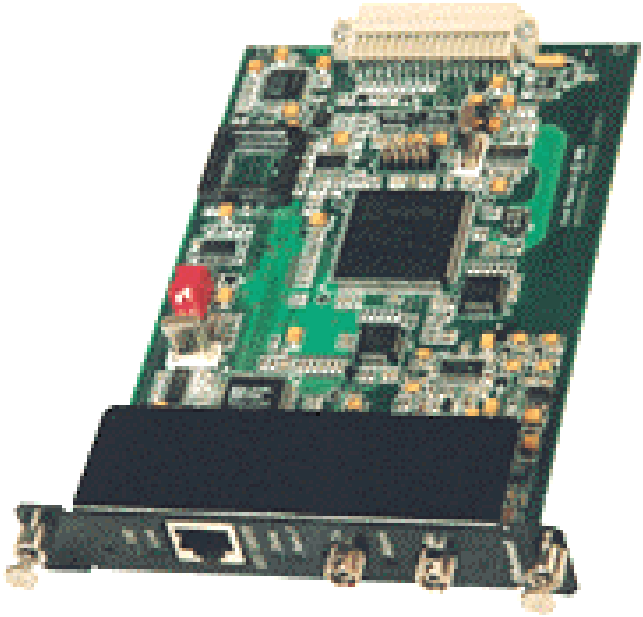
BLACK BOX
NETWORK SERVICES

FEBRUARY 2001
LCL552A
LCL553A
LCL555A
LCL556A

CityLIGHT® 10/100 Ethernet Switch 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

DATA RATE	10 OR 100 MBPS, AUTO-NEGOTIATED OR FIXED
PERFORMANCE	FORWARDING RATE UP TO 14880 PPS AT 100 MBPS
	FORWARDING RATE UP TO 1488 PPS AT 10 MBPS
	FILTERING RATE UP TO 14880 PPS AT 100 MBPS
	FILTERING RATE UP TO 1488 PPS AT 10 MBPS
MAX FRAME SIZE	6000 BYTES
DYNAMIC ADDRESS TABLE	32000 ADDRESSES
AGEING TIME	300 SECONDS
STATIC ADDRESS TABLE	128 ENTRIES
OPTICAL POWER BUDGET	18DB STANDARD POWER; 25DB HIGH POWER
TYPICAL LAUNCH	-10DBM STANDARD POWER; -1.5DBM HIGH POWER
MIN LAUNCH POWER	-12DBM STANDARD POWER; -3DBM HIGH POWER
MIN RECEIVE POWER	-28DBM
LINK LENGTHS	
OPTICAL	UP TO 36 KM; 22.5 MILES (18DB) ON 9/125µM FIBER
	UP TO 50 KM; 31.3 MILES (25DB) ON 9/125µM FIBER
ELECTRICAL	UP TO 100 M; TYPE 3 (CAT 5 UTP) RJ 45 (24 AWG)
CONNECTOR PINOUTS RJ 45	1 TX+, 2 TX-, 3 RX+, 6 RX-
CONNECTORS	
OPTICAL	ST/SC/FC (ORDER TIME OPTIONS)

CITYLIGHT 10/100 ETHERNET SWITCH CARD

ELECTRICAL	SHIELDED RJ 45
ENVIRONMENTAL	
TEMPERATURE	0^0C TO 40^0C OPERATION
	-10^0C TO 70^0C STORAGE
HUMIDITY	MAX 95% (NON-CONDENSING)
COMPLIANCE	
EMC	CE DIRECTIVE 89/336/EEC
	FCC PT. 15, SUBPART J
SAFETY	CE DIRECTIVE 73/23/EEC
	UL 1950, CUL1950
STANDARDS SUPPORTED	IEEE 802.3 10BASE-T
	IEEE 802.3U 100BASE-TX
	IEEE 802.1D MAC BRIDGING
WEIGHT	0.15 KG; 0.33 LBS
MTBF	296.3 KHOURS (33.8 YEARS)
ELECTRICAL INFORMATION	
MAX CURRENT	LESS THAN 2A @ 5V
POWER CONSUMPTION	LESS THAN 7.5 W

CARD VARIANTS

LCL552A	10/100 ETHERNET SWITCH, RJ 45 TO SM SC, 35 KM
LCL553A	10/100 ETHERNET SWITCH, RJ 45 TO SM SC, 50 KM
LCL555A	10/100 ETHERNET SWITCH, RJ 45 TO SM ST, 35 KM
LCL556A	10/100 ETHERNET SWITCH, RJ 45 TO SM ST, 50 KM

2. PRODUCT OVERVIEW

The CityLIGHT 10/100 Ethernet Switch Card is part of the CityLIGHT system and is designed to provide extended distance managed links to 10BASE-T and 100BASE-TX LAN interfaces with either half or full duplex interfaces.

The CityLIGHT 10/100 Ethernet Switch Card can connect to a DCE device using a standard straight-through cable or to a DTE device using a crossover cable.

It retransmits data between the connected devices over distances of up to 50km on single-mode fiber.

