Hardware Maintenance Guide

Software Version 7.55, Site Manager Version 1.55

WELLFLEET communications
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# Table of Contents

## Chapter 1

**Accessing the Interior**

- About this Chapter .......................................................................................... 1-1
- Removing and Replacing the Front Bezel ...................................................... 1-2
- Attaching the Antistatic Wrist Strap ............................................................. 1-4
- Removing and Replacing the RFI Shield ....................................................... 1-6
- Removing and Installing an Air Flow Module ................................................. 1-8

## Chapter 2

**Hot Swapping the Hardware**

- About this Chapter .......................................................................................... 2-1
- Replacing a Flash Memory Card ................................................................. 2-2
- Replacing a Link Module or SRM-L ............................................................ 2-5
- Replacing a FRE or SRM-F ........................................................................... 2-9
- Replacing a Power Module in a BCN ........................................................... 2-14
- Replacing a Fan Tray in a BCN ................................................................. 2-17
Chapter 3

Configuring Hardware Modules

About this Chapter ................................................................. 3-1

5200 and 5201 Dual Port T1 Framer Link Module
(PN 100831 and 101667) ......................................................... 3-2

5250 Dual Port E1 Link Module (PN 101337) ......................... 3-4

5280 Quad Port Sync Link Module (PN 102285) ....................... 3-6

5290 Single HSSI Link Module (PN 104932) ............................ 3-10

5405 Dual Ethernet Link Module (PN 100003 or 100809) ......... 3-12

5410 Single Sync/Single Ethernet Link Module (PN 102296) .... 3-14

5420 Dual Sync/Single Ethernet Link Module (PN 102293) ....... 3-16

5430 Dual Sync/Dual Ethernet Link Module (PN 102279) ......... 3-18

5450 Quad Ethernet Link Module (PN 102690) ......................... 3-20

5505 Dual Ethernet High Speed Filters Link Module
(PN 102495) ........................................................................... 3-22

5530 Dual Sync/Dual Ethernet High Speed Filters Link Module
(PN 102494) ........................................................................... 3-24

5705 Single Token Link Module (PN 102484) ......................... 3-26

5710 Dual Token Link Module (PN 103366) ............................ 3-28

5720 Single Sync/Single Token Link Module (PN 102483) ....... 3-30

5740 Dual Sync/Single Token Link Module
(DST-4, PN 101988) ............................................................... 3-32

5740 Dual Sync/Single Token Link Module
(DST-4/16, PN 101531) ........................................................... 3-34

5740 Dual Sync/Single Token Link Module
(TS416 1X2, PN 102482) ......................................................... 3-36

5930 FDDI Multimode Link Module (PN 102675) and
4995 Daughterboard (PN 103269) ............................................. 3-38

5940 FDDI Single Mode Link Module (PN 103755) and
4995 Daughterboard (PN 103269) ............................................. 3-40
Chapter 4

Switches and LEDs

About this Chapter .......................................................................................... 4-1
Front Panel ..................................................................................................... 4-2
Rear Panel ..................................................................................................... 4-4
SRM-F and FRE Modules ........................................................................... 4-13

Appendix A

Replacing Fuses

About this Appendix ...................................................................................... A-1
Replacing Fuses in the BLN .......................................................................... A-2
Replacing Fuses in the BCN ......................................................................... A-9
About this Guide

Audience and Scope

The procedures described in this guide are written for two audiences, with different skills and backgrounds. This section describes these audiences and indicates the procedures which may be performed by experienced network operators and those which require trained service personnel.

Experienced network operators who are maintaining Wellfleet Backbone Nodes (BNs) may follow the procedures described in the first four chapters of this guide: Accessing the Interior, Hot Swapping the Hardware, Configuring Hardware Modules, and Switches and LEDs. These chapters assume that the reader has a technical understanding of electronic apparatus and data communications.

Only service personnel may follow the procedures described in Appendix A, Replacing Fuses. These procedures are detailed in the statement below.

⚠️ Danger - High Energy
Due to high-energy hazards, the following procedures are to be performed by service personnel only: removing the fuse access shield, removing fuses, and replacing fuses.
⚠️ **Service Personnel**

Service personnel are required to have experience installing and servicing Wellfleet network hardware, and have training in taking precautions to minimize danger to themselves and others while performing a task inside a hazardous service access area.

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**Document Set**

The following guides complete this documentation set:

*Overview Guide*

Describes the user interface, called the Site Manager application, the system software, and the router hardware.

*Hardware Installation Guide*

Describes how to physically install the router hardware.

*Quick-Start Guide*

Describes how to configure the router’s initial IP network interface, install the Site Manager application software, and remotely create a pilot configuration for the Wellfleet router using the Site Manager.

*Configuring System Software, Volumes I and II*

Describes how to use the Site Manager’s Configuration Manager application to set Wellfleet router parameters in one of three modes: local, remote, or dynamic.

*Operations Guide*

Describes how to use the Site Manager to perform day-to-day operations and how to use the Technician Interface to perform software maintenance.
If you are missing any guides, contact Wellfleet Customer Support at 1-800-2LANWAN.

**Conventions**

This document set uses the following conventions:

<table>
<thead>
<tr>
<th>Convention:</th>
<th>Denotes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>filename</td>
<td>Italics denote file and directory names.</td>
</tr>
<tr>
<td>command</td>
<td>Bold text denotes text the user needs to enter.</td>
</tr>
</tbody>
</table>
Chapter 1

Accessing the Interior

About this Chapter ................................................................. 1-1

Removing and Replacing the Front Bezel .............................. 1-2

Attaching the Antistatic Wrist Strap ....................................... 1-4

Removing and Replacing the RFI Shield ............................... 1-6

Removing and Installing an Air Flow Module ....................... 1-8
List of Figures

Figure 1-1. Removing the Front Bezel from the BLN .......................... 1-2
Figure 1-2. Removing the Front Bezel from the BCN ...................... 1-3
Figure 1-3. Connecting the Wrist Strap ....................................... 1-5
Figure 1-4. Removing the RFI Shield from the BLN ....................... 1-6
Figure 1-5. Removing the RFI Shield from the BCN ....................... 1-7
Figure 1-6. BLN with Air Flow Module ....................................... 1-8
Figure 1-7. Back Edge of Air Flow Module ................................. 1-9
Accessing the Interior

About this Chapter

This chapter describes how to do the following:

- Remove the front bezel.
- Connect the antistatic wrist strap to the Wellfleet router to avoid damage to electronic components when handling hardware modules.
  
  The antistatic strap is in a plastic pouch attached to the inside of the front bezel (panel).
- Remove the RFI shield from the front panel of the router to access the interior.
  
  You need to access the interior to replace or insert additional Flash memory cards and FRE modules.
- Remove and install an air flow module.
  
  Each unused slot is equipped with an air flow module, which redirects cool air to the FRE module below it, or to the side of it. You remove the air flow module to replace it with a FRE module.
Removing and Replacing the Front Bezel

You remove the front bezel to access the antistatic wrist strap, remove and insert Flash memory cards, FRE modules, and the SRM-F (System Resource Module-Front) in the BLN and BCN, replace hardware module fuses in the BLN, and replace the fan tray in the BCN.

Using both hands, pull the bottom of the front bezel and remove it from the chassis (see Figure 1-1 or 1-2).

Note: The front bezel should be kept on during normal operation to comply with air flow requirements.

You replace the front bezel as follows:

1. Align the mounting retainers on the inside of the bezel with the holes on the front of the RFI shield.
2. Push the sides of the bezel into place.

Figure 1-1. Removing the Front Bezel from the BLN
Figure 1-2. Removing the Front Bezel from the BCN
Attaching the Antistatic Wrist Strap

The antistatic wrist strap is located on the inside of the front bezel (front panel). Refer to the section *Removing and Replacing the Front Bezel* to access the antistatic strap.

Wearing an antistatic strap is required whenever you do the following:

- Remove, install, and handle Flash memory cards
- Remove, install, configure, and handle FRE (Fast Routing Engine) Modules, the SRM-F (System Resource Module-Front), and Link Modules (including the SRM-L [System Resource Module-Link]).
- Remove and replace module fuses

An antistatic strap directs the discharge of static electricity from your body to the chassis of the BN, thereby avoiding discharge to sensitive electronic components.

**Warning:** Electrostatic discharge can damage hardware. Follow the procedure in this section to protect your equipment from damage.

Attach the antistatic wrist strap as follows (see Figure 1-3):

1. Remove the front bezel (refer to *Removing and Replacing the Front Bezel*).
2. Remove the strap from the package attached to the back of the front bezel.
3. Insert your hand inside the band at one end of the antistatic strap.

Ensure the metal buckle inside the band is in contact with your skin. (Swing open the metal buckle to adjust the strap to form a snug fit if necessary).
4. Remove the alligator clip from the wrist strap and insert the end of the wrist strap into the antistatic receptacle if you are accessing a Flash card, hardware module, BCN Power Module, or BCN fuse.

If you are replacing a BLN fuse, refer to the appendix *Replacing Fuses* for the correct place to connect the wrist strap.

Figure 1-3. Connecting the Wrist Strap
Removing and Replacing the RFI Shield

You remove the radio frequency interference (RFI) shield to access the Flash memory cards and FRE modules.

**Warning:** Do not operate the BCN with the RFI shield removed for more than five minutes. The BCN overheats if the RFI shield is removed for more than five minutes. The BCN’s temperature sensor does not function properly when the RFI shield is removed.

You remove the RFI shield as follows (see Figure 1-4 or 1-5):

1. Remove the front bezel (refer to the previous section for instructions).
2. Loosen the captive thumbscrews that fasten the RFI shield to the chassis.
3. Remove the RFI shield from the chassis.

The RFI shield must be in place to replace the front bezel. You replace the RFI shield as follows:

1. Position the RFI shield in front of the chassis.
2. Tighten the captive thumbscrews that fasten the RFI shield to the chassis.

Refer to the previous section to replace the front bezel.
Figure 1-5. Removing the RFI Shield from the BCN
Removing and Installing an Air Flow Module

Wellfleet ships an air flow module in each empty FRE slot. Each air flow module redirects cool air to the FRE module below it in a BLN, or to the FRE module to the side of it in a BCN. Figure 1-6 is a sample illustration of how an air flow module is used. You remove the air flow module to replace it with a FRE module.

You remove an air flow module as follows:

1. Remove the front bezel (refer to the section Removing and Replacing the Front Bezel).
2. Remove the RFI shield (refer to the section Removing and Replacing the RFI Shield).
   
   If you have a BLN, use a Phillips screwdriver to remove the screw that fastens the bottom of the board retainer bracket to the chassis. Then remove the board retainer bracket.
3. Pull the sides of the air flow module to remove it.

Figure 1-6. BLN with Air Flow Module
To install an air flow module, hold it by its sides and insert it, back edge first, into the desired slot along the card guides.

The back edge of the air flow module contains spaces to accommodate the slot’s power connector and locating pin (see Figure 1-7).

