APPENDIX A

Troubleshooting the Initial Hardware Configuration

Cisco 4000 series routers are extensively tested before leaving the factory. However, if there are problems starting up your system, refer to this appendix to help identify the cause.

This appendix contains the following sections:

- Recovering Lost Passwords
- Problem Solving
- Environmental Reporting Features
- Reading Front-Panel LEDs
- Reading Network Processor Module LEDs

Use the information in this appendix to help isolate problems or rule out the router as the source of the problem. If you cannot locate the source of your problem, contact a service representative for information on how to proceed. Before you call, have the following information ready:

- Chassis type and serial number
- Maintenance agreement or warranty information
- Type of software and version number
- Date you received the new chassis
- Brief description of the problem you are having
- Brief explanation of what steps you have taken to isolate the problem

Recovering Lost Passwords

This section explains how to recover the following types of passwords:

- An enable secret password (a very secure, encrypted password). The enable secret password is available on routers running Cisco IOS Release 10.3(2) or later.
- An enable password (a less secure, nonencrypted password). The enable password is used when the enable secret password does not exist.
- A console password. The console password is used to prevent unauthorized users from attempting to change the router configuration. When a console password is set, you must provide a password to log in to the console and access the user EXEC mode.

The key to recovering a lost enable password is to set the configuration register so that the contents of NVRAM are ignored (0x142), which allows you to see your password. The enable secret password is encrypted and cannot be recovered; it must be replaced. The enable and console passwords might be encrypted or clear text.

The outline of the steps in the password recovery procedure follows:

- If you can log in to the router, enter the command **show version** to determine the existing configuration register value. If you can't log in, proceed to the next step.
- Press the Break key get to the bootstrap program prompt (ROM monitor). You might need to reload the system image by power cycling the router to accomplish this.
- Change the configuration register so the following functions are enabled: ignore Break, ignore startup configuration, and boot from Flash memory.

Note The key to recovering a lost password is to set the configuration register bit 6 (0x0040) so that the startup configuration (usually in NVRAM) is ignored. This will allow you to log in without using a password and to display the startup configuration passwords.

- Power cycle the router by turning power off and then back on.
- Log in to the router and enter the privileged EXEC mode.
- Enter the **show startup-config** command to display the passwords.

- Recover or replace the displayed passwords.
- Change the configuration register back to its original setting.

Note To recover a lost password if Break is disabled on the router, you must have physical access to the router.

Take the following steps to recover or replace a lost enable, enable secret, or console login password:

Step 1 Plan for some system downtime. The password recovery procedure requires a system reload.

Step 2 Connect a terminal to the console port on the rear panel of the router. Make sure the terminal is configured to operate at 9600 baud, 8 data bits, no parity, and 2 stop bits.

Step 3 Enter the **show version** command to display the existing configuration register value. The configuration register value is on the last line of the display. Note the configuration register value, and whether the configuration register is set to enable or disable Break.

The factory-default configuration register value is 0x2102. Notice that the third digit from the left in 0x2102 is 1, which disables Break. If the third digit is *not* 1, Break is enabled.

Step 4 If the configuration register is set to disable Break, power cycle the router. (Turn the router OFF, wait five seconds, and then turn the router ON again.) If the configuration register is set to enable Break, press the **Break** key or send a Break signal to the router and then proceed to Step 6.

Note If your computer keyboard does not have a Break key, refer to your terminal or terminal emulation software documentation for information about how to send a Break signal to the router.

Step 5 Within 60 seconds of turning ON the router, press the **Break** key or send a Break signal. The ROM monitor prompt (>) appears.

Step 6 If the router is a Cisco 4000 or Cisco 4000-M, set the configuration register to boot from Flash memory and ignore the startup configuration by entering the **o/r** command as follows:

```
> o/r 0x142
```

Proceed to Step 8.

Step 7 To set the configuration register on a Cisco 4500, Cisco 4500-M, Cisco 4700, or Cisco 4700-M use the configuration register utility by entering the **confreg** command at the ROM monitor prompt as follows:

```
rommon 1 > confreg

Configuration Summary

enabled are:
console baud: 9600
boot: image specified by the boot system command
or default to: cisco2-RSP

do you wish to change the configuration? y/n [n]: y
enable "diagnostic mode"? y/n {n]:
enable "use net in IP bcast address"? y/n [n]:
enable "load rom after netboot fails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
enable "break/abort has effect"? y/n [n]:
enable "ignore system config info"? y/n [n]: y
change console baud rate? y/n [n]:
change boot characteristics? y/n [n]:

Configuration Summary

enabled are:
console baud: 9600
ignore system config info
boot: image specified by the boot system command
or default to: cisco2-RSP

do you wish to change the configuration? y/n [n]:

You must reset or power cycle for the new config to take effect
```

