Installing FRE-4-PPC Ethernet Link Modules in BN Platforms

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Preface

The Bay Networks® FRE®-4-PPC Ethernet link modules connect network cables and the FRE-4-PPC processor module.

Before You Begin

This guide is intended for qualified service personnel who need to install or replace a FRE-4-PPC link module in these Backbone Node (BN®) platforms:

- Backbone Link Node (BLN®)

- Backbone Link Node-2 (BLN-2)

- Backbone Concentrator Node (BCN®)

A qualified service person should have appropriate technical training and experience and be aware of the hazards involved in installing and replacing link modules.

The FRE-4-PPC Ethernet link module fits into any link module slot in the rear panel of a BN platform.

Text Conventions

This guide uses the following text conventions:

italic text   Indicates new terms and book titles.

Acronyms

This guide uses the following acronyms:

DMD	differential mode delay
EMC	electromagnetic compatibility
GAME	Gate Access Management Entity
HDCM	Harpoon Diagnostic Console Monitor
ILI	Intelligent Link Interface
LED	light-emitting diode
MMF	multimode fiber
SMF	single-mode fiber
SRM-L	System Resource Module-Link

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In the United States and Canada, you can dial 800-2LANWAN for assistance.

Chapter 1
Installing the Link Module

In this guide, the term *FRE-4-PPC Ethernet link module* refers to the following modules:

- 1000BASE-SX Ethernet
- 1000BASE-LX Ethernet
- 10/100BASE-TX Ethernet
- 100BASE-FX Ethernet

➡ **Note:** Use FRE-4-PPC Ethernet link modules with the FRE-4-PPC processor module *only.*

Complete these tasks as needed to install the link module:

1. **Choose a slot.**
2. **Remove a link module.**
3. **Install a link module.**
4. **Connect cables.**

➡ **Note:** The jumpers on Ethernet link modules are not user-configurable. Changing a jumper setting on any of these link modules can disrupt module functioning.

Choosing a Slot

You can install a FRE-4-PPC Ethernet link module in:

- Slots 2 through 5 in the BLN platform (Figure 1-1)

- Slots 2 through 5 in the BLN-2 platform (Figure 1-2)

- Slots 1 through 6 and slots 8 through 14 in the BCN platform (Figure 1-3)
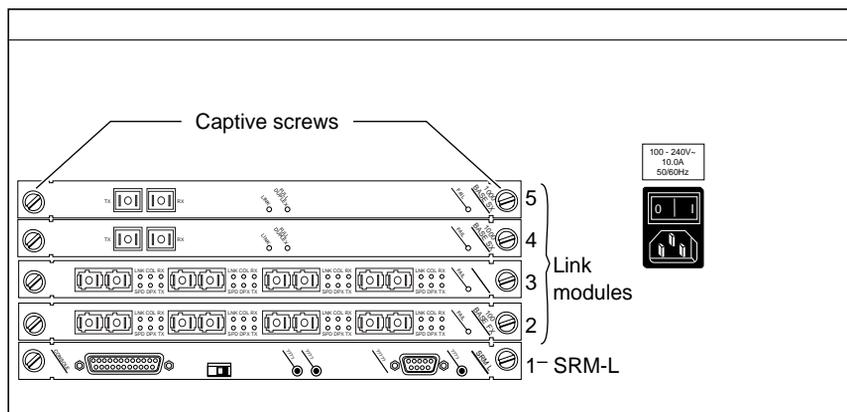
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Figure 1-1.   FRE-4-PPC Ethernet Link Modules in a BLN
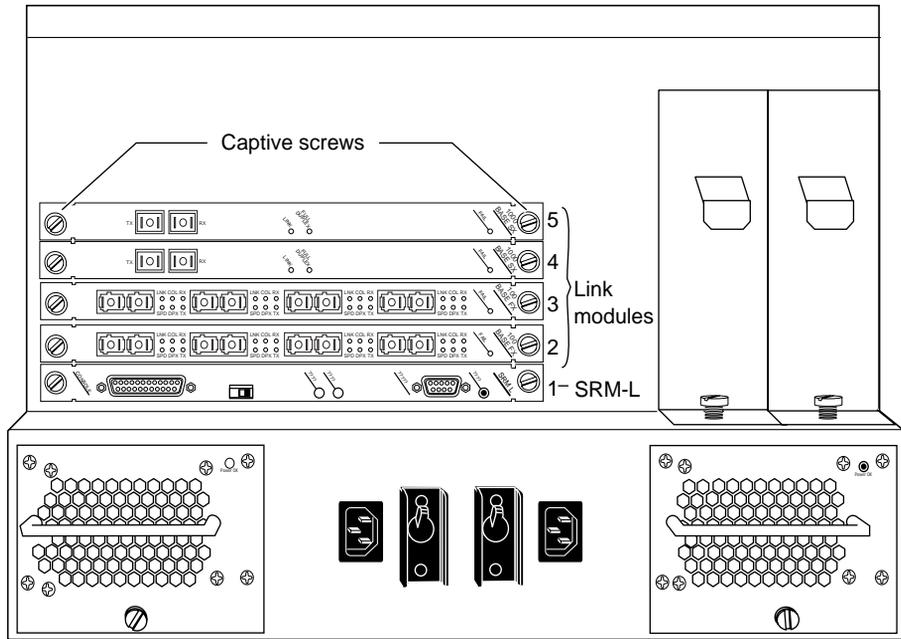
Figure 1-2.   FRE-4-PPC Ethernet Link Modules in a BLN-2