![Diagram of air flow module back edge](attachment:image.png)

**Figure 1-7. Back Edge of Air Flow Module**
Chapter 2

Hot Swapping the Hardware

About this Chapter ................................................................. 2-1
Replacing a Flash Memory Card .............................................. 2-2
Replacing a Link Module or SRM-L ......................................... 2-5
Replacing a FRE or SRM-F ..................................................... 2-9
Replacing a Power Module in a BCN ....................................... 2-14
Replacing a Fan Tray in a BCN ................................................ 2-18

Hardware Maintenance Guide (Rev. B)
List of Figures

Figure 2-1. Wellfleet Flash Memory Card ............................................... 2-2
Figure 2-2. Removing a Flash Card ........................................................ 2-4
Figure 2-3. Removing a Link Module or SRM-L from a BLN .................. 2-7
Figure 2-4. Removing a Link Module or SRM-L from a BCN .............. 2-8
Figure 2-5. Removing a FRE or SRM-F from a BLN ............................ 2-10
Figure 2-6. Removing a FRE or SRM-F from a BCN ......................... 2-12
Figure 2-7. Location of Power Switch on FRE and SRM-F ................. 2-13
Figure 2-8. Removing a Power Module from a BCN ......................... 2-16
Figure 2-9. Removing Fan Tray Screws from a BCN ......................... 2-19
Figure 2-10. Removing the Fan Tray from a BCN ................................. 2-19

List of Tables

Table 2-1. Flash Memory Card Approved Vendors ............................... 2-3
Table 2-2. BCN ILI +5 V Power Draw Configuration ............................. 2-15
Hot Swapping the Hardware

About this Chapter

This chapter describes how to replace Flash memory cards and hardware modules. This chapter also describes how to replace a power supply module and a fan tray in a BCN. Wellfleet's hot swap capability allows you to replace these components with the power on. The procedures for replacing these components are the same whether the power is off or on.
Replacing a Flash Memory Card

This section describes how to hot swap a Flash memory card. You have at least one Flash card installed in your BN (see Figure 2-1). However, the BN supports one Flash card per FRE module. You install additional cards to provide redundancy or add storage capacity.

![Figure 2-1. Wellfleet Flash Memory Card](image)

When you remove a formatted Flash card, the Non-Volatile File System (NVFS) removes access to the card. When you insert and format a Flash card or insert a formatted Flash card, the NVFS automatically provides access to the card.

**Warning:** Electrostatic discharge can damage hardware. You must remove the front bezel, attach the antistatic strap to your wrist, and connect it to the antistatic receptacle before you remove or install a Flash card (refer to the chapter *Accessing the Interior* for instructions.)
Table 2-1 lists the 2 Mb, Personal Computer Memory Card International Association (PCMCIA) standard Flash memory cards that are qualified for use in a BN:

Table 2-1. Flash Memory Card Approved Vendors

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxell</td>
<td>EF2MTB (AA)</td>
</tr>
<tr>
<td>Maxell</td>
<td>EF2MTB (BA)</td>
</tr>
<tr>
<td>INTEL</td>
<td>IMONC002FLKA</td>
</tr>
<tr>
<td>AMD</td>
<td>AMC002FLKA</td>
</tr>
<tr>
<td>Mitsubishi</td>
<td>MF82M1-G1EAT01</td>
</tr>
<tr>
<td>C Centennial</td>
<td>CC2048FLXX-15</td>
</tr>
<tr>
<td>Fujitsu</td>
<td>MB98A811220</td>
</tr>
</tbody>
</table>
Replacing a Flash Memory Card

Remove a Flash card as follows:

1. Press the rectangular button adjacent to the Flash card receptacle (see Figure 2-2).
2. Pull the Flash card toward you.

![Figure 2-2. Removing a Flash Card](image)

You insert a Flash card into any FRE module as follows:

1. Position the Flash card with the label facing up and the INSERT arrow pointing toward the BN.
2. Insert the Flash card into the Flash card receptacle.
3. Gently push the Flash card until it fits snugly into place.

You close the BN as follows (refer to the chapter Accessing the Interior for detailed instructions.)

1. Replace the RFI shield.
2. Insert the wrist strap into the wrist strap pouch attached to the back of the front bezel.
3. Replace the front bezel.

Format the Flash card using the Site Manager or TI `format` command before attempting to write to it if the card is new and you did not obtain it from Wellfleet. (Refer to the Operations Guide for instructions.)
Replacing a Link Module or SRM-L

You can remove and replace a Link Module or an SRM-L with the power on or off. You follow the same procedure to replace a Link Module or an SRM-L.

When you remove a Link Module, connectivity to the slot in question and the services provided by the slot are disrupted. The other FRE modules resynchronize their routing tables after the slot fails to receive packets.

**Warning:** The SRM-L and SRM-F each supply two backbones. Thus, two backbones become inactive if you remove one, and four backbones become inactive if you remove both. When you insert one, its associated backbones become active.

When you insert a Link Module in a slot, the FRE module in that slot detects the presence of the Link Module and provides connectivity to it. The FRE module alerts the other FRE modules that it can receive packets and the other FRE modules resynchronize their routing tables accordingly.
Replacing a Link Module or SRM-L

**Warning:** Electrostatic discharge can damage hardware. You must remove the front bezel, attach the antistatic strap to your wrist, and connect it to the antistatic receptacle before you handle BN components (refer to the chapter *Accessing the Interior* for instructions).

Refer to Figure 2-3 if you have a BLN, or to Figure 2-4 if you have a BCN. The procedures are the same for the BLN and BCN.

Remove a Link Module as follows:

1. Disconnect all exterior cables (device, LAN, and/or WAN connections).
2. Twist off the two captive screws on each end of the board.
3. Grasp the sides of the Link Module and pull it out of the node.
4. Place the Link Module in an antistatic protective bag.

Install a Link Module as follows:

1. Slide the Link Module into the desired slot inside the card guides until the board's connector panel is up against the BN's rear panel.
2. Secure the two captive screws on both sides of the Link Module.
3. Connect any device cables or LAN/WAN interface cables to the Link Module.

**Note:** Wellfleet recommends that you issue the `diags` command to the associated slot immediately after you insert a Link Module (refer to the *Operations Guide: Technician's Interface*). Otherwise, the Link Module FAIL LED will remain lit, indicating diagnostics have not been run on the ILI (refer to the *Switches and LEDs* chapter). However, regardless of whether you issue the `diags` command, the Link Module will be initialized and become operational if it is functional and its ports are configured.
To Antistatic Receptacle In Front (©)

Figure 2-3. Removing a Link Module or SRM-L from a BLN
Replacing a Link Module or SRM-L

To Antistatic Receptacle In Front

Captive Screws

Figure 2-4. Removing a Link Module or SRM-L from a BCN
Replacing a FRE or SRM-F

You can remove and replace a FRE module or SRM-F with the power on or off. You must remove the front bezel and RFI shield to access it (refer to the chapter *Accessing the Interior* for instructions.)

When you remove a FRE Module, connectivity to the slot in question and the services provided by the slot are disrupted. The other FRE modules resynchronize their routing tables after the slot fails to receive packets.

**Warning:** The SRM-L and SRM-F each supply two backbones. Thus, two backbones become inactive if you remove one, and four backbones become inactive if you remove both. When you insert one, its associated backbones become active.

When you insert a FRE module in a slot and power is determined to be stable for the slot, the FRE module automatically resets as follows:

1. The newly inserted FRE module executes the diagnostics image resident on the Flash E-PROM.
2. The newly inserted FRE module completes the boot process.

**Warning:** Electrostatic discharge can damage hardware. You must attach the antistatic strap to your wrist and connect it to the antistatic receptacle before you handle BN components (refer to the chapter *Accessing the Interior* for instructions).

Refer to Figure 2-5 if you have a BLN, or to Figure 2-6 if you have a BCN. The procedures are the same for the BLN and BCN. However, you must remove a board retainer bracket from the BLN in order to gain access to the front modules.
Danger - High Energy

A potential energy hazard exists during power on (hot swap) service of link modules. Do not remove more than two (2) adjacent boards/brackets without powering off the unit and removing the power cord.

Remove a board retainer bracket from a BLN as follows (see Figure 2-5):

1. Use a Phillips screwdriver to release the screw that fastens the board retainer bracket to the chassis.
2. Pull the bottom of the board retainer bracket to remove it.

Figure 2-5. Removing a FRE or SRM-F from a BLN
Note: Only slot 1 (the bottom slot) in the BLN may contain an SRM-F. Only slot 7 in the BCN may contain an SRM-F. The remaining slots are available for FREs.

Remove a FRE or SRM-F from a BLN or BCN as follows (see Figure 2-5 or 2-6):

1. Swing open the extractors at each end of the board that you are removing by gently pulling the inside of the extractors toward you.
2. Pull the extractors to remove the board.
3. Place the FRE or SRM-F in an antistatic protective bag.

Insert a FRE or SRM-F in a BLN or BCN as follows:

1. Ensure the power switch on the board you inserted is pushed to the right if it is equipped with a power switch (see Figure 2-7).
2. Holding the board extractors open, slide the FRE into the desired slot inside the card guides.
   If you have a BLN, lift the middle of the board slightly and push it gently to ensure the connector in the middle engages.
3. Swing the extractors forward to lock the board in place.

Note: Slide the board out and repeat steps 1 and 2 if the extractors do not lock into place easily.

Replace a board retainer bracket in a BLN as follows (see Figure 2-5):

1. Slide the top of the board retainer bracket into its designated ridge and align the bottom of the bracket with the screw hole at the bottom of the chassis.
2. Use a Phillips screwdriver to secure the board retainer bracket to the chassis.
Replacing a FRE or SRM-F

Figure 2-6. Removing a FRE or SRM-F from a BCN
When you are finished, replace the RFI shield and front bezel (refer to the chapter *Accessing the Interior* for instructions.)

**Note:** If your FRE or SRM-F is *not* equipped with a power switch, it powers on automatically when you connect it.

When you insert a FRE, the DIAG LED lights during diagnostics and goes out if diagnostics determine that the FRE is functional.

If diagnostics determine the FRE is not functional, the DIAG LED on the front panel and LED 8 on the FRE module daughterboard remain on (refer to the *Switches and LEDs* chapter to identify LED 8). If this occurs, ensure the modules are seated properly in the Wellfleet router and issue the TI `diags` command. Call Wellfleet customer service if the DIAG LED does not go out.

If diagnostics determine the FRE is functional and a Link Module is connected to the FRE, diagnostics are also performed on the Link Module. If the Link Module or any of its ports are not functional, the Link Module Fail LED lights. Regardless of the results of Link Module diagnostics, the BOOT LED then lights, indicating the FRE is booting. If a Link Module fails diagnostics, it does not become operational. If a Link Module succeeds diagnostics, it becomes operational. However, any Link Module ports that fail diagnostics do not become operational.
Replacing a Power Module in a BCN

The 620 Watt Hot Swap Power Modules are inserted in the rear panel of the BCN and are easily accessible.

