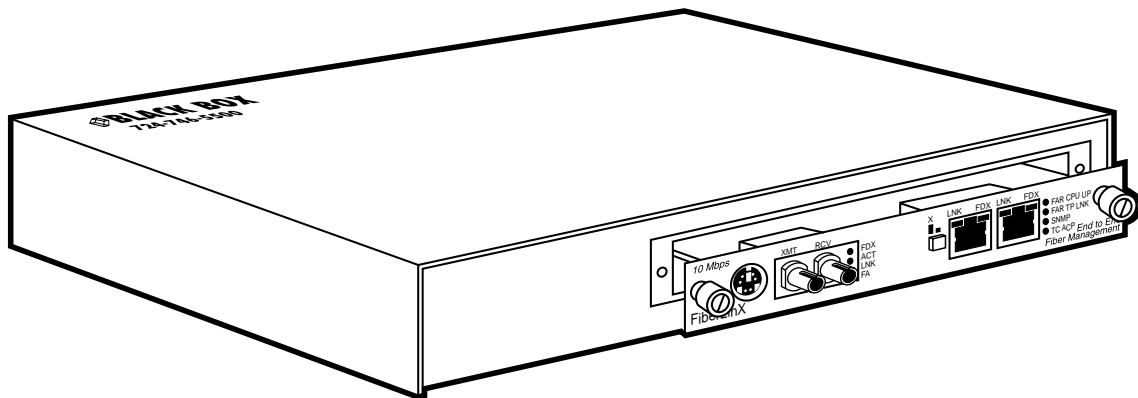




LE330C	LE334C
LE331C	LE335C
LE332C	LE336C
LE333C	LE337C

FiberLinX Modules Hardware Installation Manual



**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: www.blackbox.com • E-mail: info@blackbox.com

Preface

This manual contains information to assist with the hardware installation of the **FiberLinX** product line.

Disclaimer

Black Box Corporation makes no warranties with respect to this document and disclaims any implied warranties of merchantability or fitness for a particular purpose. Black Box Corporation assumes no responsibility for any errors that may appear in this document or for incidental consequential damages in connection with the performance or use of this material.

This document contains proprietary information which is protected by copyright. No part may be reproduced in any way without prior consent of Black Box Corporation.

Copyright

© 1999 Black Box Corporation. All rights reserved.

Trademarks

FiberLinX is a trademark. Other brands, product names or features may be trademarks and are the properties of their respective companies.

Contents

Chapter 1: Introduction

About FiberLinX	1.1
About FiberLinX Modules	1.2
How FiberLinX Works	1.2

Chapter 2: Hardware Installation

Configuring FiberLinX Modules	2.1
Switches 1 & 2: Fiber Optic Type	2.2
Switches 3 & 4: Selecting Duplex Mode	2.2
Switches 5 & 6: SNMP Management Traffic	2.2
Switches 7 & 8: Configuring FiberLinX as a Host, Remote or Standalone Unit	2.3
FiberAlert	2.4
Installing a FiberLinX Module	2.4
Selecting a Twisted Pair Crossover/Pass-Through Connection	2.5
LED Operation	2.5
LEDs for the Fiber Data Port	2.5
LEDs for the Twisted Pair Data Port	2.5
LEDs for the Twisted Pair Management Port	2.6
Mini-DIN Connector	2.6

Chapter 3: Applications

Example 1 — Direct Fiber Switch Connection from Central Site to Remote Site	3.1
Example 2 — Fiber Conversion and Remote Management Between Two Copper-Based Switches	3.2
Example 3 — Fiber Conversion and Highly Secure Remote Management Between Two Copper-Based Switches	3.3

Chapter 4: Technical Specifications

Fiber Optic Cleaning Guidelines	4.1
Electrostatic Discharge Precautions	4.1
Unit Specifications	4.2
Environmental	4.2
Power	4.2
Heat	4.2

Chapter 5: General Information

Customer Service5.1
Warranty5.1
Federal Communications Commission Radio Frequency Interference Statement5.1

Chapter 1: Introduction

About *FiberLinX*

FiberLinX™ from Black Box Corporation is an IEEE 802.3 compliant, SNMP-manageable media converter/LAN extender/Ethernet bridge that can be managed remotely. **FiberLinX** is designed to convert between 10 Mbps Ethernet twisted pair (10Base-T) and 10 Mbps Ethernet (10Base-FL) single-mode or multi-mode fiber optic cabling.