Step 8 Initialize the router by entering the initialization command (**i**) for Cisco 4000 or Cisco 4000-M routers, or the **reset** command for Cisco 4500 , Cisco 4500-M, Cisco 4700, or Cisco 4700-M routers as follows:

```
> i
```

or

```
rommon 2 > reset
```

The router will initialize; the configuration register will be set to 0x142; and the router will boot the system image from Flash memory and enter the system configuration dialog (setup) as follows:

```
--- System Configuration Dialog --
```

Step 9 Enter **no** in response to the system configuration dialog prompts until the following message is displayed:

```
Press RETURN to get started!
```

Step 10 Press **Return.** The user EXEC prompt appears as follows:

```
Router>
```

Step 11 Enter the **enable** command to enter the privileged EXEC mode. Then enter the **show startup-config** command to display the passwords in the configuration file as follows:

```
Router# show startup-config
```

Step 12 Scan the configuration file display looking for the passwords (the enable passwords are usually near the beginning of the file and the console login or user EXEC password is near the end). The passwords displayed will look something like this:

```
enable secret 5 $1$ORPP$s9syZt4uKn3SnpuLDrhuei
enable password 23skiddoo
.
.
line con 0
 password onramp
```

Proceed to Step 13 to replace an enable secret, console, or enable password. If there is no enable secret password, note the enable and console passwords, if they are not encrypted, and proceed to Step 16.

Caution *Do not* take the next step unless you have determined you must change or replace the enable, enable secret, or console login passwords. Failure to follow the steps as shown may cause you to erase your router configuration.

Step 13 Enter the **configure memory** command to modify or replace passwords in NVRAM.

```
Router# configure memory
```

Step 14 Enter the **configure terminal** command to enter configuration mode:

```
Router# configure terminal
```

Step 15 Change only the passwords that are necessary for your configuration. The following example shows how to change all three types of passwords. The first two lines show how to change the enable secret and enable passwords. The last two lines show how to change the console password.

```
Router (config)# enable secret newpassword1
Router (config)# enable password newpassword2
Router (config)# line con 0
Router (config-line)# password newpassword3
```

For maximum security, be sure the enable secret and enable passwords are different.

You can remove individual passwords by using the **no** form of the above commands. For example, entering the **no enable secret** command will remove the enable secret password.

Step 16 Configure all interfaces to be administratively up. In the following example, the Ethernet 0 port is configured to be administratively up:

```
Router(config-line)# interface ethernet 0
Router(config)# no shutdown
```

Enter the equivalent commands for all interfaces that were originally configured.

Step 17 Set the configuration register to the original value you noted in Step 3 or the factory-default value (0x2102). The following example shows how to set the configuration register to the factory-default value:

```
Router# config-register 0x2102
Router#
```

Step 18 Press **Ctrl-Z** to exit configuration mode.

Caution *Do not* take the next three steps unless you have changed or replaced a password or you might erase your router configuration. If there is no enable secret password (or if you omitted Step 13 through Step 15), proceed to Step 22 and log in.

Step 19 Enter the **copy running-config startup-config** command to save the new configuration to NVRAM. This command copies the changes you just made to the running configuration to the startup configuration. The following message appears:

```
Router# copy running-config startup-config
Building configuration
[OK]
Router#
```

Step 20 Reboot the router:

```
Router# reload
Proceed with reload? [confirm]
```

Step 21 Press **Return** to confirm. When the router reboots it will use the new configuration register value you set in Step 17.

Step 22 Log in to the router with the new or recovered passwords.

Problem Solving

The key to problem solving in this system is to try to isolate the problem to a specific subsystem. By comparing what the system is doing to what it should be doing, the task of isolating a problem is greatly simplified.

When problem solving, consider the following subsystems of the router:

- Power system—Includes the power supply and the wiring.
- Cooling system—The blower assembly should go on when you power up the router.

- Network processor modules—Problems with these modules can be the most difficult to troubleshoot. You can use the LEDs on the network processor modules to help identify a failure. For complete information on LEDs, refer to the section "Reading Front-Panel LEDs" later in this appendix.
- System cables—Includes all of the external cables that connect the router to the network.

Troubleshooting the Power and Cooling Systems

Check the following items to help isolate the problem:

- With the power switch on, is the power LED on the front panel on?
  - If not, check the AC input, AC source, router circuit breaker, and the power supply cable to make sure they are securely connected.
  - If the power LED is still off, the problem might be a power supply failure.
- Does the system shut down after being on a short time?
  - Check the fan. If the fan is not working, the system will overheat and shut itself down.
  - Check the environmental site requirements in the section "General Site Requirements" in the chapter "Preparing to Install Cisco 4000 Series Routers" and ensure that the chassis intake and exhaust vents are clear.

Troubleshooting the Network Processor Modules and Cables

Check for the following symptoms to help isolate the problem:

- Network processor module is not recognized by the system when you use the Cisco IOS **show version** command.
  - Check the front panel OK LED for the module. The OK LED should be on.
  - Check the LEDs on the network processor module.
  - Check to make sure the network processor module's connection to the motherboard is fully seated.