The GAME operating system generates an event message in response to a change in the status of each Hot Swap Power Module. These messages identify the Power Module by its slot. The Power Module slots are numbered 1 through 4 from the bottom of the BCN to the top.

Each Power Module is equipped with a green Power OK LED which when lit indicates the Power Module is operational and direct current is on. The Power LED on the front panel of the BCN indicates.

When the BCN is powered on and you remove an operational Power Module, the Power OK LED goes out, and the BCN automatically redistributes the load among the remaining Power Modules.

When the BCN is powered on and you insert an operational Power Module, the Power OK LED lights, indicating the Power Module is operational, and the BCN automatically redistributes the load among the Power Modules.

Each Power Module provides up to 90 amps at +5 V. You need at least three Power Modules to supply power to a fully-loaded BCN. Table 2-2 lists the average +5 V power draw for each Intelligent Link Interface (ILI).

The following occurs if you power up the BCN with an insufficient number of Power Modules to supply power to its ILI configuration, or you remove a Power Module necessary to supply sufficient power:

1. The Power Modules go into overcurrent mode.
2. The BCN powers off.
Verify that the remaining operational Power Modules can provide sufficient power for the BCN's ILI configuration if you are removing a Power Module and there are already less than four operating Power Modules.

If the power supply will not be sufficient when you remove a Power Module, remove network cables, Link Modules, and FREs from the least critical slots until the ILI configuration draws less power than the Power Modules will supply.

**Table 2-2. BCN ILI +5 V Power Draw Configuration**

<table>
<thead>
<tr>
<th>ILI</th>
<th>+5 V Power Draw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quad Port Sync</td>
<td>18 amps</td>
</tr>
<tr>
<td>Ethernet Single Port Sync</td>
<td>18 amps</td>
</tr>
<tr>
<td>Quad Port Ethernet</td>
<td>19 amps</td>
</tr>
<tr>
<td>Multimode FDDI</td>
<td>20 amps</td>
</tr>
<tr>
<td>Dual Port T1 Framer/Multiplexer</td>
<td>18 amps</td>
</tr>
<tr>
<td>Dual Port T1 Framer/Multiplexer - DACS 56K</td>
<td>18 amps</td>
</tr>
<tr>
<td>Dual Port E1 (CEPT) Framer/Multiplexer</td>
<td>18 amps</td>
</tr>
<tr>
<td>Single Port HSSI</td>
<td>21 amps</td>
</tr>
<tr>
<td>Dual Port Token Ring</td>
<td>18 amps</td>
</tr>
<tr>
<td>Single Port Token Ring/Dual Sync</td>
<td>18 amps</td>
</tr>
</tbody>
</table>
You can remove and replace a Power Module in a BCN with the power on or off.

Remove a Power Module as follows (see Figure 2-8):

1. Using a flat-head screwdriver, loosen the captive screw until the Power Module disengages.
2. Grasp the handle and pull it out of the BCN.
Danger

The sides of the Power Module are hot when removed from a BCN that has been operating recently. Hold the Power Module by the bottom.

After a Power Module is removed with the power on, wait thirty seconds before inserting another. This delay allows the overvoltage circuitry to reset.

Insert a Power Module as follows:

1. Grasp the handle and guide the module into the desired slot along the side guides and gently insert the module until the power supply connector comes into contact with the mating connector on the power supply backplane.

   \textbf{Note:} Stop when you feel resistance. The Power Module does not fully insert until you tighten the thumbscrew.

2. Using a flat-head screwdriver, turn the captive screw until the power module is seated firmly.

   The Power OK LED lights when the BCN is powered on and the Power Module is fully engaged.

3. Turn the captive screw an additional 1/4 turn. Do not overtighten the screw.

   If the Power OK LED does not light, the Power Module you inserted is not operational. Repeat the procedure to install a new Power Module.
Replacing a Fan Tray in a BCN

The BCN fan tray is located on the front panel of the chassis above the RFI Shield.

The GAME operating system generates two event messages in response to a change in the status of the fan tray.

Warning: The BCN may overheat if the fan tray is removed for more than two minutes. If the BCN is powered on, quickly replace the fan tray to prevent overheating.

You can remove and replace a fan tray in a BCN with the power on or off.

Remove a fan tray as follows:

1. Remove the front bezel (refer to the chapter Accessing the Interior).
2. Remove the antistatic strap and alligator clip from the package attached to the back of the front bezel. Insert your hand into the wristband of the strap.
3. Connect the alligator clip to the connector at the other end of the antistatic strap and connect the clip to the vent holes in the power supply panel.
   The power supply panel is the vented panel to the left of the RFI shield.
4. Remove the RFI shield (refer to the chapter Accessing the Interior).
5. Use a Phillips screwdriver to remove the screws that fasten the fan tray to the chassis (see Figure 2-9).
6. Grasp the bottom of the fan tray and pull it out of the BCN (see Figure 2-10).
Hot Swapping the Hardware

Figure 2-9. Removing Fan Tray Screws from a BCN

Figure 2-10. Removing the Fan Tray from a BCN
Insert a fan tray as follows:

1. Grasp the bottom of the fan tray and guide it into the slot until the connectors at the rear of the fan tray engage.

   The fans start up when the BCN is powered on and the fan tray is fully engaged.

   If the fans do not start up, the fan tray you inserted is not operational. Repeat the procedure to install a new fan tray.

2. Use a Phillips screwdriver to secure the screws that fasten the fan tray to the chassis.

   **Note:** Do not insert Phillips screws into the two lower right screw holes on the fan tray. They are reserved for the RFI shield.

3. Install RFI shield and the front bezel.
Chapter 3

Configuring Hardware Modules

About this Chapter .................................................................3-1

5200 and 5201 Dual Port T1 Framer Link Module
(PN 100831 and 101667) .......................................................3-2

5250 Dual Port E1 Link Module (PN 101337) .........................3-4

5280 Quad Port Sync Link Module (PN 102285) .....................3-6

5290 Single HSSI Link Module (PN 104932) ..........................3-10

5405 Dual Ethernet Link Module (PN 100003 or 100809) ........3-12

5410 Single Sync/Single Ethernet Link Module (PN 102296) ....3-14

5420 Dual Sync/Single Ethernet Link Module (PN 102293) ......3-16

5430 Dual Sync/Dual Ethernet Link Module (PN 102279) .......3-18

5450 Quad Ethernet Link Module (PN 102690) ......................3-20

5505 Dual Ethernet High Speed Filters Link Module
(PN 102495) ........................................................................3-22

5530 Dual Sync/Dual Ethernet High Speed Filters Link Module
(PN 102494) ........................................................................3-24

5705 Single Token Link Module (PN 102484) .........................3-26

5710 Dual Token Link Module (PN 103366) ............................3-28

5720 Single Sync/Single Token Link Module (PN 102483) .......3-30
5740 Dual Sync/Single Token Link Module (DST-4, PN 101988) ..........3-32
5740 Dual Sync/Single Token Link Module (DST-4/16, PN 101531) ......3-34
5740 Dual Sync/Single Token Link Module (TS416 1X2, PN 102482) ....3-36
5930 FDDI Multimode Link Module (PN 102675) and
4995 Daughterboard (PN 103269) ........................................................... 3-38
5940 FDDI Single Mode Link Module (PN 103755) and
4995 Daughterboard (PN 103269) ........................................................... 3-40
75000 System Resource Module-Link (PN 103782) ......................... 3-42
75010 System Resource Module-Front (PN 103985) ......................... 3-43
75150 Fast Routing Engine (PN 103790) and
Daughterboard (PN 102713) ............................................................... 3-44
List of Figures

Figure 3-1. Dual Port T1 Framer ............................................................. 3-2
Figure 3-2. Dual Port E1 ................................................................. 3-4
Figure 3-3. Quad Port Sync .............................................................. 3-6
Figure 3-4. Single HSSI ................................................................. 3-10
Figure 3-5. Dual Ethernet ............................................................... 3-12
Figure 3-6. Single Sync/Single Ethernet ........................................... 3-14
Figure 3-7. Dual Sync/Single Ethernet .............................................. 3-16
Figure 3-8. Dual Sync/Dual Ethernet ............................................... 3-18
Figure 3-9. Quad Ethernet ............................................................... 3-20
Figure 3-10. Dual Ethernet High Speed Filters ................................. 3-22
Figure 3-11. Dual Sync/Dual Ethernet High Speed Filters ................. 3-24
Figure 3-12. Single Token ............................................................. 3-26
Figure 3-13. Dual Token ............................................................... 3-28
Figure 3-14. Single Sync/Single Token ............................................. 3-30
Figure 3-15. Dual Sync/Single Token (DST-4) ............................... 3-32
Figure 3-16. Dual Sync/Single Token (DST-4/16) .......................... 3-34
Figure 3-17. Dual Sync/Single Token (TS416 1X2) ......................... 3-36
Figure 3-18. FDDI Multimode ....................................................... 3-38
Figure 3-19. FDDI Daughterboard ............................................... 3-39
Figure 3-20. FDDI Single Mode ..................................................... 3-40
Figure 3-21. FDDI Daughterboard ............................................... 3-41
Figure 3-22. SRM-Link ............................................................... 3-42
Figure 3-23. SRM-Front ............................................................. 3-43
Figure 3-24. FRE and Daughterboard ......................................... 3-44
List of Tables

Table 3-1. 5200 and 5201 Dual Port T1 Framer Settings (PN 100831 and 101667) ..................................................... 3-3
Table 3-2. 5250 Dual Port E1 Settings (PN 101337) ................................................................. 3-5
Table 3-3. 5280 Quad Port Sync Settings (PN 102285) ................................................................. 3-7
Table 3-4. 5290 Single HSSI Settings (PN 104932) ................................................................. 3-11
Table 3-5. 5405 Dual Ethernet Settings (PN 100003 or 100809) ......................................................... 3-13
Table 3-6. 5410 Single Sync/Single Ethernet Settings (PN 102296) ......................................................... 3-15
Table 3-7. 5420 Dual Sync/Single Ethernet Settings (PN 102293) ......................................................... 3-17
Table 3-8. 5430 Dual Sync/Dual Ethernet Settings (PN 102279) ......................................................... 3-19
Table 3-9. 5450 Quad Ethernet Settings (PN 102690) ................................................................. 3-21
Table 3-10. 5505 Dual Ethernet High Speed Filters Settings (PN 102495) ......................................................... 3-23
Table 3-11. 5530 Dual Sync/Dual Ethernet High Speed Filters Settings (PN 102494) ......................................................... 3-25
Table 3-12. 5705 Single Token Settings (PN 102484) ................................................................. 3-27
Table 3-13. 5710 Dual Token Settings (PN 103366) ................................................................. 3-29
Table 3-14. 5720 Single Sync/Single Token Settings (PN 102483) ......................................................... 3-31
Table 3-15. 5740 Dual/Sync Single Token Settings (DST-4, PN 101988) ......................................................... 3-33
Table 3-16. 5740 Dual Sync/Single Token Settings (DST-4/16, PN 101531) ......................................................... 3-35
Table 3-17. 5740 Dual Sync/Single Token Settings (TS416 1X2, PN 102482) ......................................................... 3-37
Table 3-18. 5930 FDDI Multimode Settings (PN 102675) ................................................................. 3-39
Table 3-19. 5940 FDDI Single Mode Settings (PN 103755) ................................................................. 3-41
Configuring Hardware Modules

About this Chapter

This chapter shows the jumper and switch settings of the hardware modules in the BN. Both factory-default jumper and switch settings and optional configuration settings are shown.