Each **FiberLinX** features the following three ports:

- 10Base-T data port
- 10Base-FL data port
- 10Base-T port specifically for SNMP traffic (i.e., the management port).

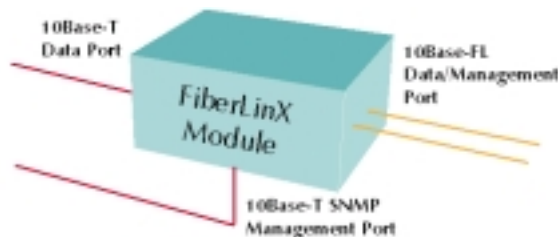


Figure 1.1 FiberLinX Port Connections

Note: Although the management port is designed for SNMP traffic, ANY port on the FiberLinX module can be configured to serve as the SNMP management port.

Note: The twisted pair management port is not designed to handle data traffic, and therefore should NOT serve as a redundant twisted pair port.

The primary advantage of **FiberLinX** is that it allows the administrator to completely monitor and manage fiber traffic between switches and routers while remaining isolated from the remote (or customer's) network.

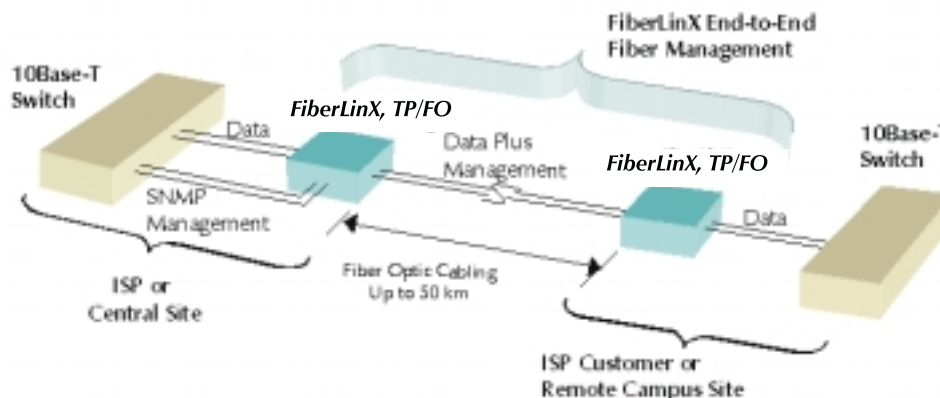


Figure 1.2 Example FiberLinX Installation.

See Chapter 3 of this guide for more example **FiberLinX** installations.

About **FiberLinX** Modules

FiberLinX Modules are designed to be installed into any Black Box Corporation **PowerChassis**. The following versions of **FiberLinX Modules** are available:

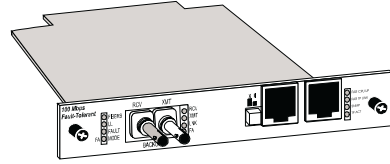


Figure 1.3 FiberLinX Module

FiberLinX — 10Base-T twisted pair and 10Base-FL 850 nm multi-mode fiber; includes two RJ-45 connectors and one pair ST or SC connectors.

FiberLinX 1300 — 10Base-T twisted pair and 10Base-FL 1300 nm multi-mode fiber; includes two RJ-45 connectors and one pair ST or SC connectors.

FiberLinX-SingleMode — 10Base-T twisted pair and 10Base-FL 1300 nm single-mode fiber; includes two RJ-45 connectors and one pair ST or SC connectors.

FiberLinX-SingleMode/PLUS — as above with higher power budget.

How **FiberLinX** Works

Each port on the **FiberLinX** includes its own MAC Address. The movement of data from one port to another is accomplished via packet switching. The destination address of each Ethernet packet entering the **FiberLinX** is checked to determine whether it is a management packet or a downstream data packet, and is switched appropriately. Packets not addressed for management ports are sent through to the network. Similarly, management packets are switched internally to the management engine and are not forwarded.