The switch provides full wire speed interconnection in full duplex mode at 100 Mbps and can switch non-standard Ethernet frames such as ISL and encapsulated FDDI frames.

The switch supports Learning and Filtering in accordance with 802.1d.

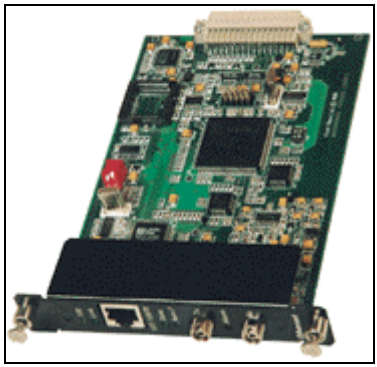


Figure 1 - CityLIGHT 10/100 Ethernet Switch Card

2.1 Data Rate

The switch can be configured to support fixed configurations of 10 or 100 Mbps Half or Full Duplex on the user (RJ 45) port. The switch also supports Auto-negotiation on the user (RJ 45) port.

Whenever auto-negotiation is not enabled switch 5 controls the speed: -

ON - 100 Mbps

OFF - 10 Mbps

The fiber link port always operates at 100 Mbps Full Duplex. This is totally transparent to the user.

2.2 Half and Full Duplex Modes

The CityLIGHT 10/100 Switch can be configured to support fixed configuration of Half Duplex or Full Duplex operation on the user (RJ 45) port. The switch also supports Auto-negotiation on the user (RJ 45) port.

Whenever auto-negotiation is not enabled switch 3 controls the HDX/FDX operation: -

ON - FDX

OFF - HDX

The fiber link port always operates at 100 Mbps Full Duplex. This is totally transparent to the user.

Appendix B describes the auto-negotiation in more detail.

2.3 Auto-negotiation

Switch 2 controls auto-negotiation. When this switch is enabled the CityLIGHT 10/100 will auto-negotiate with other auto-negotiation capable devices.

Note when connecting to Full Duplex devices that do not support auto-negotiation fixed configuration must be used. This is not the case in Half Duplex fixed configuration environments.

The CityLIGHT 10/100 Ethernet Switch Card supports auto-negotiation on the copper/user port. When enabled the port will advertise its capabilities to the attached port and negotiate to the highest common mode.

Modes are

100BASE-TX FDX

100BASE-TX HDX

10BASE-T FDX

10BASE-T HDX

NOTE: The CityLIGHT 10/100 Ethernet Switch Card will advertise all these capabilities and operates transparently in Half- or Full-Duplex mode. However care must be taken when the local port operates in Half-Duplex mode as distance is limited by the Half-Duplex Ethernet protocol. In Full-Duplex Mode the Ethernet Protocol does not limit distance.

2.4 Performance

The CityLIGHT 10/100 Switch has the following forwarding and filtering rates:

Forwarding rate up to 14880pps (64 byte frames, "wire speed" at 100 Mbps).

Filtering rate up to 14880pps (64 byte frames, "wire speed" at 100 Mbps).

2.5 Frame Size

The CityLIGHT 10/100 Ethernet Switch Card transparently supports all frame sizes including longer frames used for VLAN tagging. This includes transmission of 802.1q VLAN tagged frames as well as ISL 1548 byte length frames.

The switch is capable of supporting giant packets of up to 6144 bytes including the CRC. This allows the switch to carry frames on proprietary systems such as encapsulated FDDI frames over Ethernet.

This is handled automatically by the switch and is completely transparent to the user.

2.6 Use with CityLIGHT 10/100 Ethernet Transceiver

The CityLIGHT 10/100 Ethernet Switch Card can be used on the same link as the CityLIGHT 10/100 Ethernet Transceiver Card. This provides a cost-effective way of providing a managed link to a remote site and having switching capability at the remote site that limits the traffic sent across the link.

This is of particular use when the CityLIGHT is being used to “backhaul” Ethernet data services to a central location.

2.7 Drive Distance

The CityLIGHT 10/100 Ethernet Switch Card allows a user to connect LAN interfaces over extended distances. Each copper port has a maximum drive distance of 100m on UTP (Category 5) cables.

Every CityLIGHT 10/100 Ethernet Switch Card fiber link can be up to 35km using standard optics or 50km using high power optics.

The standard power unit typically launches at -10dBm.

The high power unit typically launches at -1.5dBm.

All units receive to a minimum light level of -28dBm.

The receiver saturation is -10dBm. When using the hot optics the receive power must be -10dBm or less (e.g. -12dBm) if the receive power is higher than this data errors can occur. See Specifications for more details.

2.8 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.

2.9 Ergonomics

The CityLIGHT 10/100 Ethernet Switch Card is able to be installed in any of the CityLIGHT family of chassis including the 3U SNMP Chassis, 1U SNMP Chassis and 2 Card Chassis.