Link module slots

14 13 12 11 10 9 8 S R M L 6 5 4 3 2 1

FR40017A

Figure 1-3.   FRE-4-PPC Ethernet Link Modules in a BCN

Removing a Link Module

If there are no empty slots in your BN platform, you must remove a link module to install the FRE-4-PPC Ethernet link module. When replacing a configured link module, you must delete all configured circuits (ports) from the slot so that your software can properly configure the new link module.

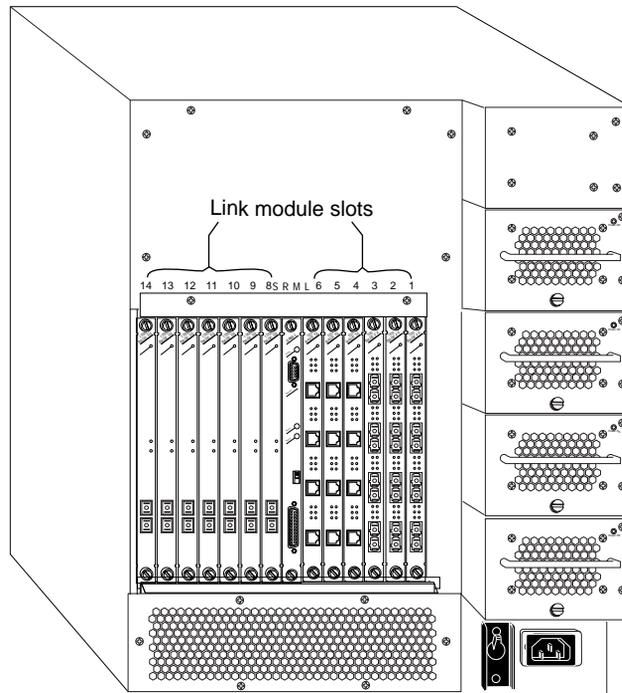For instructions on editing a configuration file and deleting circuits, see *Configuring and Managing Routers with Site Manager* or *Using the Bay Command Console (BCC).*

You can install and remove a link module with the chassis power on or off.

Danger: A potential energy hazard exists during insertion and removal of link modules with the power on. Do *not* remove more than two adjacent modules without turning off the BN.