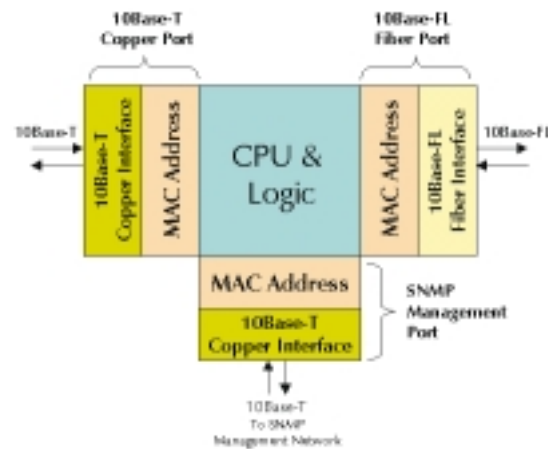


Figure 1.4 FiberLinX Packet Switching

Chapter 2: Hardware Installation

Installing a **FiberLinX Module** involves the following steps:

- 1) Configuring the **FiberLinX Module** via its eight-position Dip switch for the following:
 - Half/Full Duplex setting (data ports only),
 - Management traffic port,
 - Host/Remote or standalone operation;
- 2) Installation of a **PowerChassis** and, if desired, a second, redundant **Power Supply Module** (optional);
- 3) Installation of the **FiberLinX Module** into the above-mentioned **PowerChassis**; and,
- 4) Selecting a crossover or pass-through connection for the twisted pair data port.

Configuring **FiberLinX** Modules

FiberLinX Modules have an eight-position Dip switch, located at position S2 (shown below), for configuring the module.

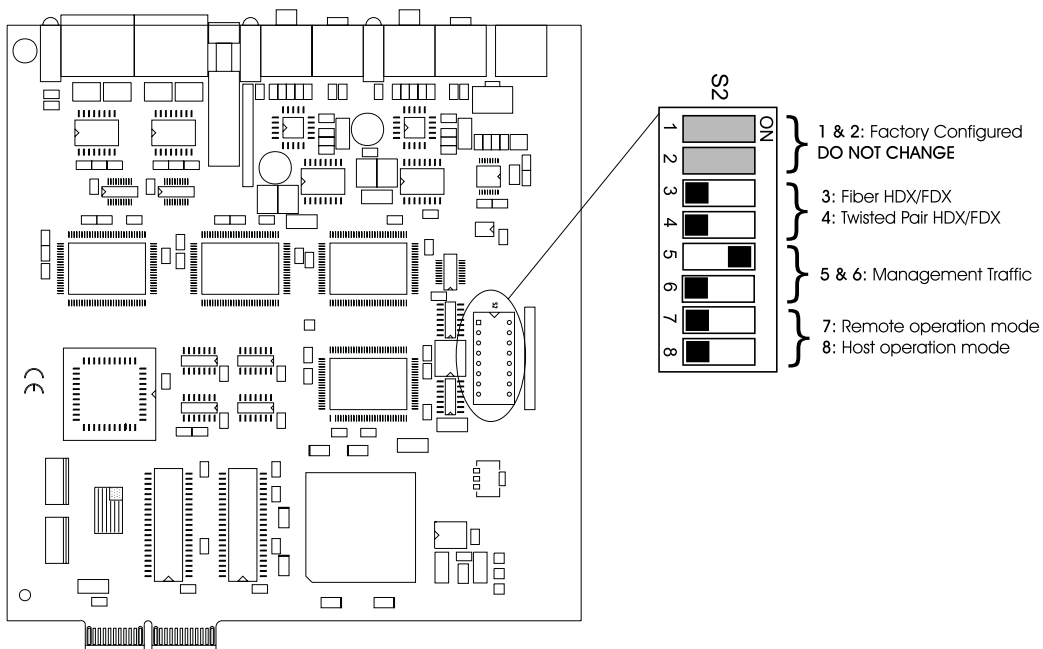


Figure 2.1 Dip Switch Location on FiberLinX.

The following table shows the function for each of the eight Dip switches on **FiberLinX**. Refer to the section on each feature for specific configuration information.

<i>FIBERLINX DIP SWITCH GUIDE</i>		
Switch	Feature	Default
1	Specifies Fiber Type DO NOT CHANGE	Varies
2	Specifies Fiber Type DO NOT CHANGE	Varies
3	Enables Full-Duplex mode on the Fiber Data port	OFF
4	Enables Full-Duplex mode on the Twisted Pair Data port	OFF
5	Specifies from which port SNMP traffic is accepted	ON
6	Specifies from which port SNMP traffic is accepted	OFF
7	Configures <i>FiberLinX</i> as a Remote unit	OFF
8	Configures <i>FiberLinX</i> as a Host unit	OFF

Switches 1 & 2: Fiber Optic Type

FiberLinX features two Dip switches at positions 1 and 2 that let the management software read and display the module's fiber optic type. These switches do not affect the performance of the module itself, only the display within the software. The Dip switch settings for specifying the fiber optic type are configured at the factory **and should NOT be changed in the field**. To verify your **FiberLinX** module has the correct settings, refer to the table below.