2.10 Power Supply

The CityLIGHT 10/100 Ethernet Switch Card receives all its power requirements from the PSUs mounted in the CityLIGHT SNMP Chassis or the CityLIGHT 2 Card Chassis. (See the CityLIGHT SNMP Chassis or CityLIGHT 2 Card Chassis as applicable for details).

2.11 Link Loss Forwarding

To allow fiber link failures to be passed to the copper interface a link loss forwarding feature is provided.

Failures on the fiber link are passed to the copper port, and can be seen by the device attached to the copper port as a link failure.

Consequently the fiber link must be enabled before the copper link is established whenever link loss forwarding is enabled.

When link loss forwarding is disabled the copper and fiber links are controlled and maintained separately.

Switch 4 controls the operation of the link loss forwarding. When forwarding a link loss the link LED will be extinguished, as well as the 10/100 LED to indicate that link loss forwarding is enabled.

ON - Enabled

OFF - Disabled

2.12 Management

The CityLIGHT 10/100 Ethernet Switch Card is managed via the CityLIGHT SNMP Card which supports both In-Band and Out-of-Band management of the unit.

NOTE: The CityLIGHT SNMP software automatically recognises the card types at either end of the link and provides management of either card type transparently. The additional menu required for the switch configuration is accessed from the slot information menu of the SNMP Card terminal. The switch configuration information is only available via the console; it is not available via an SNMP management station.

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 Speed

ii) Fiber Port Link Status

iii) Copper Port Link Status

iv) Temperature

v) Fan Status

vi) Laser Bias

vii) Card Supply Voltage

viii) Redundant PSU State

ix) Serial Number

x) Firmware Version Number

xi) Location (entered by the user, see SNMP Card manual for details)

The CityLIGHT SNMP Card provides trap alarms for the following parameters of the CityLIGHT 10/100 Ethernet Switch Card.

Temperature

This is the temperature of the CityLIGHT 10/100 Ethernet Switch Card. A trap alarm is generated if the temperature is not within the required range.

Laser Bias Current

The laser bias current gives an indication of the drive current required to maintain the correct output power of the laser on the CityLIGHT 10/100 Ethernet Switch Card. The value of the laser bias is used to generate a trap if a threshold value is exceeded. This indicates that the laser is approaching its end of life and the card should be replaced during a suitable maintenance window.

Receive Power

The receive power is the light power level at the receive connection of the CityLIGHT 10/100 Ethernet Switch Card. If the receive power level falls below -28dBm then a receive power trap alarm is generated.

Link Activity

This gives an indication of data activity on the copper connection of the CityLIGHT 10/100 Ethernet Switch Card. Its state is either active (carrying LAN data) or inactive (not carrying LAN data).

Remote Fault

The local 10/100 Switch Card indicates that a fault has been recognised by the remote 10/100 Switch Card. This fault lies in the transmit path from this card to the remote card on the fiber link.

Copper and Fiber Port Status

These give an indication of the state of both the copper and fiber connections to the CityLIGHT 10/100 Ethernet Switch Card.

The fiber port states can be:

i) Inserted (the CityLIGHT 10/100 Ethernet Switch Card is correctly attached).

ii) Check Rx (the CityLIGHT 10/100 Ethernet Switch Card is not receiving light from the far end device. A fault lies in the far end device or the receive fiber path).

iii) Remote Fault. (the CityLIGHT 10/100 Ethernet Switch Card has a fault in the transmit path from this card to the far end card. Check the status of the remote device on the link.)

iv) CheckTx and Rx (the port is inactive. The CityLIGHT 10/100 Ethernet Switch Card in the CityLIGHT managed chassis has been recognised on the receive fiber but a fault lies in the path between this CityLIGHT 10/100 Ethernet Switch Card and the remote unit's receiver).

The copper port states can be:

v) Link Up (this CityLIGHT 10/100 Ethernet Switch Card is receiving link pulses on the copper interface and is therefore correctly attached and all other ports both local and remote are good).

vi) Link Down (this CityLIGHT 10/100 Ethernet Switch Card is receiving link pulses on the copper interface but the copper port at the far end is reporting a fault).

Switch Settings

The switch settings on the card always control the operating mode. These five switches and their positions can be read by the management card.

Other Managed Features

The CityLIGHT 10/100 Switch also provides monitoring and control of the following features via the SNMP Card console (VT100 interface).

Ageing Time, this is fixed at 300s

Static Address Entry

These fields are accessed from the Slot Information Menu/Switch Settings on the console. The fields cannot be accessed via the MIB.

These fields can be accessed via TELNET.

