -28 dBm. See Specifications for more details.

2.3 External Attenuator

All high-power or long haul CityLIGHT cards have been designed for long distance transmission and provide a minimum optical budget ranging between 20dB and 25dB. This provides transmission distances between 40km and 50km based on an average fiber attenuation of 0.5dB/km.

When these products are used for short distance applications, the received power may exceed the saturation limit of the receiver and external attenuation will be necessary to prevent optical overload and the inevitable data errors. For these applications, an external 10dB attenuator is available to ensure that the optical receive power falls within the operating limits of the receiver.

The fixed value 10dB attenuator, LCL505A, is of a doped-fiber design which eliminates the troublesome reflections which an air-gap attenuator may introduce. These reflections can upset the operation of lasers, particularly those used in high data rate systems.

The 10dB attenuator may be deployed anywhere in the single-mode fiber link but it is recommended that it be deployed at the receive end (rather than the transmit end) of any particular point-to-point link.

The attenuator has a female connector at one end and a male connector at the other end. The connector style should be specified at the time of ordering.

2.4 Typical Applications

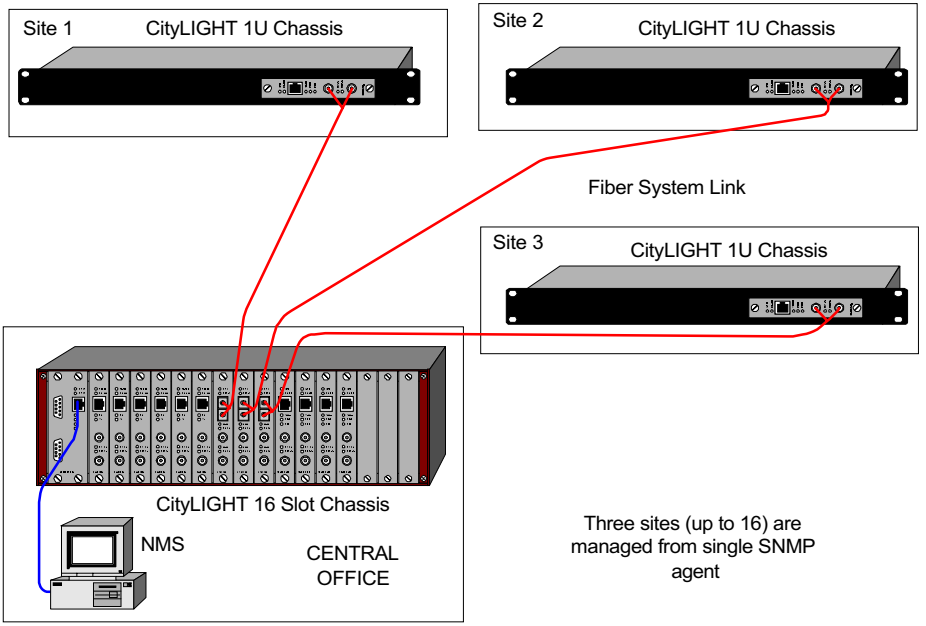


Figure 2 - Three Sites "Backhauled" to a Central Office

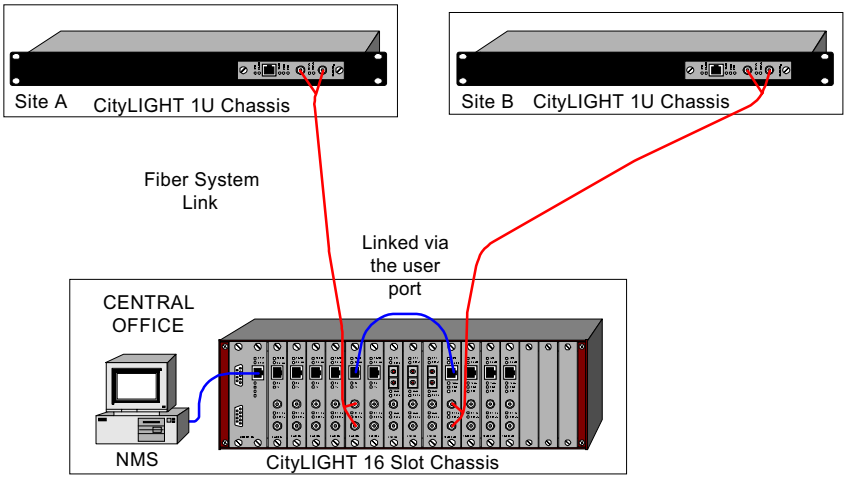


Figure 3 - Linking Two Sites Managed from a Central Office

2.5 Ergonomics

The CityLIGHT ATM 155 Card is able to be installed in either the CityLIGHT 1U or 3U Chassis or in the CityLIGHT 2-Card Chassis.