<i>DIP SWITCH 1 AND 2 FACTORY SETTINGS</i>				
Switch	850mm	1300mm	1300sm	1300sm/PLUS
1	ON	ON	OFF	OFF
2	ON	OFF	ON	OFF

Switches 3 & 4: Selecting Duplex Mode

Each data port on **FiberLinX** can operate in either Half-Duplex (HDX) or Full-Duplex (FDX) Mode. (**Note: The Twisted Pair management port is ALWAYS Half-Duplex.**) You'll need to set the duplex mode of these ports depending on the capabilities of the connected hardware.

FiberLinX is shipped from the factory with HDX selected on each data port (i.e., Dip switches 3 and 4 in the OFF position). Select FDX for the fiber data port by setting Dip switch 3 to ON. Select FDX for the twisted pair data port by setting Dip switch 4 to ON.

Switches 5 & 6: SNMP Management Traffic

Although **FiberLinX** provides a twisted pair port solely for management traffic, you can configure **FiberLinX** to accept SNMP management traffic from

any of its three ports. There are four different ways you can configure **FiberLinX** to accept (or not accept) SNMP management traffic. Only one source for SNMP management traffic can be active at any time, and only the SNMP management traffic directed to the module's IP address will be accepted.

FiberLinX is configured at the factory to accept SNMP management traffic from the twisted pair **data** port (i.e., Dip switch 5 ON, Dip switch 6 OFF). You can change this setting by adjusting Dip switches 5 and 6. The following table shows the switch settings for each configuration.

SNMP MANAGEMENT TRAFFIC DIP SWITCHES		
Switch 5	Switch 6	Result
(Designated Mgmt. Port)		
OFF (none)	OFF	Accepts no SNMP commands, even if directed to <i>FiberLinX</i> 's IP address. All SNMP traffic on the data ports is passed through. All traffic on the management port is discarded.
OFF (TP mgmt. port)	ON	Accepts SNMP commands only from the management port. All SNMP traffic on the data ports is passed through.
ON (TP data port)	OFF	Accepts SNMP commands only in-band from the twisted pair data port. All traffic on the management port is discarded. All SNMP traffic on the fiber data port is passed through.
ON (FO data port)	ON	Accepts SNMP commands only in-band from the fiber data port. All traffic on the management port is discarded. All SNMP traffic on the twisted pair data port is passed through.

Switches 7 & 8: Configuring *FiberLinX* as a Host, Remote or Standalone Unit

When two **FiberLinX** units are paired with one another, each **FiberLinX** unit can be configured to be either a Host unit or a Remote unit. As a Host, **FiberLinX** requests management information from any attached remote unit and displays that information, along with its own, upon SNMP query. As a Remote, **FiberLinX** will not respond to requests for management information from an attached unit. In single installation, the sole **FiberLinX** should be configured as standalone unit (factory default). Following is a table showing the Dip switch configurations for each setting. Please see Chapter 3 of this guide for possible installations and their related Host, Remote and standalone Dip switch settings.

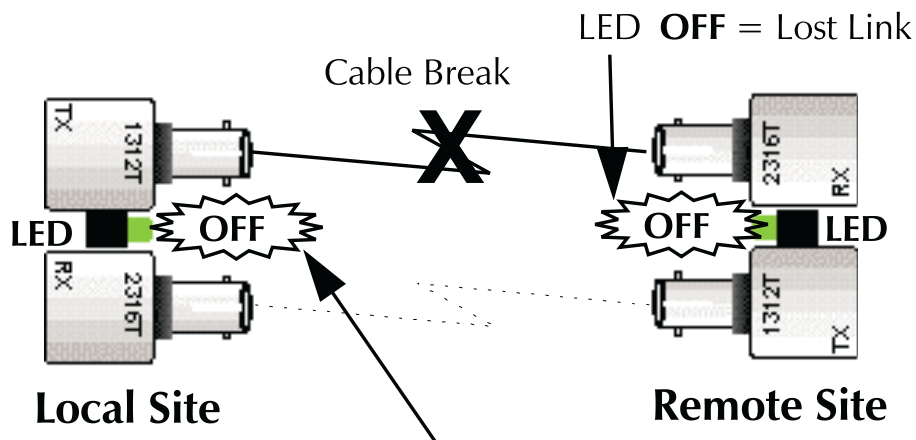
HOST AND REMOTE DIP SWITCHES		
Switch 7	Switch 8	Result
OFF	OFF	Standalone Configuration (no Host or Remote) DEFAULT
ON	OFF	Remote Unit Configuration (Slave)
OFF	ON	Host Unit Configuration (Master)