Each section title in this chapter identifies a board’s 4-digit Link Module (LM) model number, name, and 6-digit part number (PN). Before configuring a board, be sure its part number matches the one in the section title. Part numbers are printed on the boards.

Each illustration shows the cable connector panel and the component side of the board. The illustration of the board shows the factory-default positions of the jumpers and switches. The pins that are jumpered on the solder (back) side of the board are not configurable. Also, some pins identified as “not configurable” may not appear on the board, depending on the release of the board.

A table after each illustration shows the option (function) of each jumper/switch, a description of the factory-default setting (if configurable), and the associated jumper/switch position.

The term “not configurable” in the Setting column means that changing the setting could jeopardize the functioning of the board. If an option is user-configurable, alternative settings and associated jumper/switch positions are listed after the factory-default setting.

Note: S1 jumpers are not included in the drawings and tables. S1 jumpers designate the current revision of the board; they are not user-configurable.
5200 and 5201 Dual Port T1 Framer Link Module (PN 100831 and 101667)

Figure 3-1. Dual Port T1 Framer
Table 3-1.  5200 and 5201 Dual Port T1 Framer Settings (PN 100831 and 101667)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>Not configurable</td>
<td>S2</td>
</tr>
<tr>
<td>32-pin EPROM option</td>
<td>Not configurable</td>
<td>S3</td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
</tr>
<tr>
<td>Internal clock</td>
<td>Enabled (master)</td>
<td>S5</td>
</tr>
<tr>
<td></td>
<td>Disabled (slave)</td>
<td>S5</td>
</tr>
<tr>
<td>Unused (Installed on E1)</td>
<td>Not configurable</td>
<td>S6</td>
</tr>
</tbody>
</table>

The jumper settings for both models (5200 and 5201) are the same.

Note: A T1 framer normally reports a yellow alarm whenever it receives a 0 in Bit 2 of 256 consecutive channels. Wellfleet uses several encoding algorithms to prevent the reporting of a false alarm when a normal data stream happens to contain a 0 in Bit 2 of 256 consecutive channels.

The DACS T1-64K model (Model 5200; PN 101667) uses a proprietary encoding algorithm to accept an all 0's condition without reporting a false yellow alarm. However, a Wellfleet DACS T1-64K must be on the other side of the wire to decode the data.

The DACS T1-56K model (Model 5201; PN 100831) sets Bit 7 of every channel to a 1. This prevents the false yellow alarm by forcing every eighth bit to a 1. Even if an all 0's condition occurs, the 1 maintains framer sync. This method allows the use of any standard T1 framer on the other side of the wire, but reduces the bandwidth to 56K.
Figure 3-2. Dual Port E1
<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option Setting</td>
<td>Not configurable</td>
<td>S2 A</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM option</td>
<td>Not configurable</td>
<td>S3 A</td>
</tr>
<tr>
<td>Power for 28-pin EPROMs</td>
<td>Not configurable</td>
<td>S4</td>
</tr>
<tr>
<td>Internal clock</td>
<td>Enabled (master)</td>
<td>S5</td>
</tr>
<tr>
<td></td>
<td>Disabled (slave)</td>
<td>S5</td>
</tr>
<tr>
<td>Installed on E1</td>
<td>Not configurable</td>
<td>S6</td>
</tr>
</tbody>
</table>

Table 3-2. 5250 Dual Port E1 Settings (PN 101337)
Figure 3-3. Quad Port Sync
## Table 3-3. 5280 Quad Port Sync Settings (PN 102285)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM</td>
<td>Not configurable</td>
<td>S3</td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10</td>
<td></td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S11</td>
</tr>
<tr>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S7, S8</td>
<td>Balanced signal for RS-422, X.21</td>
<td>S11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S7, S8</td>
<td>Com port 3</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S12</td>
<td></td>
</tr>
</tbody>
</table>

Options continued on next page
### Table 3-3. 5280 Quad Port Sync Settings (PN 102285), Continued

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com port 4</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td><img src="image" alt="Jumper Diagram" /></td>
</tr>
<tr>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td><img src="image" alt="Jumper Diagram" /></td>
</tr>
<tr>
<td>Daughterboard</td>
<td>Daughterboard not installed</td>
<td><img src="image" alt="Jumper Diagram" /></td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>Each J-to-S row is in a separate location on the board.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Daughterboard not installed</th>
<th><img src="image" alt="Jumper Diagram" /></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J7 S17</td>
<td>000000000000000000000000</td>
</tr>
<tr>
<td></td>
<td>J9 S16</td>
<td>000000000000000000000000</td>
</tr>
<tr>
<td></td>
<td>J11 S15</td>
<td>000000000000000000000000</td>
</tr>
<tr>
<td></td>
<td>J13 S14</td>
<td>000000000000000000000000</td>
</tr>
</tbody>
</table>

3-8
This page is intentionally left blank.
Figure 3-4. Single HSSI
Table 3-4. **5290 Single HSSI Settings (PN 104932)**

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Not configurable (Single HSSI)</td>
<td>S2</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S3</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S4</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S5</td>
</tr>
<tr>
<td>Clock select</td>
<td>Not configurable</td>
<td>S6</td>
</tr>
</tbody>
</table>
5405 Dual Ethernet Link Module (PN 100003 or 100809)

Figure 3-5. Dual Ethernet
Table 3-5. 5405 Dual Ethernet Settings (PN 100003 or 100809)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> This jumper may be hard-wired.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32-bit EPROM option</td>
<td>Not configurable</td>
<td></td>
</tr>
</tbody>
</table>

Note: This jumper may be hard-wired.
Figure 3-6. Single Sync/Single Ethernet
## Table 3-6. 5410 Single Sync/Single Ethernet Settings (PN 102296)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S11</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM</td>
<td>Not configurable</td>
<td>S3</td>
<td>Balanced signal for RS-422, X.21</td>
<td></td>
<td>S11</td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
<td>Chassis ground connection for unused pins on J1</td>
<td>Not configurable</td>
<td>S12</td>
</tr>
<tr>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28 V.35</td>
<td>S7, S8</td>
<td>Installation of V.35 daughter-board</td>
<td>Not configurable</td>
<td>S14, S15</td>
</tr>
<tr>
<td></td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S7, S8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-7. Dual Sync/Single Ethernet
### Table 3-7. 5420 Dual Sync/Single Ethernet Settings (PN 102293)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM</td>
<td>Not configurable</td>
<td>S3</td>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S11</td>
</tr>
<tr>
<td></td>
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<td>A</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
<td></td>
<td>Not configurable</td>
<td>S12</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S7, S8</td>
<td>Installation of V.35 daughter-board</td>
<td>V.35 daughter-board not installed</td>
<td>S14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S15</td>
</tr>
<tr>
<td></td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S7, S8</td>
<td></td>
<td>V.35 daughter-board installed</td>
<td>S14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S15</td>
</tr>
<tr>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>
Figure 3-8. Dual Sync/Dual Ethernet
### Table 3-8. 5430 Dual Sync/Dual Ethernet Settings (PN 102279)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S11</td>
</tr>
<tr>
<td>option</td>
<td></td>
<td></td>
<td></td>
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<td>A</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Address line for 32-</td>
<td>Not configurable</td>
<td>S3</td>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S11</td>
</tr>
<tr>
<td>pin EPROM</td>
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<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Power for 28-pin</td>
<td>Not configurable</td>
<td>S4</td>
<td>Chassis ground</td>
<td>Not configurable</td>
<td>S12</td>
</tr>
<tr>
<td>EPROM</td>
<td></td>
<td></td>
<td>connection for</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>unused pins on J1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface Voltage ±5</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S7</td>
<td>Chassis ground</td>
<td>Not configurable</td>
<td>S13</td>
</tr>
<tr>
<td>or ±12</td>
<td></td>
<td>S8</td>
<td>connection for</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>unused pins on J2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S7</td>
<td>Installation of V.35</td>
<td>V.35 daughter-board not installed</td>
<td>S14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S8</td>
<td>daughter-board</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10</td>
<td>V.35 daughter-board</td>
<td>V.35 daughter-board installed</td>
<td>S14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5450 Quad Ethernet Link Module (PN 102690)

Figure 3-9. Quad Ethernet
### Table 3-9. 5450 Quad Ethernet Settings (PN 102690)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daughterboard</td>
<td>Daughterboard not installed <em>(not customer-configurable)</em></td>
<td>S2  S17  S18  S19  S20</td>
</tr>
<tr>
<td>Note: The jumpers are in separate locations on the board.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daughterboard</td>
<td>Daughterboard installed <em>(not customer-configurable)</em></td>
<td>S2  S17  S18  S19  S20</td>
</tr>
<tr>
<td>512 K EPROM</td>
<td><em>(not configurable)</em></td>
<td>S3  S4</td>
</tr>
</tbody>
</table>
Figure 3-10. Dual Ethernet High Speed Filters
### Table 3-10. 5505 Dual Ethernet High Speed Filters Settings (PN 102495)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td><img src="image" alt="Jumper" /></td>
</tr>
<tr>
<td>Address line for 32-pin EPROM</td>
<td>Not configurable</td>
<td><img src="image" alt="Jumper" /></td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td><img src="image" alt="Jumper" /></td>
</tr>
<tr>
<td>2 cams installed</td>
<td>Not configurable</td>
<td><img src="image" alt="Jumper" /></td>
</tr>
<tr>
<td>Chassis ground connection for unused pins on J1</td>
<td>Not configurable</td>
<td><img src="image" alt="Jumper" /></td>
</tr>
<tr>
<td>Chassis ground connection for unused pins on J2</td>
<td>Not configurable</td>
<td><img src="image" alt="Jumper" /></td>
</tr>
</tbody>
</table>