2.6 Power Supply

The CityLIGHT ATM 155 Card receives all its power requirements from the PSUs mounted in the CityLIGHT 1U or 3U Chassis or the CityLIGHT 2-Card Chassis.

2.7 Management

The CityLIGHT ATM 155 Card is managed via the CityLIGHT SNMP Card.

Once installed in a chassis with an SNMP card or connected via the fiber to a card in an SNMP-managed chassis, the SNMP agent automatically detects the card and displays the following information.

NOTE: This information is the same for the local and remote cards and is available via the terminal interface as well as the SNMP MIB.

i) Card Type.

ii) Fiber Port Link Status.

iii) Temperature.

iv) Fan Status.

v) Laser Bias Current Alarm.

vi) Receive Power.

vii) PSU Voltage.

viii) Redundant PSU State.

ix) Serial Number.

x) Firmware Version Number.

xi) Location.

Card Type

The type of the card in the slot (ATM 155 in this case).

Fiber Port Link Status

This gives an indication of the state of the fiber connections of the CityLIGHT ATM 155 Card.

The single-mode fiber port states can be:

i) Inserted (the CityLIGHT ATM 155 Card is correctly attached).

ii) Rx Alarm (the CityLIGHT ATM 155 Card is not receiving light from the far end device. A fault lies in the far end device or the receive fiber path).

The multimode fiber port states can be either:

i) Link Down (the CityLIGHT ATM 155 Card is not receiving a carrier signal).

ii) Link Up (the CityLIGHT ATM 155 Card is receiving a carrier signal. The far end card is Link Down).

iii) Active (Both CityLIGHT ATM 155 Cards are Link Up).

Temperature

This is the temperature of the CityLIGHT ATM 155 Card. A trap alarm is generated if the temperature is not within the required range.

NOTE: This temperature monitors the actual temperature of the electronics on the card. Acceptable values are from -10°C to +70°C.

Laser Bias

This field results from monitoring the drive current required to maintain the correct output power of the lasers on the ATM 155 transceiver cards. It is used to generate a trap when a threshold value is exceeded. This indicates that the laser is approaching its end of life (though typically the laser will not fail totally for some months after the alarm is raised) and should be replaced during an appropriate maintenance window.

Rail Voltage

The voltage actually present at the card. In non-redundant PSU chassis this can be used to monitor the state of the power supply and should always be greater than 4.9V.

PSU

This field gives an indication of the operating state of the PSUs in both the CityLIGHT 1U or 3U Chassis and the CityLIGHT 2-Card Chassis associated with the slot selected. The displayed state of the PSUs can be any one of the following:

i) Good.

ii) Under voltage (the voltage on the card is too low).

iii) Over voltage (the voltage on the card is too high).

Serial Number

This field gives the serial number of the CityLIGHT ATM 155 Card in the selected slot of the CityLIGHT management chassis.

Firmware Version Number

The factory-loaded firmware version resident on this card.

Location

The location is entered by the user (see CityLIGHT SNMP Card installation manual for details).

Other Managed Features

The CityLIGHT SNMP Card also monitors the PSUs and cooling fans of both the CityLIGHT 1U or 3U Chassis and CityLIGHT 2-Card Chassis. Refer to the installation manual supplied with the CityLIGHT SNMP Card for more details.

2.8 Shipping Contents

The shipping carton contains:

This manual (1)

CityLIGHT ATM 155 Card (1)

3. INSTALLATION

NOTE: The CityLIGHT ATM 155 Card is hot-swappable; the power to the CityLIGHT 1U or 3U Chassis and the CityLIGHT 2-Card Chassis does not need to be turned off during installation.

3.1 Tools Required

To install the CityLIGHT ATM 155 Card, the following tools are required:

Flat-Bladed Screwdriver

Rack/Suitable Bench Space

Fiber Cleaning Kit

Fiber Patch Cords

Loss Set (Power Meter and 1300 nm Light Source)

3.2 Before You Start

Make sure you have the following information at hand before you start:

Fiber Configuration: Check that the connections on the CityLIGHT ATM 155 Card, the patch cords used, and the site requirements are compatible.

As the CityLIGHT ATM 155 Card is a long-distance product, installation is greatly simplified with a technician at each end of the link. This allows link tests to be completed in the least amount of time.

3.3 General Set-Up

1) If an SNMP Card is used on the link, set switch 1 on both cards to 'R' (Remote).

   If no SNMP card is present, one card must be set to 'L' (Local); the other card must be set to 'R' (Remote). Unspecified results will occur if not configured in this way.