Configure **FiberLinX** to be a Host unit by setting Dip switch **8** to ON.
Configure **FiberLinX** to be a Remote unit by setting Dip switch **7** to ON.

FiberAlert

Since media converters are a transparent link in a network, **FiberLinX** features **FiberAlert**, a troubleshooting feature that assists in pinpointing link faults between media conversion products. If a media converter is not receiving a fiber link, **FiberAlert** disables the media converter's fiber transmitter, thus mirroring the link status of the opposite end of the fiber. Both fiber link LEDs on either side of the devices should extinguish, alerting you to the fault.

Note: FiberAlert *is always enabled on* FiberLinX.



Black Box product with *FiberAlert* enabled —
Remote Site stops transmitting
Local Link LED is **OFF** indicating a break in the fiber loop

Installing a **FiberLinX** Module

Once you configure a **FiberLinX Module**, it is ready to be installed in a chassis. You can install a **FiberLinX Module** into any slot in any Black Box Corporation **PowerChassis**. **FiberLinX Modules** may be safely installed or removed with power on (i.e., **FiberLinX Modules** are “hot-swappable”). Please read the electrostatic discharge precautions on page 4.1 of this manual before installing your module.

Note: FiberLinX Modules *should be installed into a* PowerChassis *only AFTER the* PowerChassis *has been installed. Please see the installation guide included with your chassis for assistance in installing the chassis and* Power Supply Modules, *if applicable.*

PowerChassis come with blank brackets covering the slots where the modules are to be installed. To install a **FiberLinX Module**, remove the blank bracket by loosening the screws located on the outside edges of the bracket. Slide the **FiberLinX Module** into the chassis, via the cardguides, until the module is seated securely in the connector. Secure the module to the chassis by tightening the screws.

Selecting a Twisted Pair Crossover/Pass-Through Connection

Once a **FiberLinX** is installed, you can select a crossover workstation or pass-through repeater/hub connection for the twisted pair data port. **FiberLinX's** twisted pair data port has one RJ-45 connector for a single shielded or unshielded twisted pair link segment and features a push-button switch, located next to the port, for selecting the type of connection.

To select a pass-through connection on **FiberLinX**, simply press the push-button IN. A crossover connection is selected when the push-button is OUT. If uncertain whether a crossover or pass-through connection is needed, set the switch to whatever position makes the twisted pair link LED glow.

LED Operation

FiberLinX features diagnostic LEDs for each port. The following illustration shows the location of the LEDs on **FiberLinX**.



Figure 2.2 LEDs on FiberLinX

LEDs for the Fiber Data Port

LED functions for the fiber data port are as follows:

- FDX** Glows yellow when FDX is selected on port
- ACT** Blinks green when data is detected on the port
- LNK** Glows green when a link is established
- FA** Glows green when **FiberAlert** is enabled

LEDs for the Twisted Pair Data Port

LED functions for the twisted pair data port are as follows:

- LNK** Glows green when a link is established
- FDX** Glows yellow when FDX is selected on the port

LEDs for the Twisted Pair Management Port

LED functions for the twisted pair management port are as follows:

LNK	Glows green when a link is established
FDX	Glows yellow when FDX is selected on the port
FAR CPU UP	Glows yellow when far end is detected
FAR TP LINK	Glows green when a link is established on remote (far end) TP data port
SNMP	Blinks green with SNMP activity
TP ACT	Blinks green with TP activity