**Note:** The S7, S8, S10, and S11 pins have no function on this board, and may or may not be installed.
Figure 3-11. Dual Sync/Dual Ethernet High Speed Filters
### Table 3-11. 5530 Dual Sync/Dual Ethernet High Speed Filters Settings (PN 102494)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM</td>
<td>Not configurable</td>
<td>S3</td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10 A E</td>
<td></td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S11 A E</td>
</tr>
<tr>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S7 S8</td>
<td>Balanced signal for RS-422, X.21</td>
<td>S11 A E</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S7 S8</td>
<td>Chassis ground connection for unused pins on J1</td>
<td>S12 A B</td>
<td></td>
</tr>
<tr>
<td>2 cams installed</td>
<td>Not configurable</td>
<td>S9</td>
<td>Chassis ground connection for unused pins on J2</td>
<td>S13 A B</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-12. Single Token
### Table 3-12. 5705 Single Token Settings (PN 102484)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM at U39</td>
<td>Not configurable</td>
<td>S3</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at U39</td>
<td>Not configurable</td>
<td>S4</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at 50</td>
<td>Not configurable</td>
<td>S5</td>
</tr>
<tr>
<td>Reserved for future use</td>
<td>Not configurable</td>
<td>S7</td>
</tr>
<tr>
<td>Reserved for future use</td>
<td>Not configurable</td>
<td>S8</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM at U50</td>
<td>Not configurable</td>
<td>S16</td>
</tr>
</tbody>
</table>
Figure 3-13. Dual Token
### Table 3-13. 5710 Dual Token Settings (PN 103366)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Option</td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td>Address line for diagnostic EPROM at U8</td>
<td>Not configurable</td>
<td>S2</td>
</tr>
<tr>
<td>Power for diagnostic EPROM at U8</td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td>Power for BUD/MAC EPROM at U11</td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td>Address line for BUD/MAC EPROM at U11</td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td>Reserved for future use</td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td>Reserved for future use</td>
<td>Not configurable</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-14. Single Sync/Single Token
### Table 3-14. 5720 Single Sync/Single Token Settings (PN 102483)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM at U39</td>
<td>Not configurable</td>
<td>S3</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at U39</td>
<td>Not configurable</td>
<td>S4</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at U50</td>
<td>Not configurable</td>
<td>S5</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM at U50</td>
<td>Not configurable</td>
<td>S16</td>
</tr>
<tr>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S7, S8</td>
</tr>
<tr>
<td></td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S7, S8</td>
</tr>
<tr>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10 A, S10 E</td>
</tr>
<tr>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10 A, S10 E</td>
</tr>
</tbody>
</table>
5740 Dual Sync/Single Token Link Module (DST-4, PN 101988)

Figure 3-15. Dual Sync/Single Token (DST-4)
### Table 3-15. 5740 Dual/Sync Single Token Settings (DST-4, PN 101988)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S7</td>
</tr>
<tr>
<td>32-bit EPROM option at V36</td>
<td>Not configurable</td>
<td>S3</td>
<td>Balanced signal for RS-422, X.21</td>
<td>S7</td>
<td></td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S8, S9</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at U48</td>
<td>Not configurable</td>
<td>S5</td>
<td>±5 for RS-422, RS-423, X.21</td>
<td>S8, S9</td>
<td></td>
</tr>
<tr>
<td>32-bit EPROM option at U48</td>
<td>Not configurable</td>
<td>S6</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10, E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10, E</td>
</tr>
</tbody>
</table>
5740 Dual Sync/Single Token Link Module (DST-4/16, PN 101531)

Figure 3-16. Dual Sync/Single Token (DST-4/16)
### Table 3-16. 5740 Dual Sync/Single Token Settings (DST-4/16, PN 101531)

<table>
<thead>
<tr>
<th>Option</th>
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<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S7</td>
</tr>
<tr>
<td>32-bit EPROM option at V36</td>
<td>Not configurable</td>
<td>S3</td>
<td>Balanced signal for RS-422, X.21</td>
<td></td>
<td>S7</td>
</tr>
<tr>
<td>Power for 28-pin EPROM</td>
<td>Not configurable</td>
<td>S4</td>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S8 S9</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at U48</td>
<td>Not configurable</td>
<td>S5</td>
<td>±5 for RS-422, RS-423, X.21</td>
<td></td>
<td>S8 S9</td>
</tr>
<tr>
<td>32-bit EPROM option at U48</td>
<td>Not configurable</td>
<td>S6</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td>S10 A</td>
</tr>
</tbody>
</table>
Figure 3-17. Dual Sync/Single Token (TS416 1X2)
### Table 3-17. 5740 Dual Sync/Single Token Settings (TS416 1X2, PN 102482)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model ID and board option</td>
<td>Not configurable</td>
<td>S2</td>
<td>Interface Voltage ±5 or ±12</td>
<td>±12 for RS-232, V.28, V.35</td>
<td>S7, S8</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM at U39</td>
<td>Not configurable</td>
<td>S3</td>
<td>±5 for RS-422, RS-423, X.21</td>
<td></td>
<td>S7</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at U39</td>
<td>Not configurable</td>
<td>S4</td>
<td>Com port 1</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S10</td>
</tr>
<tr>
<td>Power for 28-pin EPROM at 50</td>
<td>Not configurable</td>
<td>S5</td>
<td>Balanced signal for RS-422, X.21</td>
<td></td>
<td>S10</td>
</tr>
<tr>
<td>Address line for 32-pin EPROM at U50</td>
<td>Not configurable</td>
<td>S16</td>
<td>Com port 2</td>
<td>Unbalanced signal for RS-232, RS-423, V.28</td>
<td>S11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Balanced signal for RS-422, X.21</td>
<td></td>
</tr>
</tbody>
</table>
5930 FDDI Multimode Link Module (PN 102675) and 4995 Daughterboard (PN 103269)

Figure 3-18. FDDI Multimode
Table 3-18. 5930 FDDI Multimode Settings (PN 102675)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Not configurable</td>
<td>S2</td>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S5</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S3</td>
<td>Clock select</td>
<td>Not configurable</td>
<td>S6</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S4</td>
<td>Future compatibility</td>
<td>Not configurable</td>
<td>S7</td>
</tr>
</tbody>
</table>

Figure 3-19. FDDI Daughterboard

The FDDI Daughterboard does not have user-configurable jumpers or switches.
Figure 3-20. FDDI Single Mode
Table 3-19. 5940 FDDI Single Mode Settings (PN 103755)

<table>
<thead>
<tr>
<th>Option</th>
<th>Setting</th>
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<th>Option</th>
<th>Setting</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Not configurable</td>
<td>S2</td>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S5</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S3</td>
<td>Clock select</td>
<td>Not configurable</td>
<td>S6</td>
</tr>
<tr>
<td>PROM Configuration</td>
<td>Not configurable</td>
<td>S4</td>
<td>Future compatibility</td>
<td>Not configurable</td>
<td>S7</td>
</tr>
</tbody>
</table>

Figure 3-21. FDDI Daughterboard

The FDDI Daughterboard does not have user-configurable jumpers or switches.
Figure 3-22. SRM-Link

Note: This board does not contain jumpers or switches.
75010 System Resource Module-Front (PN 103985)

Figure 3-23. SRM-Front

Note: This board does not contain jumpers or switches.
Figure 3-24. FRE and Daughterboard

Note: This board does not contain jumpers or switches.
Chapter 4

Switches and LEDs

About this Chapter ................................................................. 4-1
Front Panel ................................................................. 4-2
Rear Panel ................................................................. 4-4
  SRM-L LEDs ......................................................... 4-4
  E1 and T1 LEDs .................................................. 4-5
  Ethernet LEDs ..................................................... 4-6
  FDDI LEDs ......................................................... 4-7
  HSSI LEDs ......................................................... 4-9
  Sync LEDs .......................................................... 4-10
  Token Ring LEDs .............................................. 4-11
  BCN 620 Watt Hot Swap Power Module LED .......... 4-12
SRM-F and FRE Modules .................................................. 4-13
  SRM-F Switch and LEDs .................................. 4-13
  FRE Module Switch and LEDs ......................... 4-14
List of Figures

Figure 4-1. Front Panel LEDs ................................................................. 4-2
Figure 4-2. SRM-L Connector Panel ....................................................... 4-4
Figure 4-3. FDDI LEDs ........................................................................... 4-7
Figure 4-4. HSSI LEDs ........................................................................... 4-9
Figure 4-5. Token Ring LEDs ............................................................... 4-11
Figure 4-6. 620 Watt Hot Swap Power Module Power OK LED .......... 4-12
Figure 4-7. SRM-F LEDs ...................................................................... 4-13
Figure 4-8. FRE Module LEDs ............................................................. .4-14

List of Tables

Table 4-1. FDDI L1, L2, and L3 LEDs ...................................................4-7
Table 4-2. FDDI S and P LEDs............................................................. 4-8
Table 4-3. FRE Module Diagnostic Codes ...........................................4-16
Switches and LEDs

About this Chapter

This chapter describes the function of every switch and Light Emitting Diode (LED) on the BN.

The BN is equipped with switches and LEDs on the front panel and the rear panel. Also, the front edge of each FRE module inside the BN is equipped with LEDs for diagnostic purposes and a Flash memory card ejector button.
This section describes the function of the Reset switch and the LEDs on the front panel of the BN (see Figure 4-1).

Indicates power On/Off
Indicates router software is executing
Indicates one or more slots are booting
Indicates a diagnostic test is executing or node failure
Initializes (boots) the system

Figure 4-1. Front Panel LEDs

The front panel displays the following switch and LEDs:

The Reset switch warm-starts the router. It is equivalent to issuing the `boot` command from the Site Manager or the TI. Refer to the Operations Guide for a description of the warm-start procedure.

The Power LED indicates that the power supply voltages are within normal limits.
The Diag LED indicates that a diagnostic test is in progress on one or more slots. Diagnostic testing occurs when you cold-start the router. You cold-start the router when you power-cycle it or issue the diags command from the TI. Diagnostic testing takes one to two minutes. If a Token Ring Link Module is attached to a FRE, the diagnostic test for that slot takes about four minutes. The DAIG LED turns off when the testing terminates successfully.

When lit on a BCN, the DIAG LED may also indicate a fan failure. If a fan failure has occurred, refer to the chapter *Hot Swapping the Hardware* to hot swap the fan tray. You can verify whether the problem is a fan failure by doing one of the following:

- View the event messages generated by the GAME operating system. Event messages will report System fan module failure... and System temperature has risen into cautionary range.

- Remove the RFI shield to view the FRE module LEDs. If the DIAG LED on the front panel of the BCN is lit, and LEDs F and 8 on all FRE modules are not lit, a fan failure has occurred. Refer to the section *FRE Module* in this chapter to identify LEDs F and 8.

The Boot LED indicates that one or more slots are booting.

The Run LED indicates that one or more slots are executing system software.

The POWER and RUN LEDs remain lit when the BN is operating normally.
Rear Panel

The sections that follow describe the switches and LEDs on the Link Modules. You can see these switches and LEDs on the rear panel of the Wellfleet router. The Power OK LED on each of the 620 Watt Hot Swap Power Modules inserted in the rear panel of the BCN is also described.

SRM-L LEDs

The SRM-L is installed in the bottom slot (slot 1) on the rear panel of the BN (see Figure 4-2).