2) Position the CityLIGHT ATM 155 Card at the required slot of either the CityLIGHT 1U or 3U Chassis or the CityLIGHT 2-Card Chassis.

3) Push the CityLIGHT ATM 155 Card along the card guides into the slot until it engages with the connector inside the CityLIGHT management chassis.

4) Tighten the two captive screws on the front panel of both CityLIGHT ATM 155 Cards to secure them in position.

5) Make sure the Power LED on the front panel of both CityLIGHT ATM 155 Cards illuminates.

6) Using the loss set, and ideally a technician at the remote chassis, check that the link budget is less than 17 dB for the standard-power unit or 25 dB for the high-power unit.

7) Connect the fiber cables to the Rx and Tx connectors at both ends of the link. Make sure the local transmit is connected to the remote receive and vice versa.

8) Thoroughly clean the connectors using pure alcohol and lint-free materials. Allow to air dry or blow with clean compressed air. Never blow dry using breath. If available, fiber cleaning tape may be used.

9) Make sure the (upper) Alarm LED is extinguished (see Diagnostic LEDs). If the Alarm LED is illuminated, check that the receive multimode power is greater than -31 dBm. If it is less than -31 dBm, check the launch power of the connected devices and that the fiber connections are correctly made Tx to Rx.

10) Make sure the (lower) Alarm LED is extinguished. If the Alarm LED remains illuminated, check that the receive single-mode power is greater than -28 dBm. If it is less than -28 dBm, check the launch power of the CityLIGHT ATM 155 Card at the other end of the link. Check the fiber connections are correctly made Tx to Rx.

11) Once the link is correctly inserted, check the following:

    i) The Power LED is illuminated.

    ii) The Rem F LED is extinguished.

    iii) Both Alarm LEDs are extinguished.

    If any of the LEDs is not correctly illuminated/extinguished, see Appendix A – Troubleshooting for possible causes.

NOTE: During commissioning most faults are associated with bad/wrong cabling, dirty connectors, incorrect patching, loss of power, or excessive power budget.

The hardware installation is now complete. To enable management, refer to the Management Serial Interface section of the CityLIGHT Card installation manual.

4. DIAGNOSTIC LEDs

LED	COLOR	CONDITION
POWER	GREEN	THIS INDICATES THAT POWER IS SUPPLIED TO THE DEVICE.
REMF	RED	THIS INDICATES THAT THE FAR END SINGLE-MODE FIBER LINK IS SHOWING AN RX ALARM (ALARM LOWER).
ALARM (UPPER)	RED	THIS INDICATES THAT A CARRIER SIGNAL HAS NOT BEEN DETECTED ON THE MULTIMODE FIBER LINK.
ALARM (LOWER)	RED	THIS INDICATES THAT A CARRIER SIGNAL HAS NOT BEEN DETECTED ON THE SINGLE-MODE FIBER LINK.