When you remove a FRE-4-PPC link module with the power on, the services that slot provides are disrupted. After the slot fails to receive packets, the other link modules in the chassis resynchronize their routing tables and continue uninterrupted.

To remove a link module from a BLN, BLN-2, or BCN platform:

1. **Disconnect any cables from the link module.**

2. **Attach an antistatic wrist strap.**

   BN platforms and link modules ship with an antistatic wrist strap. You must wear one of these straps whenever you access components in BN platforms. The antistatic wrist strap directs the discharge of static electricity from your body to the chassis, thereby avoiding discharge and possible damage to sensitive electronic components.

Caution: Electrostatic discharge can damage hardware. Always use the antistatic wrist strap when handling any component in your BN platform.

3. **Loosen the captive screw on each end of the module (Figure 1-4).**

   Figure 1-4 shows the captive screws on a 100BASE-FX Ethernet link module; these screws are the same on all link modules.
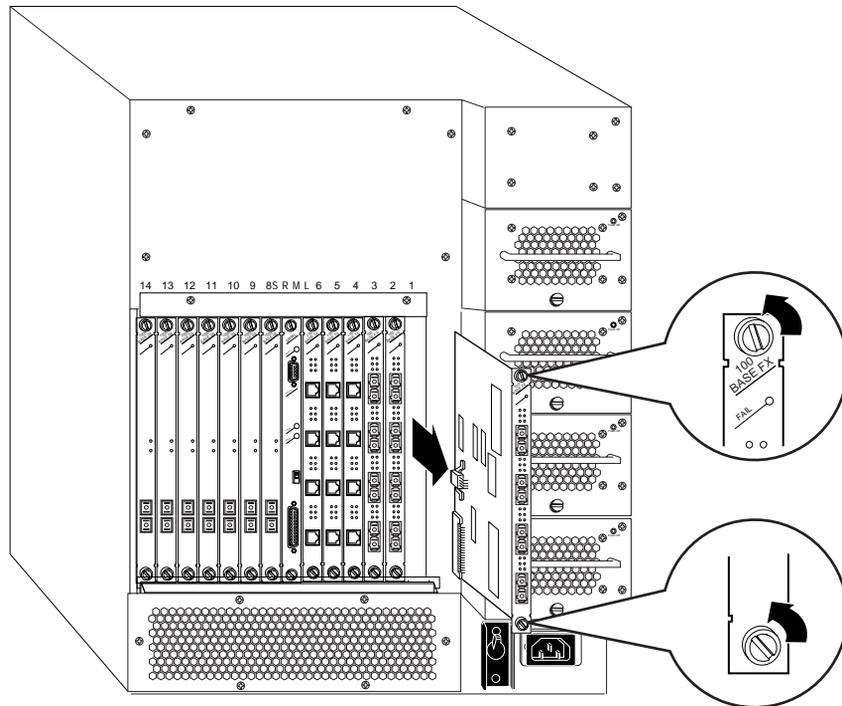
Figure 1-4.   Removing a Link Module (BCN Example)

4.   **Grasp the sides of the module and pull it out of the slot.**

5.   **Place the module in an antistatic protective bag.**

Inserting the Link Module

To install a FRE-4-PPC link module in a BLN, BLN-2, or BCN:

1. **Slide the module into the appropriate slot, using the slot card guides.**

   Refer to Figure 1-1 (BLN) on page 1-2, Figure 1-2 (BLN-2) on page 1-3, or Figure 1-3 (BCN) on page 1-4 for slot locations.