The LEDs on the SRM-L indicate the following:

- When the 12V 1 LED is not lit, the F7 fuse is blown in the BLN, or the F9 fuse is blown in the BCN. (Refer to Replacing Specialized Fuses in the appendix Replacing Fuses.)
- When the 12V 2 LED is not lit, the F6 fuse is blown in the BLN, or the F12 fuse is blown in the BCN. (Refer to Replacing Specialized Fuses in the appendix Replacing Fuses.)
- VCC indicates that the power supply voltages are within normal limits.
E1 and T1 LEDs

The E1 and T1 LEDs are as follows:

- **FAIL** is normally off. It lights when one of the following occurs:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the BN, issue the `diags` command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.

- **RLOS** (Receiver Frame Loss) is normally off. It lights when the received signal has at least two framing errors for every four frames.

- **RSIG** (Receiver Signal Loss) is normally off. It lights when the received signal drops below .5V, or when more than 32 zeroes are detected.

- **RYEL** (Received Yellow Alarm) or **RRA** (Received Remote Alarm) is normally off. It lights when one of the following occurs:
  - RLOS is on at the remote end
  - RSIG or RLOS is on (at the local end)
**Ethernet LEDs**

The LEDs displayed on the Ethernet Link Module connector panels depend on which Ethernet Link Modules are installed in the BN. The following list includes the LEDs that may be displayed:

- **COL** indicates a collision detection.
- **COM1** or **COM2** indicates Carrier Detect is present on the respective COM port.
- **FAIL** indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the BN, issue the `diags` command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.

**RCVR**, **RCVR1**, or **RCVR2** indicates data is being received by the respective port.

**RLSD1** indicates Carrier Detect is present.

**XCVR1** or **XCVR2** indicates Ethernet traffic is present (either transmitting or receiving) on the respective port.

**XMIT** indicates data is being transmitted by the respective port.
FDDI LEDs

Figure 4-3 shows the LEDs on the FDDI Multimode Link Module.

![FDDI LEDs Diagram]

The groups of LEDs labeled A and B indicate the status of physical connectors A and B as follows:

- The yellow LED labeled SD indicates the detection of an incoming signal.
- The green LED labeled TX indicates that the FDDI is transmitting across the interface.
- The red LEDs labeled L1, L2, and L3 indicate the line state. Table 4-1 shows the L1, L2, and L3 codes.

Table 4-1. FDDI L1, L2, and L3 LEDs

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Line State (LS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Idle 16 (ILS16)</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Halt (HLS)</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>Master (MLS)</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Quiet (QLS)</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Idle 4 (ILS4)</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Reserved</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Active (ALS)</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Noise</td>
</tr>
</tbody>
</table>
The S (Secondary) and P (Primary) LEDs light only when an optional FDDI Dual Switch Module is cabled to the BYPASS connector on the FDDI display panel and is in OPERATE mode. (The switch is in OPERATE mode during normal FDDI Link Module operation.)

The S and P LEDs turn off when the FDDI Dual Switch Module bypasses the physical connectors A and B and redirects the incoming and outgoing signals to its own connectors. This occurs whenever:

- The router is powered off.
- The router is reset.
- The FDDI circuit is disabled.

Table 4-2 summarizes the S and P LED codes.

<table>
<thead>
<tr>
<th>S and P LEDs</th>
<th>Router Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Router is present on the FDDI ring.</td>
</tr>
<tr>
<td>Off</td>
<td>Router is bypassed (absent) from the FDDI ring.</td>
</tr>
</tbody>
</table>

The FAIL LED lights when the FDDI Link Module fails power-up diagnostics.
HSSI LEDs

This section identifies the LEDs on the High Speed Serial Interface (HSSI) Link Modules.

Figure 4-4 shows the LEDs on the HSSI Link Module.

![HSSI LEDs diagram]

**Figure 4-4. HSSI LEDs**

The HSSI LEDs are as follows:

- The green LED labeled CA indicates the DSU is active and ready to receive or transmit data.
- The green LED labeled TA indicates that the router is active and ready to receive or transmit data.
- The red LED labeled FAIL indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the Wellfleet router, issue the **diags** command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
Sync LEDs

The LEDs displayed on the Sync Link Module connector panels depend on which Sync Link Modules are installed in the BN. The following list includes the LEDs that may be displayed:

- RLSD1, 2, 3, or 4; or COM indicates Carrier Detect is present on the respective port. RLSD stands for Received Line Signal Detect.

- FAIL indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the BN, issue the `diags` command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.

  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
Token Ring LEDs

This section identifies the LEDs on the Token Ring Link Modules. Figure 4-5 shows the LEDs on the Dual Token Ring Link Module.

Figure 4-5. Token Ring LEDs

The Token Ring LEDs assist in monitoring receive and transmit activities across a Token Ring connection. The LEDs are as follows:

- The green LED labeled RCVR indicates that data is being received across the Token Ring connection.
- The green LED labeled NSRT indicates the node is inserted into the Token Ring connection.
- The red LED labeled WFAIL indicates a wire fault on either receive or transmit.
- The red LED labeled FAIL indicates one of the following:
  - Diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the slot. You cold-start the slot when you power-cycle the Wellfleet router, issue the `diags` command from the TI, or perform a hot swap of the Link Module. This LED blinks three times and goes out when the diagnostic testing terminates successfully.
  - Power-up diagnostic testing failed and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
  - A catastrophic failure due to a hardware problem on the Link Module occurred and the Link Module is waiting for an automatic attempt to reinitiate diagnostic testing. If the FAIL LED lights again, please call Wellfleet Customer Service.
BCN 620 Watt Hot Swap Power Module LED

This section describes the function of the green Power OK LED on each of the 620 Watt Hot Swap Power Modules inserted in the rear panel of the BCN. Figure 4-6 shows the LED on a Hot Swap Power Module.

![Power OK LED Diagram]

Figure 4-6. 620 Watt Hot Swap Power Module Power OK LED

The Power OK LED indicates that the BCN is powered on, and that the Hot Swap Power Module is fully engaged and operational.
**SRM-F and FRE Modules**

Use the SRM-F and FRE module LEDs for troubleshooting only. You remove the front bezel and the RFI shield to view the LEDs (refer to the chapter *Accessing the Interior* for instructions).

**SRM-F Switch and LEDs**

The front edge of the SRM-F module in slot 1 inside the BN is equipped with two LEDs. A power switch may also be included (see Figure 4-7).

![Power Switch Diagram](image)

**Figure 4-7. SRM-F LEDs**

**Note:** The power switch is installed on some SRM-F modules.

The power switch powers on the SRM-F when you switch it to the right and powers off the SRM-F when you switch it to the left.

LED A, when lit, indicates the board is held in reset due to a catastrophic hardware failure.

LED B, when lit, indicates 5 Volts are available to the SRM-F.
**FRE Module Switch and LEDs**

The front edge of each FRE module inside the BN is equipped with LEDs, an HDCM (Harpoon Diagnostic Console Monitor) button, and a Flash Card Ejector (see Figure 4-8). A power switch is included on some FRE modules.

![Figure 4-8. FRE Module LEDs](image)

LEDs 1 through 9 and the HDCM button are located on the daughter board.

LEDs 1-8 indicate the following during diagnostic testing. (Diagnostic testing occurs during a cold-start (power-cycle or TI `diags` command.)

1 to 7 Diagnostic test number executing. The diagnostic test number is represented in hexadecimal notation. Lighted LEDs indicate 1's; darkened LEDs indicate 0's.

8 Diagnostic testing is in progress.

LEDs 1-8 indicate the following when LED F is also lit. (When LED F is lit, the Gate Access Management Entity [GAME] operating system is executing.)

1 to 6 Least significant digits of the second counter expressed in binary. The counter is updated each second. (During a boot, these LEDs flicker rapidly.)

7 Slot is running TI. (Only one slot runs the TI at a time.)

8 FRE module is booting (or resetting) and PROM read/write protection is disabled. This LED also lights during the
execution of the TI prom-w (write) command, which is issued to update a PROM.

LED 9 lights whenever a reset is sent to the CPU.

The HDCM button has three functions:

- Cold-starts the FRE module when you press it for more than one second and release it (regardless of the session).
- Establishes an HDCM session when pressed for less than one second and released. The HDCM is for Wellfleet Customer Service only.
- Warm-starts the FRE module when an HDCM session is established and you press it for less than one second and release it.

The LEDs A through P, the power switch, and Flash Card Ejector are located on the mother board.

The mother board LEDs indicate the following when lit:

- **A** The backbone is held in reset due to a hardware or software error. This LED also flashes briefly when the FRE is reinitialized or reset.
- **B** The backbone DMA logic is accessing the DRAM.
- **C, D** These LEDs display a code which reveals the diagnostic test under execution (see Table 4-3).
- **E** Diagnostics code execution is in progress.
- **F** The GAME operating system is executing.
- **G** The CPU is accessing the DRAM.
- **H** Hardware is resetting.
- **I** The FRE module is transmitting on Backbone A.
- **J** The FRE module is transmitting on Backbone B.
- **K** The FRE module is transmitting on Backbone C.
- **L** The FRE module is transmitting on Backbone D.
- **M** Backbone A is asserting flow control.

Hardware Maintenance Guide (Rev. B) 4-15
N  Backbone B is asserting flow control.
O  Backbone C is asserting flow control.
P  Backbone D is asserting flow control.

The power switch powers on the FRE module when you switch it to the right and powers off the FRE module when you switch it to the left. The power switch is installed on some FRE modules.

The Flash Card Ejector disconnects the Flash card.

Table 4-3. FRE Module Diagnostic Codes

<table>
<thead>
<tr>
<th>C LED</th>
<th>D LED</th>
<th>E LED</th>
<th>Diagnostic Test in Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>on</td>
<td>on</td>
<td>on</td>
<td>CPU</td>
</tr>
<tr>
<td>off</td>
<td>on</td>
<td>on</td>
<td>Backbone</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
<td>on</td>
<td>Link Module</td>
</tr>
<tr>
<td>off</td>
<td>off</td>
<td>on</td>
<td>HDCM (Harpoon Diagnostic Console Monitor)</td>
</tr>
</tbody>
</table>
Appendix A

Replacing Fuses

About this Appendix ................................................................. A-1
Replacing Fuses in the BLN .......................................................... A-2
Replacing Fuses in the BCN .......................................................... A-9
List of Figures

Figure A-1. Removing the Fuse Access Panel from the BLN .......... A-3
Figure A-2. Connecting the Antistatic Strap to the BLN Chassis .... A-4
Figure A-3. Disconnecting the Back of the Fuse Access Panel on the BLN ................................................................. A-5
Figure A-4. Location of Specialized Fuses in the BLN ............... A-5
Figure A-5. Specialized Fuse (New) ......................................... A-6
Figure A-6. Removing the Fuse Access Panel from the BCN ...... A-10
Figure A-7. Location of Specialized Fuses in the BCN ............... A-11
Figure A-8. Specialized Fuse (New) ......................................... A-11

List of Tables

Table A-1. BLN Fuses ............................................................. A-7
Table A-2. BCN Fuses ............................................................. A-12
Replacing Fuses

About this Appendix

This appendix describes how to inspect and replace specialized fuses in the BLN and BCN. It is divided into two sections: Replacing Fuses in the BLN and Replacing Fuses in the BCN.