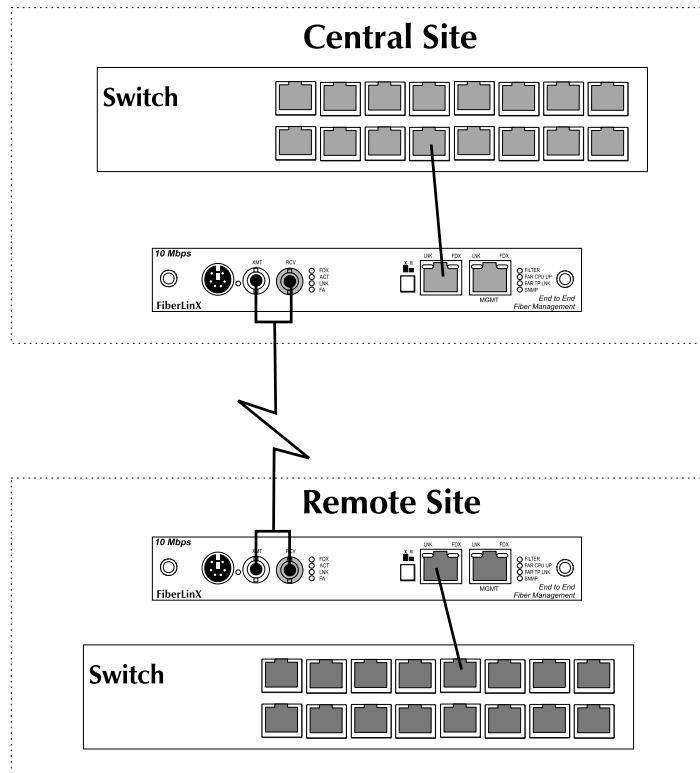
Note: The FAR CPU UP LED and the FAR TP LNK LED only function when two FiberLinX units are connected to one another (i.e., Host and Remote).

Mini-DIN Connector (FUTURE USE)

FiberLinX features a mini-DIN connector, located on the left of the faceplate (front view). This connector can be used as a serial port connection (feature currently not implemented in software) or as a switch connection in installations requiring a tamper-proof enclosure.

Example 2:
Fiber Conversion and Remote Management Between Two Copper-Based Switches

In this situation, configure the Central site's unit as a Host with management traffic through the twisted pair data port, and the Remote site's unit to accept management traffic through the fiber data port.



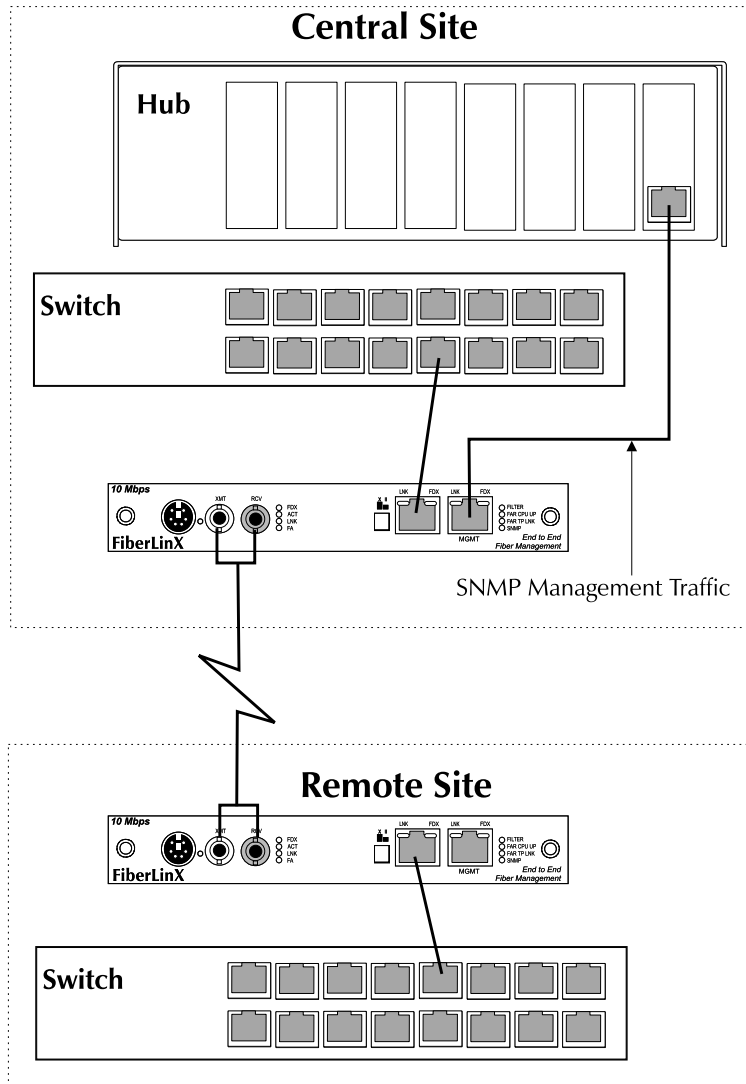
Note that the twisted pair management ports on both **FiberLinX** remain unused.