2. **Insert the module until its connector panel touches the BN back panel.**

3. **Secure the captive screw on each end of the module (Figure 1-5).**
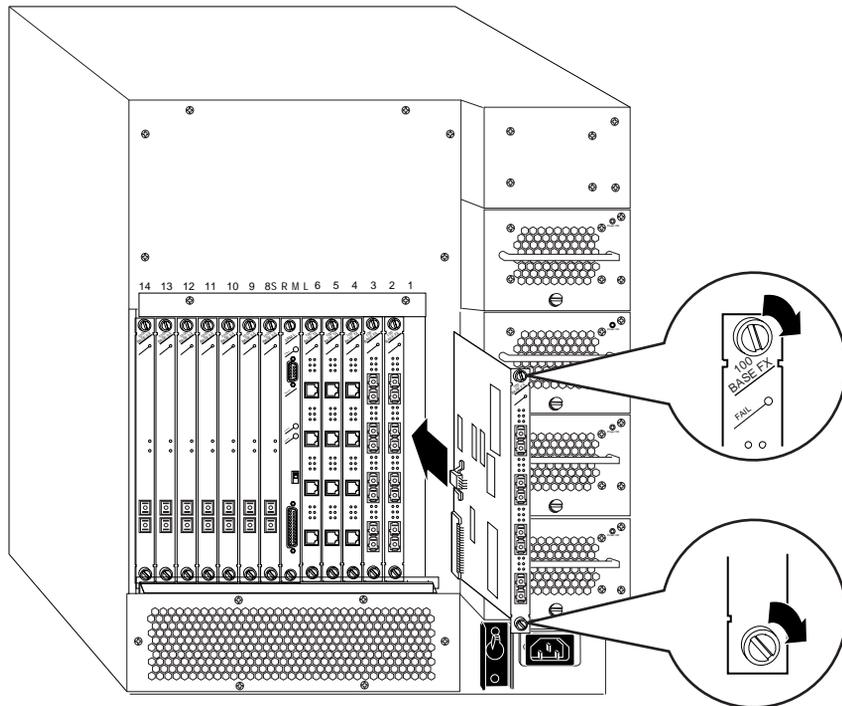
FR40019A

Figure 1-5.   Installing a Link Module (BCN Example)

4. **When you finish accessing the interior of the chassis, remove the antistatic wrist strap.**

Connecting Cables

Connect the appropriate cables to the link module ports (Figures 1-6 through 1-8).

⚠ **Danger:** Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.
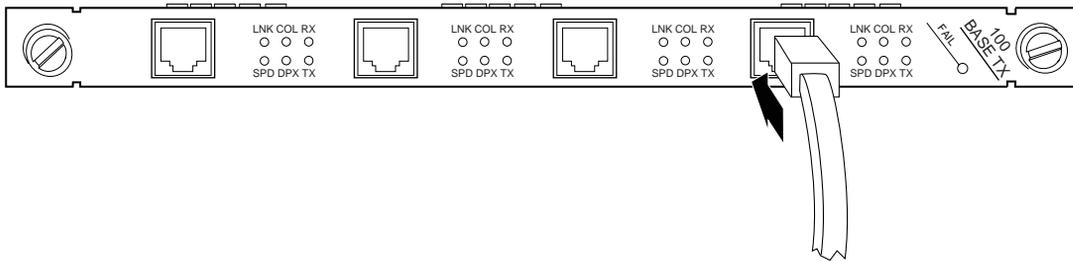
FR40020A

Figure 1-6. **Connecting an Ethernet UTP Cable to a 100BASE-TX Link Module**

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Figure 1-7. **Connecting a Fiber Optic Cable to a 100BASE-FX Link Module**
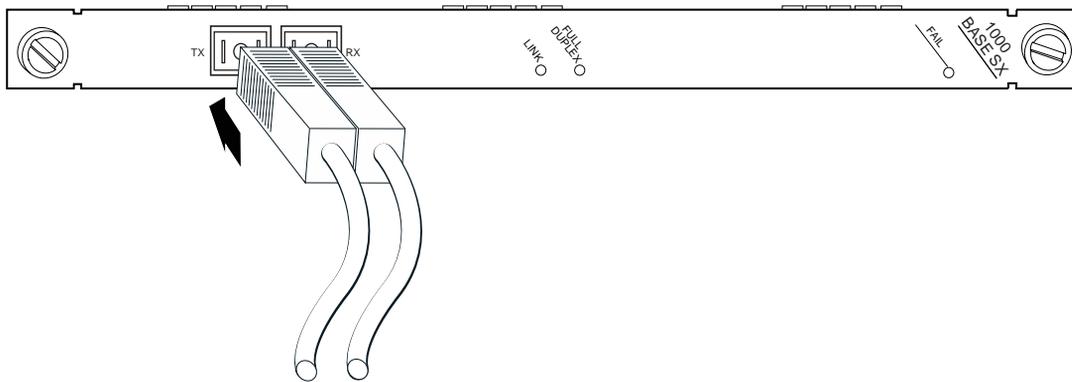
FR40022A