2.13 Management

The shipping carton contains:

This manual (1)

CityLIGHT 10/100 Ethernet Switch Card (1)

Ethernet crossover cable (1)

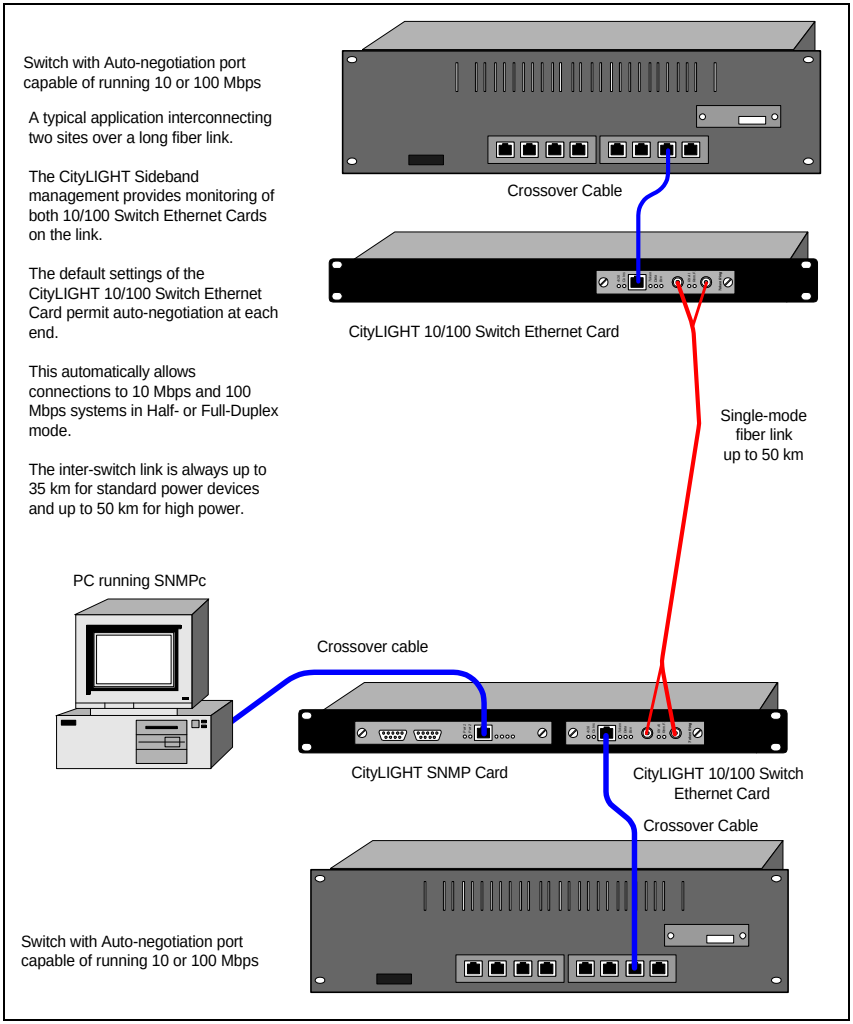


Figure 2 - Typical Application

The diagram shows a typical application of the 10/100 Ethernet Switch Card connected to a remote site via fiber.

The inter-switch link can always be up to 50km using high power optics and 35km using standard optics irrespective of the operation of the port to which it is connected, i.e. a Half Duplex connection can be extended in the same way and to the same distance as a Full Duplex connection.

The example above shows the simplest CityLIGHT configuration. The CityLIGHT 10/100 Switch can be used in any of the CityLIGHT chassis including the 3U SNMP Chassis which can manage up to 32 devices from one SNMP agent.

3. INSTALLATION

NOTE: The CityLIGHT 10/100 Ethernet Switch 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 or removal.

3.1 Tools Required

To install the CityLIGHT 10/100 Ethernet Switch Card the following items are required:

Flat-bladed Screwdriver

Fiber Cleaning Kit

Fiber Patch Cords

Electrical Patch Cables

Loss Set (Power Meter and 1300 nm Light Source)

3.2 Before You Start

Make sure that both CityLIGHT chassis (local and remote) are correctly installed.

Make sure you have the following information before you start:

Cable Type: 100Ω Category 5 RJ 45.

Fiber Connection: Check that the connections on the units, the patch cords used, and the site requirement are compatible.

As the CityLIGHT 10/100 Ethernet Switch 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 minimum of time.

3.3 Default Configuration

The CityLIGHT 10/100 Switch is pre-configured to be very simple to install. The factory defaults are:

1) Set for use with an SNMP agent in one chassis
2) Auto-negotiate Enabled
3) Link Loss Forwarding Disabled (this allows each link to be established in isolation)
4) Self Learning Enabled
5) Local/Remote switch is set to remote. (This allows automatic operation when an SNMP Card is fitted). If an SNMP Card is not being used one card must be set to 'Local'.
6) The HDX/FDX is set to FDX, though this is overridden by the Auto-setting described above.
7) 10/100 Switch is set to 100 Mbps, though this is overridden by the Auto-setting described above.

This creates a plug and play environment and, providing the right cables are used and the fiber link loss is within budget, installation should be very simple.

3.4 General Set-Up

NOTE: If the default settings are acceptable (see above) items 1 to 3 in general set-up may be ignored.

1) Set the switch user port to the required operating speed using the switches on the card. Note that it is not essential to have the switches at either end of the link set to the same speed.

   Setting switch 2 to ON enables auto-negotiation. This overrides switches 3 and 5, and allows the copper port to auto-negotiate with the attached device for the optimum common performance.