5. SWITCH POSITION

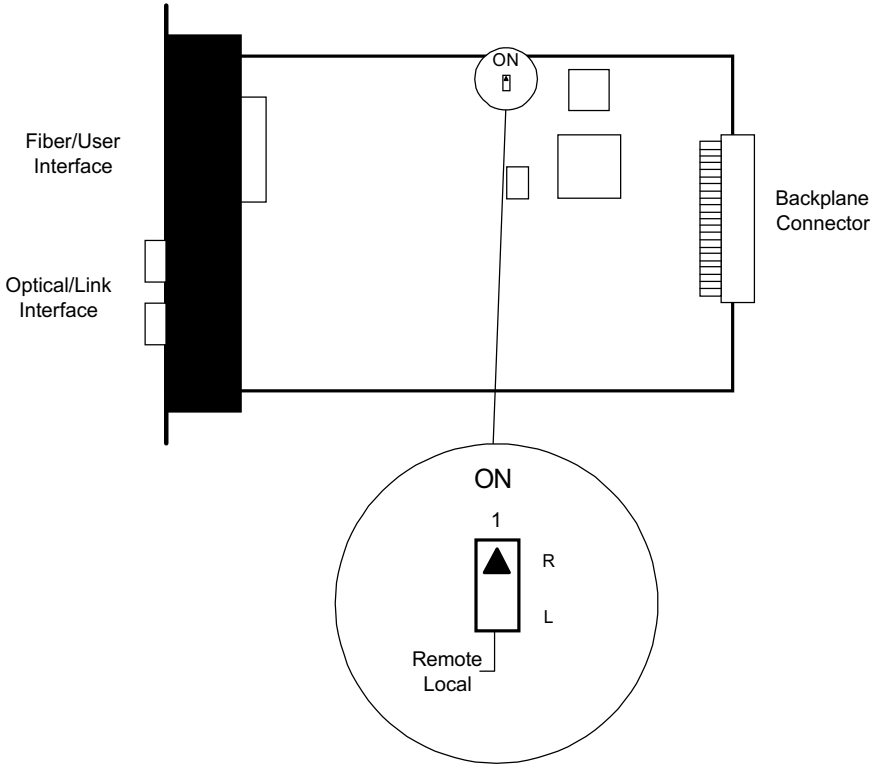


Figure 4 - Switch Position

SWITCH	POSITION	FUNCTION
1	ON – REMOTE	IF AN SNMP CARD IS PRESENT AT EITHER END OF THE LINK, SET BOTH CARDS TO REMOTE.
	OFF – LOCAL	IF THERE IS NO SNMP CARD PRESENT AT EITHER END OF THE LINK, ONE CARD ON THE LINK MUST BE SET TO 'L' (LOCAL) AND THE OTHER SET TO 'R' (REMOTE).

APPENDIX A - TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
THE POWER LED DOES NOT ILLUMINATE.	THE CITYLIGHT ATM 155 CARD IS NOT RECEIVING POWER. CHECK THE PSUS IN THE ASSOCIATED CITYLIGHT CHASSIS ARE CORRECTLY INSTALLED. CHECK THE EXTERNAL POWER SUPPLY CONNECTION TO THE PSUS IS CORRECT.
THE REM F LED IS ILLUMINATED.	THE REMOTE END SINGLE-MODE FIBER PORT IS NOT INSERTED (ALARM LOWER).
THE ALARM (UPPER) LED IS ILLUMINATED.	THE MULTIMODE FIBER LINK IS NOT WORKING. CHECK THE RECEIVE CONNECTORS AND MAKE SURE POWER IS CORRECTLY SUPPLIED TO ALL DEVICES. THE RECEIVE POWER LIGHT LEVEL SHOULD BE GREATER THAN -31 dBm. IF THE RECEIVE POWER IS LESS THAN -31 dBm, CHECK THE LAUNCH POWER OF THE DEVICE CONNECTED TO THE MULTIMODE FIBER PORT.
THE ALARM (LOWER) LED IS LLUMINATED.	THE SINGLE-MODE FIBER LINK IS NOT WORKING. CHECK THE RECEIVE CONNECTORS AND MAKE SURE POWER IS CORRECTLY SUPPLIED TO ALL DEVICES. THE RECEIVE POWER LIGHT LEVEL SHOULD BE GREATER THAN -28 dBm. IF THE RECEIVE POWER IS LESS THAN -28 dBm AT THE CITYLIGHT SNMP CHASSIS, CHECK THE LAUNCH POWER OF THE CITYLIGHT ATM 155 CARD IN THE CITYLIGHT 2-CARD CHASSIS IS GREATER THAN -11 dBm FOR THE STANDARD-POWER UNIT AND -3 dBm FOR HIGH-POWER UNIT. IF THE RECEIVE POWER IS LESS THAN -28 dBm AT THE CITYLIGHT 2-CARD CHASSIS, CHECK THE LAUNCH POWER OF THE CITYLIGHT ATM 155 CARD IN THE CITYLIGHT SNMP CHASSIS AS ABOVE.

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.

APPENDIX B - GLOSSARY OF TERMS

ATM	ASYNCHRONOUS TRANSFER MODE. USED AS A GENERIC TERM TO DESCRIBE CELL-BASED TRANSMISSION BETWEEN SITES. A CONNECTION-BASED TECHNOLOGY THAT USES VIRTUAL PATHS AND VIRTUAL CHANNELS TO MAKE END-TO-END CONNECTIONS BETWEEN THE ATM SWITCHES THAT FORM THE BACKBONE OR CLOUD.
LAN	LOCAL AREA NETWORK.
LED	LIGHT-EMITTING DIODE.
MIB	MANAGEMENT INFORMATION BASE. THIS IS A TEXT DESCRIPTION OF A MANAGED DEVICE WRITTEN IN ABSTRACT SYNTAX NOTATION 1 (ASN1) THAT IS USED WITH SNMP MANAGEMENT SYSTEMS.
MULTIMODE	AN OPTICAL FIBER IN WHICH LIGHT TRAVELS IN MULTIPLE MODES.
PSU	POWER-SUPPLY UNIT.
RX	RECEIVE.
SINGLE-MODE	AN OPTICAL FIBER IN WHICH LIGHT TRAVELS IN ONE MODE.
SNMP	SIMPLE NETWORK MANAGEMENT PROTOCOL.
TX	TRANSMIT.

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