Figure 1-8. **Connecting a Fiber Optic Cable to a 1000BASE-SX Link Module**

Using Multimode Fiber with the 1000BASE-LX Link Module

If you use multimode fiber (MMF) with the 1000BASE-LX Ethernet link module, you may need to use external, removable mode-conditioning patch cords to prevent differential mode delay (DMD).
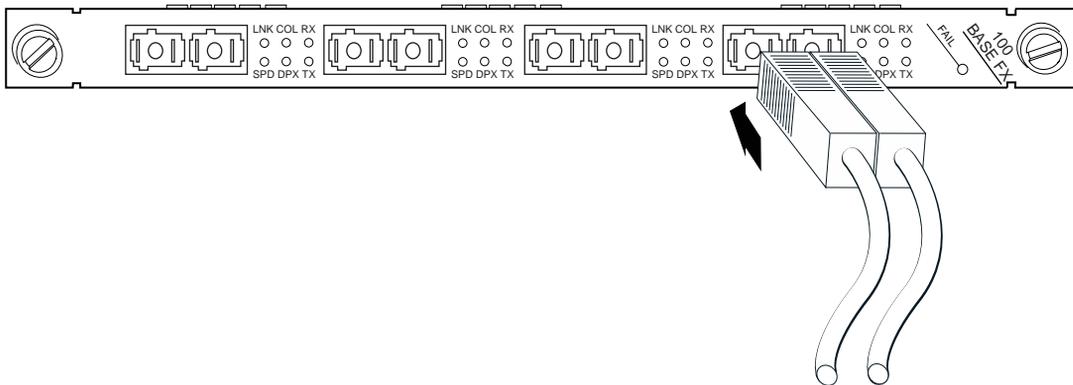
You can order mode-conditioning patch cords through Bay Networks (SC-SC Mode Conditioning Patch Cord 62.5/125, Part No. AA0018035). This patch cord is also available from other vendors including Computer Crafts, Methode Electronics, Inc., and SIECOR.

For more information about DMD in 1000BASE-LX applications, refer to *Reference Note: Gigabit Ethernet Physical Layer Considerations* (Bay Networks Part No. 201540-B).

Chapter 2
Checking Status Indicators

This chapter describes the status indicator lights (LEDs) on the FRE-4-PPC Ethernet link modules. Use the LEDs to verify that the link module is operating after installation.

You should issue the **diags** command for the associated slot immediately after you insert a link module (see *Using the Bay Command Console (BCC)*). Otherwise, the link module FAIL LED will remain lit, indicating that diagnostics have not run on the Intelligent Link Interface (ILI). However, even if you do not issue the **diags** command, the link module initializes and becomes operational as long as the module functions properly and contains the correct interface configurations.

1000BASE-SX Ethernet Link Module LEDs

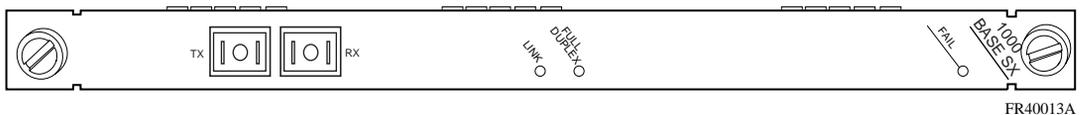Figure 2-1 shows the LEDs on the 1000BASE-SX Ethernet link module.