   Setting switch 2 to OFF allows the speed and mode to be controlled by switches 3 and 5 in fixed configuration.

   Switch 3 controls the mode: ON FDX, OFF HDX.

   Switch 5 control the speed: ON 100 Mbps, OFF 10 Mbps.

2) If an SNMP Card is present anywhere on the link set both cards to Remote i.e. set switch 1 to OFF. This is the default condition.

   If no SNMP Card is present then one card must be set to Local by setting switch 1 to ON, and the other card must be set to Remote by setting switch 1 to OFF.

NOTE: With No SNMP Card present on the link failure to set one as Local and one as Remote will result in incorrect operation of the sideband management and may stop a link being established between the sites.

3) If link loss forwarding from fiber to copper is required then switch 4 should be set to ON. In this mode fiber failures will cause the user (RJ 45) link to drop which will indicate the failure to the attached device.

   If the user wants the copper and fiber links to be established separately then switch 4 should be set to OFF. The default is OFF.

4) Push the first CityLIGHT 10/100 Ethernet Switch Card along the card guides into the slot until it engages with the connector inside the CityLIGHT management/local chassis.

5) Push the other (remote end) CityLIGHT 10/100 Ethernet Switch Card into the slot of the remote chassis until it engages with the connector in the CityLIGHT chassis.

6) Tighten the two captive screws on the front panels of both CityLIGHT 10/100 Ethernet Cards to secure them in position.

7) Make sure on both the CityLIGHT 10/100 Ethernet Switch Cards that the 100 LED illuminates to indicate that power is available and that it is the correct colour, yellow for 10 Mbps or green for 100 Mbps. Also note that the Alarm LED illuminates.

8) Using the loss set, and ideally a technician at the CityLIGHT remote chassis, check that the link budget is less than 18dB for the standard power unit or 25dB for the high power units.

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

10) Make sure the Alarm LED is extinguished. If the Alarm LED on the CityLIGHT 10/100 Ethernet Switch Card in the CityLIGHT managed chassis remains illuminated, check that the receive power is greater than -28dBm.

If it is less than -28dBm check the launch power of the CityLIGHT 10/100 Ethernet Switch Card in the CityLIGHT remote chassis and check the fiber connections are correctly made Tx to Rx.

11)Check both ends of the link in the same manner.

12)At both CityLIGHT 10/100 Ethernet Switch Cards insert the copper interface in the RJ 45 10T/100TX port. To connect to a DCE use a straight-through cable; to connect to a DTE use the crossover cable supplied. Make sure the Link LED illuminates. If it does not check the cable type and the switch settings.

13)Once the fiber and copper links are correctly established check the following:

i) The 100 LED is illuminated and is the correct colour.

ii) The Link LED is illuminated.

iii) The FDX LED is illuminated if FDX operation is required.

iv) The Rem F LED is extinguished.

v) The Alarm LED is extinguished.

The Data LED flashes (if the link is active).

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, 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 SNMP Card user manual.

As the 10/100 Switch is always self-learning communication should now be possible between stations across the link unless explicitly blocked by management.

4. DIAGNOSTIC LEDs

LED	COLOR	CONDITION
100	GREEN/YELLOW	THIS INDICATES THAT POWER IS SUPPLIED TO THE DEVICE AND ADDITIONALLY THE OPERATING DATA RATE; YELLOW FOR 10 MBPS OR GREEN FOR 100 MBPS. THIS MAY CHANGE COLOUR ONCE AUTO-NEGOTIATION HAS COMPLETED LINK NEGOTIATION. THIS LED WILL BE OFF IN THE EVENT OF NO POWER OR WHENEVER A FIBER FAULT EXISTS AND LINK LOSS FORWARDING IS ENABLED.
LINK	GREEN	THIS INDICATES THAT THE INTEGRITY OF THE COPPER LINK IS GOOD. IF LINK LOSS FORWARDING IS ENABLED THIS COPPER LINK WILL NOT BE ESTABLISHED IF THE FIBER LINK IS FAULTY OR NOT CONNECTED. SEE LINK LOSS FORWARDING FOR DETAILS OF OPERATION.
FDX	GREEN	THE CARD IS RUNNING IN FULL DUPLEX MODE. THIS MAY BE THE RESULT OF AUTO-NEGOTIATION OR DUE TO THE SWITCH 3 SETTING.
DATA	GREEN	THIS INDICATES THAT RECEIVE ACTIVITY IS PRESENT ON THE COPPER PORT. THE SIGNAL THAT DRIVES THE LED IS STRETCHED TO MAKE SURE THAT A SINGLE ACTIVITY EVENT IS SEEN. IF THE ACTIVITY IS CONTINUOUS, THE LED APPEARS PERMANENTLY ILLUMINATED.
REM F	RED	THIS INDICATES THAT THERE IS A FAULT WITH FIBER TRANSMIT PATH FROM THIS CARD TO THE FAR END CARD.
ALARM	RED	THIS INDICATES THERE IS A LOSS OF RECEIVE POWER ON THE FIBER PORT, I.E. THE RECEIVE POWER HAS DROPPED BELOW -28DBM.