EXAMPLE 2: DIP SWITCH SETTINGS				
FiberLinX	Switch 5	Switch 6	Switch 7	Switch 8
Central (Host)	ON	OFF	OFF	ON
Remote	ON	ON	ON	OFF

Note: You can access and manage the Remote site's FiberLinX **directly in this configuration if you assign the unit an IP address.**

**Example 3:
Fiber Conversion and Highly Secure Remote Management
Between Two Copper-Based Switches**

For the highest level of management security, route SNMP management traffic completely away from the switch. Two **FiberLinX** units are also used in this configuration. The following illustration shows an external hub being used to maintain LAN separation.



Configure the two **FiberLinX** units used in this example exactly as the ones in Example 2, except direct management traffic on the Central site's unit to the twisted pair management port.

EXAMPLE 3: DIP SWITCH SETTINGS				
FiberLinX	Switch 5	Switch 6	Switch 7	Switch 8
Central (Host)	OFF	ON	OFF	ON
Remote	ON	ON	ON	OFF

Chapter 4:

Technical Specifications

Fiber Optic Cleaning Guidelines

Fiber Optic transmitters and receivers are extremely susceptible to contamination by particles of dirt or dust which can obstruct the optic path and cause performance degradation. Good system performance requires clean optics and connector ferrules.

- 1) Use fiber patch cords (or connectors, if you terminate your own fiber) only from a reputable supplier; low quality components can cause many hard-to-diagnose problems in an installation.
- 2) Dust caps are installed by the manufacturer to ensure factory-clean optical devices. These protective caps should not be removed until the moment of connecting the fiber cable to the device. Assure that the fiber is properly terminated, polished and free of any dust or dirt and that the location is as free from dust and dirt as possible.
- 3) Store spare caps in a dust free environment such as a sealed plastic bag or box so that when reinstalled they do not introduce any contamination to the optics.
- 4) Should it be necessary to disconnect the fiber device, reinstall the protective dust caps.
- 5) If you suspect that the optics have been contaminated, alternate between blasting with clean dry compressed air and flushing with methanol to remove particles of dirt.

Electrostatic Discharge Precautions

Electrostatic discharge (ESD) can cause damage to your add-in modules. Always observe the following precautions when installing or handling an add-in module or any board assembly.

- 1) Do not remove unit from its protective packaging until you are ready to install it.
- 2) Wear an ESD wrist grounding strap before handling any module or component. If you do not have a wrist strap, maintain grounded contact with the system unit throughout any procedure requiring ESD protection.

WARNING! Integrated circuits and fiber optic components are extremely susceptible to electrostatic discharge damage. Do not handle these

components directly unless you are a qualified service technician and use tools and techniques that conform to accepted industry practices.

- 3) Hold boards by the edges only; do not touch the electronic components or gold connectors.
- 4) After removal, always place the boards on a grounded, static free surface, ESD pad or in a proper ESD bag. Do not slide the board over any surface.

Unit Specifications

Environmental

Operating Temperature: 32° - 122° F (0° - 40° C)

Storage Temperature: 22° - 160° F (-6° - 71° C)

Humidity: 5 - 95% non-condensing

Power

AC Input Load: 100/240V ~ 50/60 Hz, 0.2/0.1A (stand-alone chassis)

Heat

Heat generated: 50 BTU/hr.

Chapter 5: General Information

Customer Service

Call: (724) 746-5500 Phone orders 24 hours a day, 7:00 AM Monday to midnight Friday; 8:00 AM to 4:00 PM Saturday (EST)

Fax: (724) 746-0746 or in North America **1-800-321-0746**

Mail order: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018

Technical Support and fax orders 24 hours a day

Warranty

Please contact Black Box Corporation for complete warranty information.

Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A computing device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

The use of non-shielded I/O cables may not guarantee compliance with FCC RFI limits.

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 classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.



Black Box Corporation
The World's Source for ConnectivitySM

© Copyright 1998. Black Box Corporation. All rights reserved.

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