Figure 2-1. **1000BASE-SX Ethernet Link Module**

Table 2-1 describes the 1000BASE-SX Ethernet link module LEDs.

Table 2-1. **1000BASE-SX Ethernet Link Module LEDs**

LED	State	Meaning
LINK	Off	Port has not established a valid link with another node or repeater in gigabit mode.
	On (Green)	Port has established a valid link with another node or repeater in gigabit mode.
FULL DUPLEX	Off	Port is in half-duplex mode and is sending and receiving data.
	On (Green)	Port is in full-duplex mode and is sending and receiving data.
FAIL	Off	Diagnostics completed successfully and the BN platform booted.
	On (Red)	• Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the BCC™, or installing the link module with the power on. • Power-up diagnostic testing failed and the link module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights red again, call the Bay Networks Technical Solutions Center. • A link module hardware problem exists and the link module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights red again, call the Bay Networks Technical Solutions Center.

1000BASE-LX Ethernet Link Module LEDs

Figure 2-2 shows the LEDs on the 1000BASE-LX Ethernet link module.
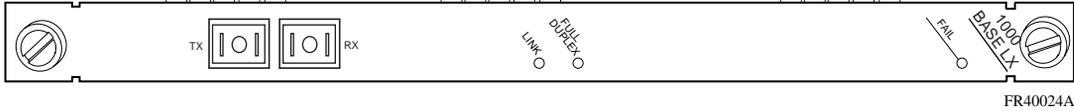

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Figure 2-2.   1000BASE-LX Ethernet Link Module

Table 2-2 describes the meaning of the 1000BASE-LX Ethernet link module
LEDs.

Table 2-2.   1000BASE-LX Ethernet Link Module LEDs

LED	State	Meaning
LINK	Off	Port has not established a valid link with another node or repeater in gigabit mode.
	On (Green)	Port has established a valid link with another node or repeater in gigabit mode.
FULL DUPLEX	Off	Port is in half-duplex mode and is sending and receiving data.
	On (Green)	Port is in full-duplex mode and is sending and receiving data.
FAIL	Off	Diagnostics completed successfully and the BN platform booted.
	On (Red)	• Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the BCC, or installing the link module with the power on. • Power-up diagnostic testing failed and the link module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights red again, call the Bay Networks Technical Solutions Center. • A link module hardware problem exists and the link module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights red again, call the Bay Networks Technical Solutions Center.

10/100BASE-TX Ethernet Link Module LEDs

Figure 2-3 shows the LEDs on the 10/100BASE-TX Ethernet link module.
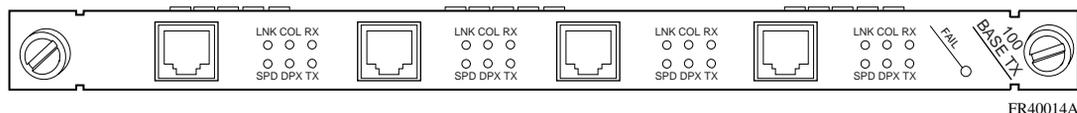

FR40014A

Figure 2-3.   10/100BASE-TX Ethernet Link Module

Table 2-3 describes the 10/100BASE-TX Ethernet link module LEDs.