5. SWITCH POSITIONS

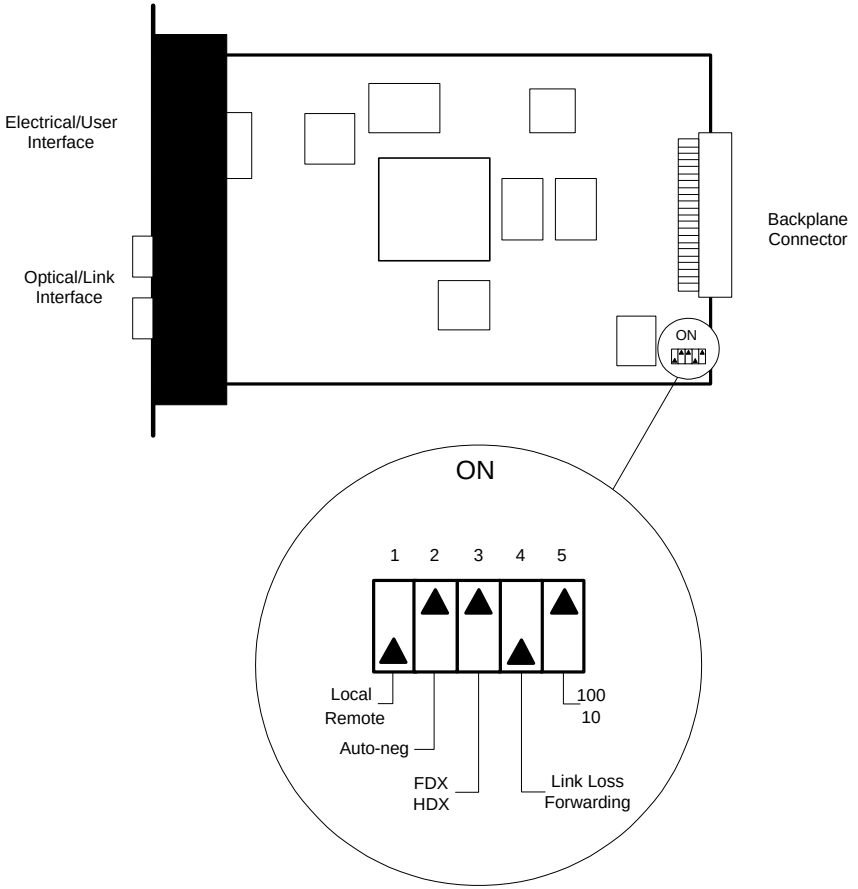


Figure 3 - Switch Positions

The switches are located on the side of the CityLIGHT 10/100 Ethernet Switch Card circuit board towards the rear connector. Changing the switch settings requires that the card is removed from the chassis. It is not necessary to power down the rack in order to remove a card.

The switches are slides switches with one side of the switch block labelled as “ON”. The switch positions described on the next page refer to “ON” and “OFF”.

SWITCH	POSITION	FUNCTION
1, LOCAL/REMOTE		USED WHEN NO SNMP CARD IS PRESENT. ONE CARD MUST BE SET TO LOCAL, THE OTHER TO REMOTE.
	ON	LOCAL (ONE END OF THE LINK).
	OFF	REMOTE (OTHER END OF THE LINK). NOTE: WITH AN SNMP CARD PRESENT SET BOTH CARDS TO REMOTE.
2, AUTO-NEGOTIATION		USED TO CONTROL THE COPPER PORT OPERATING MODE. EITHER AS FIXED SPEED AND DUPLEX MODE OR AUTO-NEGOTIATED MODE. SWITCHES 3 AND 5 CONTROL THE MODE AND SPEED WHEN AUTO-NEGOTIATION IS DISABLED.
	ON	AUTO-NEGOTIATION AT THE LOCAL COPPER PORT ENABLED.
	OFF	AUTO-NEGOTIATION IS DISABLED, (USE FIXED SWITCH/PORT CONFIGURATION FROM SWITCHES 3 AND 5). NOTE: IF THE LOCAL PORT HAS FIXED CONFIGURATION FULL DUPLEX OPERATION THEN THE 10/100 SWITCH MUST HAVE AUTO-NEGOTIATION SET TO OFF.

SWITCH	POSITION	FUNCTION
3, HALF/FULL DUPLEX		USED WHEN AUTO-NEGOTIATION IS DISABLED. I.E. SWITCH 2 IS OFF. THIS SWITCH CONTROLS WHETHER THE USER (COPPER) PORT OPERATES IN FULL DUPLEX OR HALF DUPLEX MODE.
	ON	FULL DUPLEX OPERATION.
	OFF	HALF DUPLEX OPERATION.
4, LINK LOSS FORWARDING		CONTROL WHETHER OR NOT FAILURES ON THE FIBER LINK CAUSE THE USER (COPPER) PORT TO BE DISABLED. THIS IS USEFUL FOR INDICATING THE FIBER FAILURE TO THE ATTACHED DEVICE. WHEN THIS FEATURE IS DISABLED (SWITCH OFF) THE COPPER AND FIBER PORTS ESTABLISH THEIR LINKS INDEPENDENTLY.
	ON	ENABLED.
	OFF	DISABLED.
5, SPEED SELECT		THIS SWITCH SETS THE LOCAL (COPPER PORT SPEED). IT IS ACTIVE WHEN AUTO-NEGOTIATION IS DISABLED, I.E. SWITCH 2 IS OFF.
	ON	100 MBPS OPERATION.
	OFF	10 MBPS OPERATION.