The following warning applies to the BLN and BCN.

⚠️ Danger - High Energy
Due to high-energy hazards, all procedures described in this chapter are to be performed by service personnel only.

⚠️ Service Personnel
Service personnel are required to have experience installing and servicing Wellfleet network hardware, and have training in taking precautions to minimize danger to themselves and others while performing a task inside a hazardous service access area.

The BLN is equipped with a power supply fuse to protect the power supply from excessive current. If the BLN will not power on, contact Wellfleet Customer Support. (This document does not provide instructions for replacing the power supply fuse.)
The BCN is equipped with a circuit breaker to protect the power supply from excessive current. If the BLN has an AC power supply, but will not power on, contact Wellfleet Customer Support. (This document does not provide instructions for replacing the power supply fuse.)

Replacing Fuses in the BLN

The BLN is equipped with eight fuses to protect individual slots, the Ethernet ports, and the SRM-L Console port. Refer to the instructions in this section if the Slot disconnected or Backbone disconnected event message is displayed on the log and one of the following occurs:

- All LEDs on a Link Module connector panel are not lit.
- The CR2 or CR3 LED on the SRM-L connector panel is not lit.
- The LEDs on a FRE module are not lit. (Refer to the chapter Accessing the Interior to remove the front bezel and RFI shield to view the FRE module LEDs. Then replace the RFI shield.)

The specialized fuses are located behind the fuse access panel, the metal panel where the Reset switch is mounted (see Figure A-1).

**Warning:** Electrostatic discharge can damage hardware. You must attach the antistatic strap to your wrist and connect it to the chassis behind the fuse access panel before you handle BLN components (refer to the instructions that follow.)

Remove the fuse access panel as follows:

1. Power down the BLN and disconnect the plug from the power receptacle.
2. Refer to the chapter Accessing the Interior to remove the front bezel.
3. Remove the antistatic strap, alligator clip, and fuse puller from the pouch attached to the back of the front bezel.
4. Insert the end of the antistatic strap into the hole in the alligator clip.

5. Insert your (left) hand inside the band at one end of the antistatic strap.

   Ensure the metal buckle inside the band is in contact with your skin. (Swing open the metal buckle to adjust the strap to form a snug fit if necessary).

   You connect the other end of the wrist strap after you remove the fuse access panel.

6. Use a Phillips screwdriver to remove the screws that secure the fuse access panel to the chassis (see Figure A-1).

   **Note:** Hold the fuse access panel in place several inches away from the chassis to avoid pulling the wires that connect the back of the panel to the BLN.

![Fuse Access Panel Diagram]

7. Connect the alligator clip on the other end of the antistatic strap to the chassis behind the fuse access panel (see Figure A-2).
8. Lift the ejectors behind the fuse access panel (see Figure A-3). The ejectors connect the component behind the fuse access panel to a ribbon cable connector.

9. Slide the component to the right to disconnect it.

**Note:** The red line on the ribbon cable connector aligns with the arrow on the connector attached to the back of the fuse access panel.
Replacing Fuses

Figure A-3. Disconnecting the Back of the Fuse Access Panel on the BLN

10. Remove the fuse access panel.

The specialized fuses are inserted in fuse connectors mounted on a vertical plane inside the BLN (see Figure A-4). Each fuse connector is labeled with a fuse (F) number. Refer to Table A-1 to determine which fuse to replace.

Figure A-4. Location of Specialized Fuses in the BLN
To remove a fuse, push the forked edge of the fuse puller over the fuse until it locks into place and pull it toward you.

Replace the fuse with a new one if the fuse is smoked or the loop between the two sides of the fuse is broken (see Figure A-5).

Figure A-5. Specialized Fuse (New)

To install a fuse, insert and push it into the fuse connector.

Replace the BLN hardware components as follows:

1. Hold the fuse access panel several inches away from the chassis.
2. Align the red line on the ribbon cable connector with the arrow on the connector attached to the back of the fuse access panel.
3. Close the ejectors to secure the connection.
4. Disconnect the wrist strap from the chassis.
5. Insert and tighten the screws that fasten the fuse access panel to the chassis.
6. Replace the front bezel (refer to the chapter Accessing the Interior for instructions).
# Table A-1. BLN Fuses

<table>
<thead>
<tr>
<th>Fuse ID</th>
<th>Fuse Part No.</th>
<th>Amperage (Voltage)</th>
<th>Function</th>
<th>Physical Indicators</th>
<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 1 SRM-F</td>
<td>All SRM-F LEDs are off.</td>
<td>GAME: Backbones 0 and 1 became disconnected</td>
</tr>
<tr>
<td>F2</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 1 SRM-L, Slot 2 Link Module, and FRE</td>
<td>All FRE and Link Module LEDs in slot 2 are off.</td>
<td>GAME: Backbones 2 and 3 became disconnected</td>
</tr>
<tr>
<td>F3</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 3 Link Module and FRE</td>
<td>All FRE and Link Module LEDs in 3 are off.</td>
<td>GAME: Slot 3 became disconnected</td>
</tr>
<tr>
<td>F4</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 4 Link Module and FRE</td>
<td>All FRE and Link Module LEDs in slot 4 are off.</td>
<td>GAME: Slot 4 became disconnected</td>
</tr>
<tr>
<td>F5</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 5 Link Module and FRE</td>
<td>All FRE and Link Module LEDs in slot 5 are off.</td>
<td>GAME: Slot 5 became disconnected</td>
</tr>
<tr>
<td>F6</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Ethernet ports on Slots 4 and 5</td>
<td>All FRE Module LEDs in slots 4 and 5 and the SRM-L 12V 2 LED in slot 1 are off.</td>
<td>GAME: Backbones 0 and 1 became disconnected</td>
</tr>
</tbody>
</table>

*Hardware Maintenance Guide (Rev. B) A-7*
### Table A-1. BLN Fuses

<table>
<thead>
<tr>
<th>Fuse ID</th>
<th>Fuse Part No.</th>
<th>Amperage (Voltage)</th>
<th>Function</th>
<th>Physical Indicators</th>
<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F7</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Ethernet ports on Slots 2 and 3</td>
<td>All FRE Module LEDs in slots 2 and 3 and the SRM-L 12V 1 LED in slot 1 are off.</td>
<td>GAME: Backbones 2 and 3 became disconnected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GAME: Slots 2 and 3 became disconnected</td>
</tr>
<tr>
<td>F8</td>
<td>104394</td>
<td>5 Amp (-12 Volt)</td>
<td>SRM-L (TI Console Port)</td>
<td>No response at TI console</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>F9</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Spare</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Replacing Fuses in the BCN

The BCN is equipped with fuses to protect individual slots, the SRM-F, the SRM-L, and the fan tray. Refer to the instructions in this section if the *Slot disconnected* or *Backbone disconnected* event message is displayed on the log and one of the following occurs:

- All LEDs on a Link Module connector panel are not lit.
- The CR2 or CR3 LED on the SRM-L connector panel is not lit.
- The LEDs on a FRE module are not lit. (Refer to the chapter *Accessing the Interior* to remove the front bezel and RFI shield to view the FRE module LEDs. Then replace the RFI shield.)

The specialized fuses are located behind the fuse access panel, the bottom rear panel of the BCN (see Figure A-6).

**Warning:** Electrostatic discharge can damage hardware. You must attach the antistatic strap to your wrist and connect it to the chassis before you handle BCN components (refer to the instructions that follow.)

Remove the fuse access panel as follows:

1. Power down the BCN and disconnect the plug from the power receptacle.
2. Refer to the chapter *Accessing the Interior* to remove the front bezel.
3. Remove the antistatic strap and fuse puller from the pouch attached to the back of the front bezel.
4. Insert your hand inside the band at one end of the antistatic strap and connect the other end to the antistatic receptacle on the fan tray panel, which is mounted to the front of the BCN’s chassis. (Refer to the chapter *Accessing the Interior* for details.)
5. Use a Phillips screwdriver to remove the screws that secure the fuse access panel to the chassis (see Figure A-6).
6. Remove the fuse access panel.
Replacing Fuses in the BCN

Figure A-6. Removing the Fuse Access Panel from the BCN
Replacing Fuses

The specialized fuses are inserted in fuse connectors mounted on a vertical plane inside the BCN (see Figure A-7). Each fuse connector is labeled with a fuse (F) number. Refer to Table A-2 to determine which fuse to replace.

![Figure A-7. Location of Specialized Fuses in the BCN](image)

To remove a fuse, push the forked edge of the fuse puller over the fuse until it locks into place and pull it toward you.

Replace the fuse with a new one if the fuse is smoked or the loop between the two sides of the fuse is broken (see Figure A-8).

![Figure A-8. Specialized Fuse (New)](image)

To install a fuse, insert and push it into the fuse connector.
## Danger - High Energy

Be sure to replace and secure the BCN fuse access panel before powering on.

### Table A-2. BCN Fuses

<table>
<thead>
<tr>
<th>Fuse ID</th>
<th>Fuse Part No.</th>
<th>Amperage (Voltage)</th>
<th>Function</th>
<th>Physical Indicators</th>
<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 1 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 1</td>
<td>GAME: Slot 1 became disconnected</td>
</tr>
<tr>
<td>F2</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 2 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 2</td>
<td>GAME: Slot 2 became disconnected</td>
</tr>
<tr>
<td>F3</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slots 1 and 3 Link Modules and FREs</td>
<td>All FRE and Link Module LEDs are off in Slots 1 and 3</td>
<td>GAME: Slots 1 and 3 became disconnected</td>
</tr>
<tr>
<td>F4</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 3 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 3</td>
<td>GAME: Slot 3 became disconnected</td>
</tr>
<tr>
<td>F5</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 4 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 4</td>
<td>GAME: Slot 4 became disconnected</td>
</tr>
</tbody>
</table>
### Table A-2. BCN Fuses

<table>
<thead>
<tr>
<th>Fuse ID</th>
<th>Fuse Part No.</th>
<th>Amperage (Voltage)</th>
<th>Function</th>
<th>Physical Indicators</th>
<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slots 2 and 4 Link Modules and FREs</td>
<td>All FRE and Link Module LEDs are off in Slots 2 and 4</td>
<td>GAME: Slots 2 and 4 became disconnected</td>
</tr>
<tr>
<td>F7</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 5 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 5</td>
<td>GAME: Slot 5 became disconnected</td>
</tr>
<tr>
<td>F8</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 6 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 6.</td>
<td>GAME: Slot 6 became disconnected</td>
</tr>
<tr>
<td>F9</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slots 5 and 8 FREs and SRM-L</td>
<td>All FRE and Link Module LEDs are off in Slots 5 and 8, and all SRM-L LEDs are off.</td>
<td>GAME: Backbones 2 and 3 became disconnected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GAME: Slots 5 and 8 became disconnected</td>
</tr>
<tr>
<td>F10</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>SRM-F</td>
<td>All SRM-F LEDs are off.</td>
<td>GAME: Backbones 0 and 1 became disconnected</td>
</tr>
<tr>
<td>F11</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 8 Link Module, FRE, and SRM-L</td>
<td>All FRE and Link Module LEDs are off in Slot 8, and all SRM-L LEDs are off.</td>
<td>GAME: Backbones 2 and 3 became disconnected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GAME: Slot 8 became disconnected</td>
</tr>
</tbody>
</table>
### Table A-2. BCN Fuses