Table 2-3.   10/100BASE-TX Ethernet Link Module LEDs

LED	State	Meaning
LNK	Off	Port has not established a valid link with another node or repeater in 10 or 100 MB mode.
	On (Green)	Port has established a valid link with another node or repeater in 10 or 100 MB mode.
COL	Off	Port has not detected an Ethernet wire collision.
	On (Amber)	Port has detected an Ethernet wire collision in simplex mode, or is transmit-congested in duplex mode.
TX and RX	Off	Port is neither transmitting nor receiving data.
	On (Green)	Port is transmitting and receiving data.
SPD	Off	Port is in 10 MB mode.
	On (Green)	Port is in 100 MB mode.
DPX	Off	Port is in half-duplex mode and is sending and receiving data.
	On (Amber)	Port is in full-duplex mode and is sending and receiving data.
FAIL	Off	Diagnostics completed successfully and the BN platform booted.
	On (Red)	Lights during power-up, and may flash during diagnostic testing. It remains lit if the link module or any connector on the link module fails diagnostics. In this case, the DIAG LED on the BN front panel will also light, and you should contact the Bay Networks Technical Solutions Center.

100BASE-FX Ethernet Link Module LEDs

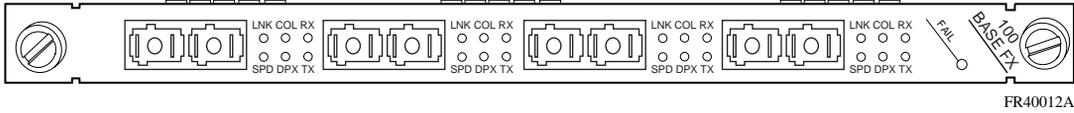Figure 2-4 shows the LEDs on the 100BASE-FX Ethernet link module.

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Figure 2-4.   **100BASE-FX Ethernet Link Module**

Table 2-4 describes the 100BASE-FX Ethernet link module LEDs.

Table 2-4.   **100BASE-FX Ethernet Link Module LEDs**

LED	State	Meaning
LNK	Off	Port has not established a link.
	On (Green)	Port has established a valid link with another node or repeater in 10 or 100 MB mode.
COL	Off	Not used
TX and RX	Off	Port is neither transmitting nor receiving data.
	On (Green)	Port is transmitting and receiving data.
SPD	Off	Port is in 10 MB mode.
	On (Green)	Port is in 100 MB mode.
DPX	Off	Port is in half-duplex mode and is sending and receiving data.
	On (Amber)	Port is in full-duplex mode and is sending and receiving data.
FAIL	Off	Diagnostics completed successfully and the BN platform booted.
	On (Red)	Lights during power-up, and may flash during diagnostic testing. It remains lit if the link module or any connector on the link module fails diagnostics. In this case, the DIAG LED on the BN front panel will also light, and you should contact the Bay Networks Technical Solutions Center.

Appendix A
Technical Specifications

This appendix provides technical specifications for the 1000BASE-SX and 1000BASE-LX Ethernet link modules.

Table A-1 lists the minimum distance ranges for the 1000BASE-SX and 1000BASE-LX Ethernet link modules.

Table A-1.   Gigabit Ethernet Minimum Distance Ranges

Transceiver	Fiber Type	Diameter (Microns)	Modal Bandwidth (MHz/km)	Minimum Range (Meters)
1000BASE-SX	MMF	62.5	160	2-220
	MMF	62.5	200	2-275
	MMF	50	400	2-500
	MMF	50	500	2-550
1000BASE-LX	MMF	62.5	500	2-550
	MMF	50	400	2-550
	MMF	50	500	2-550
	SMF	10	N/A	2-5000

Table A-2 lists the optical parameters for the 1000BASE-SX and 1000BASE-LX Ethernet link modules.

Table A-2.   Gigabit Ethernet Optical Parameters

	Gigabit Ethernet Module Type	
Parameter	**1000BASE-SX**	**1000BASE-LX**
Link Power Budget	7.5 dB	7.5 dB for 62.5 and 50 micron MMF; 8.0 dB for 10 micron SMF
Laser Transmitter Characteristics		
Minimum Launch Power	-9.5 dBm	-11.5 dBm
Maximum Launch Power	-3 dBm	-3 dBm
Receiver Characteristics		
Minimum Receiver Sensitivity	-17 dBm	-19 dBm
Maximum Input Power	0 dBm	-3 dBm