APPENDIX A - TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSES
THE 100 LED DOES NOT ILLUMINATE.	THE CITYLIGHT 10/100 ETHERNET SWITCH CARD IS NOT RECEIVING POWER. CHECK THE PSU IN THE ASSOCIATED CITYLIGHT SNMP CHASSIS OR CITYLIGHT 2 CARD CHASSIS ARE CORRECTLY INSTALLED. CHECK THE EXTERNAL POWER SUPPLY CONNECTION TO THE PSU IS CORRECT. LINK LOSS FORWARDING IS ENABLED (SWITCH 4 IS ON) AND THE FIBER LINK IS DOWN. IN THIS MODE THE COPPER PORT IS POWERED DOWN.
THE 100 LED ILLUMINATES BUT SHOWS THE WRONG SPEED.	CHECK THAT THE SPEED SWITCHES ARE SET CORRECTLY. IF AUTO-NEGOTIATION IS ENABLED CHECK THE OPERATING CAPABILITY OF THE DEVICE ATTACHED TO THE USER PORT. IF LINK LOSS FORWARDING IS ENABLED CHECK THAT THE FIBER LINK IS GOOD.
THE LINK LED DOES NOT ILLUMINATE.	THE CITYLIGHT 10/100 ETHERNET SWITCH CARD CANNOT DETECT THE CONNECTED DEVICE. CHECK THE CONNECTED DEVICE IS TURNED ON. IF LINK LOSS FORWARDING IS ENABLED (SWITCH 4 ON) CHECK THAT THE FIBER LINK IS INSERTED. USER (RJ 45) CABLE INCORRECTLY INSTALLED. CHECK THAT THE CABLE IS CORRECTLY INSERTED IN THE RJ 45 CONNECTOR. INCORRECT RJ 45 CABLE. CHECK THAT THE CORRECT CABLE TYPE IS BEING USED. USE THE SUPPLIED CROSSOVER CABLE FOR CONNECTION TO A DTE TYPE DEVICE. USE A STRAIGHT-THROUGH CABLE FOR CONNECTION TO A DCE TYPE DEVICE. AUTO-NEGOTIATION IS ENABLED

PROBLEM	POSSIBLE CAUSES
THE REM F LED IS ILLUMINATED.	THE REMOTE CITYLIGHT 10/100 HAS A FIBER RECEIVE ALARM. AT THE REMOTE UNIT CHECK: THE RECEIVE LIGHT LEVEL AT THE FIBER INTERFACE. THAT CONNECTIONS ARE CORRECTLY MADE AND THAT THE FIBER IS CORRECTLY INSERTED INTO THE CONNECTOR.
THE ALARM LED IS ILLUMINATED.	THE 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 -28DBM. IF THE RECEIVE POWER IS LESS THAN -28DBM AT THE CITYLIGHT CHASSIS CHECK THE LAUNCH POWER OF THE CITYLIGHT 10/100 ETHERNET SWITCH CARD IN THE FAR END CHASSIS IS GREATER THAN -10DBM FOR THE STANDARD POWER UNIT AND -3DBM FOR THE HIGH POWER UNIT. CHECK THAT THE LINK LOSS IS LESS THAN 18DB FOR THE STANDARD POWER UNIT OR 25DB FOR THE HIGH POWER UNIT.
FDX LED DOES NOT ILLUMINATE.	THE SWITCH IS NOT OPERATING IN FULL DUPLEX MODE. IF FDX IS REQUIRED CHECK THAT: IF AUTO-NEGOTIATION IS ENABLED CHECK THAT THE DEVICE CONNECTED TO THE CITYLIGHT 10/100 HAS AUTO-NEGOTIATION ENABLED. SEE APPENDIX B FOR DETAILS. IF AUTO-NEGOTIATION IS DISABLED CHECK THAT SWITCH 3 IS SET TO ON FOR FDX OPERATION.