<table>
<thead>
<tr>
<th>Fuse ID</th>
<th>Fuse Part No.</th>
<th>Amperage (Voltage)</th>
<th>Function</th>
<th>Physical Indicators</th>
<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F12</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slots 6 and 9 Link Modules, FREs, and SRM-F</td>
<td>All FRE and Link Module LEDs are off in Slots 6 and 9, and all SRM-F LEDs are off.</td>
<td>GAME: Backbones 0 and 1 became disconnected</td>
</tr>
<tr>
<td>F13</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 9 Link Module, FRE, and BCN fan tray</td>
<td>All FRE and Link Module LEDs are off in Slot 9, and all front panel LEDs are off.</td>
<td>GAME: System fan module failure, one or more fans not operating properly</td>
</tr>
<tr>
<td>F14</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 10 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 10.</td>
<td>GAME: Slot 10 became disconnected</td>
</tr>
<tr>
<td>F15</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slots 10 and 12 Link Modules and FREs</td>
<td>All FRE and Link Module LEDs are off in Slots 10 and 12</td>
<td>GAME: Slots 10 and 12 became disconnected</td>
</tr>
<tr>
<td>F16</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 11 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 11.</td>
<td>GAME: Slot 11 became disconnected</td>
</tr>
</tbody>
</table>
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<tr>
<th>Fuse ID</th>
<th>Fuse Part No.</th>
<th>Amperage (Voltage)</th>
<th>Function</th>
<th>Physical Indicators</th>
<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F17</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 12 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 12</td>
<td>GAME: Slot 12 became disconnected</td>
</tr>
<tr>
<td>F18</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slots 11 and 13 Link Modules and FREs</td>
<td>All FRE and Link Module LEDs are off in Slots 11 and 13</td>
<td>GAME: Slots 11 and 13 became disconnected</td>
</tr>
<tr>
<td>F19</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 13 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 13</td>
<td>GAME: Slot 13 became disconnected</td>
</tr>
<tr>
<td>F20</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Slot 14 Link Module, FRE, and BCN fan tray</td>
<td>All FRE and Link Module LEDs are off in Slot 14, and all front panel LEDs are off.</td>
<td>GAME: System fan module failure, one or more fans not operating properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GAME: System temperature has risen into cautionary range</td>
</tr>
<tr>
<td>F21</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Slot 14 Link Module and FRE</td>
<td>All FRE and Link Module LEDs are off in Slot 14</td>
<td>GAME: Slot 14 became disconnected</td>
</tr>
<tr>
<td>Fuse ID</td>
<td>Fuse Part No.</td>
<td>Amperage (Voltage)</td>
<td>Function</td>
<td>Physical Indicators</td>
<td>Event Messages</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>--------------------</td>
<td>----------</td>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>F22</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Reserved for future use. If fuse is blown, disregard.</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>F23</td>
<td>104395</td>
<td>7.5 Amp (+12 Volt)</td>
<td>Reserved for future use. If fuse is blown, disregard.</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>F24</td>
<td>103541</td>
<td>25 Amp (+5 Volt)</td>
<td>Spare</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>F25</td>
<td>104394</td>
<td>5 Amp (-12 Volt)</td>
<td>Sync Connectors in Slots 2, 4, 6, 9, 11, and 13</td>
<td>Not Applicable</td>
<td>Sync : Connector COM &lt;no.&gt; : can’t run BOFL with chosen WAN protocol. Sync : Connector COM &lt;no.&gt; LLC&lt;1_or_2&gt; service withdrawn. Sync : System error, service attempting restart.</td>
</tr>
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<table>
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<tr>
<th>Fuse ID</th>
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<th>Event Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>F26</td>
<td>104394</td>
<td>5 Amp (-12 Volt)</td>
<td>Sync Connectors in Slots 1, 3, 5, 8, 10, 12, and 14; and SRM-L (TI) Console Port</td>
<td>No response at TI console</td>
<td>Sync: Connector COM &lt;no.&gt;: can’t run BOFL with chosen WAN protocol. Sync: Connector COM &lt;no.&gt; LLC&lt;1_or_2&gt; service withdrawn. Sync: System error, service attempting restart.</td>
</tr>
</tbody>
</table>
Numerics

12V SRM-Link LEDs 4-4
4995 FDDI Daughterboard for Multimode Link Module 3-39
4995 FDDI Daughterboard for Single Mode Link Module 3-41
5201 Dual Port T1 Link Module 3-2
5250 Dual Port E1 Link Module 3-4
5280 Quad Port Sync Link Module 3-6
5290 Single HSSI Link Module 3-10
5405 Dual Ethernet Link Module 3-12
5410 Single Sync/Single Ethernet Link Module 3-14
5420 Dual Sync/Single Ethernet Link Module 3-16
5430 Dual Sync/Dual Ethernet Link Module 3-18
5450 Quad Ethernet Link 3-20
5505 Dual Ethernet High Speed Filters Link Module 3-22
5530 Dual Sync/Dual Ethernet High Speed Filters Link Module 3-24
5705 Single Token Link Module 3-26
5710 Dual Token Link Module 3-28
5720 Single Sync/Single Token Link Module 3-30
5740 Dual Sync/Single Token (DST-4) Link Module 3-32
5740 Dual Sync/Single Token (DST-4/16) Link Module 3-34
5740 Dual Sync/Single Token (TS416 1X2) Link Module 3-36
5930 FDDI Multimode Link Module 3-38
5940 FDDI Single Mode Link Module 3-40
75000 System Resource Module-Link 3-42
75010 System Resource Module-Front 3-43
75150 Fast Routing Engine 3-44

A

A FDDI Multimode Link LED 4-7
antistatic wrist strap
instructions 1-4
location 1-4

B

B FDDI Multimode Link LED 4-7
BOOT LED, front panel 4-3
C
CA HSSI Link LED 4-9
Carrier Detect Ethernet LED 4-6
Carrier Detect Sync LED 4-10
COL Ethernet LED 4-6
COM Ethernet LEDs 4-6
COM Sync LED 4-10

D
DIAG LED 4-3
Dual Ethernet High Speed Filters Link 5505 3-22
Dual Ethernet Link 5405 3-12
Dual Port E1 Link 5250 3-4
Dual Port T1 Link 5201 3-2
Dual Sync/Dual Ethernet High Speed Filters Link 5530 3-24
Dual Sync/Dual Ethernet Link 5430 3-18
Dual Sync/Single Ethernet Link 5420 3-16
Dual Sync/Single Token (DST-4) Link 5740 3-32
Dual Sync/Single Token (DST-4/16) Link 5740 3-34
Dual Sync/Single Token (TS416 1X2) Link 5740 3-36
Dual Token Link 5710 3-28

E
E1 Link LEDs 4-5
Ethernet Link LEDs 4-6

F
FAIL LED
- Ethernet Link 4-6
- FDDI Multimode Link 4-8
- HSSI Link 4-9
- Sync Link 4-5, 4-10
- Token Ring Link 4-11
fan tray
- replacing in the BCN 2-18
Fast Routing Engine 75150 3-44
FDDI Daughterboard 4995 for Multimode Link 3-39
FDDI Daughterboard 4995 for Single Mode Link 3-41
FDDI Multimode Link 5930 3-38
FDDI Single Mode Link 5940 3-40
Flash card
- approved vendors 2-3
- ejector button 4-15
- replacing 2-2
- system's response to installation and removal 2-2
FRE
- LEDs 4-14
- replacing 2-9
- system's response to installation and removal 2-9
front bezel, removing and installing 1-2
front panel
- switches and LEDs 4-2
fuses
- indicators, functions, and part numbers A-7, A-12
- replacing A-1
H
HDCM button 4-14
hot swap instructions 2-1 to 2-13
hot swap power module
  LED 4-12
HSSI Link LEDs 4-9

L
L1, L2, and L3 FDDI Multimode Link
  LEDs 4-7
LEDs
  BOOT 4-3
  DIAG 4-3
  E1 Link 4-5
  Ethernet Link 4-6
  FDDI Multimode Link 4-7
  FRE module 4-14
  HSSI Link 4-9
  POWER 4-2
  Power OK 4-12
  RUN 4-3
  SRM-F 4-13
  SRM-L 4-4
  Sync Link 4-10
  T1 Link 4-5
  Token Ring Link 4-11
Link Module
  replacing 2-5
  system's response to installation
  and removal 2-5

N
NSRT Token Ring Link LED 4-11

P
P FDDI Multimode Link LED 4-8
PCB boards, configuring 3-1
POWER LED, front panel 4-2
Power Module
  replacing in the BCN 2-16
  BCN's response to installation and
  removal 2-14
Power OK LED 4-12
power switch
  location of FRE and SRM-F 2-13

Q
Quad Ethernet Link 5450 3-20
Quad Port Sync Link 5280 3-6

R
RCVR Ethernet LEDs 4-6
RCVR Token Ring Link LED 4-11
rear panel switches and LEDs 4-4
Reset switch 4-2
RFI Shield, removing and installing 1-6
  RLSD1 Ethernet LED 4-6
  RLSD1 Sync LED 4-10
  RUN LED, front panel 4-3
S

S FDDI Multimode Link LED 4-8
SD FDDI Multimode Link LED 4-7
Single HSSI Link 5290 3-10
Single Sync/Single Ethernet Link 5410
  3-14
Single Sync/Single Token Link 5720
  3-30
Single Token Link 5705 3-26
SRM-F
  power switch location 2-13
  removing with SRM-L, effect on system 2-5
  replacing 2-9
  switches and LEDs 4-13
SRM-L
  removing with SRM-F, effect on system 2-5
  replacing 2-5
  switches and LEDs 4-4
Sync Link LEDs 4-10
System Resource Module-Front 75010
  3-43
System Resource Module-Link 75000
  3-42

T

T1 Link LEDs 4-5
TA HSSI Link LED 4-9
Token Ring Link LEDs 4-11
TX FDDI Multimode Link LED 4-7

V

VCC SRM-Link LED 4-4

W

WFAIL Token Ring Link LED 4-11
  wrist strap
    instructions 1-4
    location 1-4

X

XCVR LEDs 4-6
XMIT LED 4-6
Maintenance Guide  Revision B

What did you find most useful about this guide?

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What did you find least useful about this guide?

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What information that you expected or needed was missing?

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Please note any errors or ambiguities.

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