THE DATA ACTIVITY LED DOES NOT ILLUMINATE.	NB. CHECK THE STATUS OF ALL OTHER LEDS FIRST, ESPECIALLY THE LINK, SPEED AND RX ALARM LEDS! CHECK THE CONNECTED DEVICES ARE TURNED ON. CHECK THAT THE ATTACHED NETWORK DEVICES ARE ACTIVE AND ARE CARRYING DATA.
DEVICE DOES NOT FORWARD DATA.	NB. CHECK THE STATUS OF ALL OTHER LEDS FIRST! CONNECTIONS NOT CORRECT, CHECK OTHER LED STATES. DEVICE HAS BEEN MOVED FROM THE LOCAL NETWORK TO THE REMOTE NETWORK. IT WILL TAKE SOME TIME FOR THE ENTRY TO BE AGED OUT OF THE FILTER DATABASE, DEPENDING ON THE AGEING TIMER. A STATIC ENTRY HAS BEEN MADE FOR THIS CARD ADDRESS AND SO THAT PACKETS ARE NOT SWITCHED ACROSS THE LINK. CHECK THAT COMMUNICATION CAN BE ESTABLISHED WITH A DIFFERENT DEVICE, I.E. ONE WITH A DIFFERENT MAC ADDRESS.
DATA ERRORS ARE SEEN ON THE LINK.	CHECK THAT THE RECEIVE LIGHT LEVEL IS LESS THAN -10DBM, E.G. ATTENUATE THE RECEIVED SIGNAL TO SAY -15DBM. OVERLOAD OF THE RECEIVER WILL NOT PERMANENTLY DAMAGE THE DEVICE BUT WILL CAUSE ERRORS DURING THE OVERLOAD. POOR CABLING. CHECK THAT ALL PATCH CORDS HAVE BOTH HALVES OF BOTH PAIRS CORRECTLY CONNECTED. CHECK THAT THE RECEIVE ALARM IS NOT ON OR FLICKERING. IF THE FIBER HAS A BREAK OR BAD SPLICE THE RX ALARM LED MAY FLICKER. CHECK THE FIBER.

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 - AUTO-NEGOTIATION

When switch 2 is set to ON Auto-negotiation is enabled. In this mode switches 3 and 5 are ignored.
The switch will auto-negotiate with other devices on the copper link so that a link is established at the highest common capability of the devices on the link.

Note: When devices have fixed Full Duplex configuration but do not have auto-negotiation enabled it is not possible to use the 10/100 Switch with auto-negotiation enabled. This is because the 10/100 Switch will sense the correct speed but the other device will not (cannot) advertise the FDX operation, consequently the switch will always operate in HDX mode. To inter-operate with fixed configuration FDX ports a fixed configuration should be used on the 10/100 Switch.

Other problems may be encountered when using auto-negotiation with auto-speed hubs or D-Link switches. In either case it is recommended that fixed (non auto-negotiate) mode is used.

APPENDIX C - STATIC ADDRESSES

The 10/100 Switch supports static addresses in both the local and remote switches. For simplicity all the static addresses are associated with the local user port. This limits traffic on the fiber and encourages simple system control.

To set addresses at either end of the link it is necessary to use the terminal interface from the CityLIGHT SNMP management card. This can be done directly or via TELNET.

The static addresses are reached via the slot information menu pressing ‘d’ or ‘e’ to access the local and remote switches respectively.

From there static addresses may be entered and deleted by following the prompts on the screen. Note that all static addresses must be entered in the form XX:XX:XX:XX:XX:XX where XX is a hexadecimal number 00 - FF and ‘:’s are used to separate each octet of the address. Static addresses not entered in this form will be rejected.

When using static addresses please note the following:

The static addresses reside permanently in the switch and are retained during power off.

A static address operates in the same way as a learned dynamic address. A packet received with a Destination Address that matches the entry in the static filter database will be discarded.

Up to 128 addresses may be stored in the switches at either end of the link (256 per link).

Broadcast and multicast addresses are not filtered out regardless of the filter database.

APPENDIX D - GLOSSARY OF TERMS

CATEGORY 5	HIGH-SPECIFICATION CABLE FOR USE WITH DATA RATES UP TO 100 Mbps OVER 100 M DEFINED BY EIA/TIA 568.
DCE	DATA COMMUNICATING EQUIPMENT. IN SERIAL (RS -232) COMMUNICATION THIS IS THE DEVICE THAT CONNECTS TO A DTE (E.G. A MODEM).
DTE	DATA TERMINATING EQUIPMENT. IN SERIAL (RS-232) COMMUNICATION THIS IS THE DEVICE WHICH IS EITHER THE SOURCE OR SINK FOR DATA ON THE LINK (E.G. A TERMINAL OR COMPUTER).
ETHERNET	A LAN DEFINED BY THE IEEE 802.3 COMMITTEE CAPABLE OF OPERATING AT 10 Mbps, 100 Mbps OR 1000 Mbps DATA RATES.
LAN	LOCAL AREA NETWORK.
LED	LIGHT-EMITTING DIODE.
PSU	POWER-SUPPLY UNIT.
RJ 45	EIGHT-PIN MODULAR JACK CONNECTOR.
SNMP	SIMPLE NETWORK MANAGEMENT PROTOCOL.
UTP	UNSHIELDED TWISTED PAIR (CABLE TYPE).

© Copyright 2000. Black Box Corporation. All rights reserved.

1000 Park Drive · Lawrence, PA 15055-1018 · 724-746-5500 Fax 724-746-0746