  - If the module has one or more daughter boards, check to make sure their connections to the module are correctly seated.
  - Check that the correct software version is installed. Refer to the section "Software Compatibility" in the chapter titled "Overview of the Cisco 4000 Series Routers."
- Network processor module is recognized when you use the **show interface** command, but interface port(s) will not initialize.
  - Check to make sure the network processor module's connection to the motherboard is fully seated.
  - Check the external cables to make sure they are securely connected.
  - Use the **show interface** command to make sure the module is not administratively shut down.
- System will not boot properly, or constantly or intermittently reboots.
  - Check to make sure the network processor module's connection to the motherboard is fully seated.
  - Check that the correct software version is installed. Refer to the section "Software Compatibility" in the chapter titled "Overview of the Cisco 4000 Series Routers."
  - Remove and then replace each network processor module one at a time. While each module is removed, reboot the system. If the system boots properly with one of the modules removed, the module might be at fault.
- System boots, but the console screen is frozen.
  - Check the external console connection to make sure it is secure.
  - Verify that you are using the correct console baud rate in the documentation for the terminal.

Environmental Reporting Features

If the router is operating at an abnormally high temperature, the following message will be displayed on the console screen:

```
%SYS-1-OVERTEMP: System detected OVERTEMPERATURE condition. Please
resolve cooling problem immediately!
```

Typical causes of an abnormally high system temperature are as follows:

- Fan failure
- Air blockage to cooling vents
- Air conditioner failure in the room where the router is located

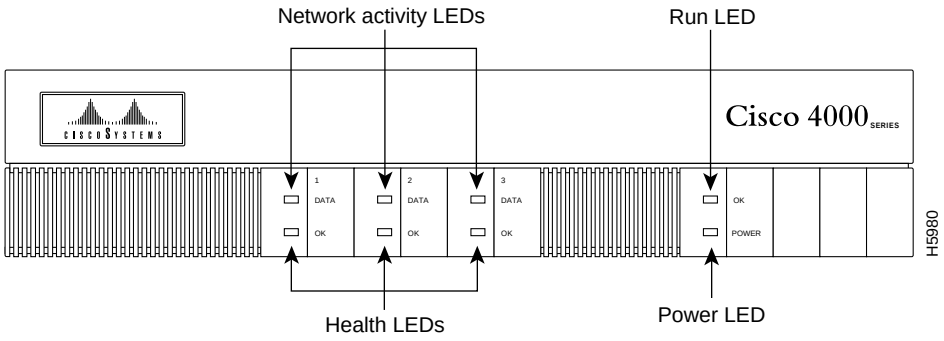
Reading Front-Panel LEDs

The LEDs on the front panel of the router enable you to determine system performance and operation at a glance. This section contains information about the LEDs.

System LED Operation

Figure A-1 shows the network activity, health, run, and power LEDs on the front panel of the router.

Figure A-1 Cisco 4000 Series—Front Panel LEDs



On the front panel, the three LEDs labeled OK correspond to the three network processor modules, if present, and show their status. The upper LEDs labeled DATA, when blinking, indicate network activity on the interfaces of each module.

When on, the LED labeled POWER indicates that the system card's power is on, and the OK LED above indicates that the processor is working.

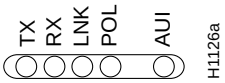
Reading Network Processor Module LEDs

The network processor module LEDs are all visible through cutouts in the rear of the chassis.

Ethernet Network Processor Module LEDs

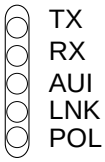
The LEDs on the single-port Ethernet network processor module are labeled as shown in Figure A-2. (Also see Figure 4-4.)

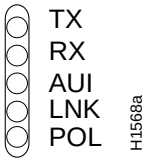
Figure A-2 Single-Port Ethernet Network Processor Module LEDs



The LEDs on the dual-port Ethernet network processor module are labeled as shown in Figure A-3. (Also see Figure 4-8.)

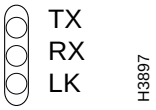
Figure A-3 Dual-Port Ethernet Network Processor Module LEDs





The LEDs on the six-port Ethernet network processor module are labeled as shown in Figure A-4. (Also see Figure 4-9.)

Figure A-4 Six-Port Ethernet Network Processor Module LEDs



When the AUI LED is on, none of the other LEDs on the network processor module will be on. The other LEDs are meaningful only when you use 10BaseT, and you have a link.

The LEDs on Ethernet network processor modules are explained in Table A-1.

Table A-1 Ethernet Network Processor Module LEDs

LEDs	Indication
TX (transmit)	System is transmitting data
RX (receive)	System is receiving data
AUI (attachment unit interface)	AUI connection is selected
LNK (link)	10BaseT is selected and the link is available
POL (polarity)	Polarity has been switched to correct for defective polarity

Token Ring Network Processor Module LEDs

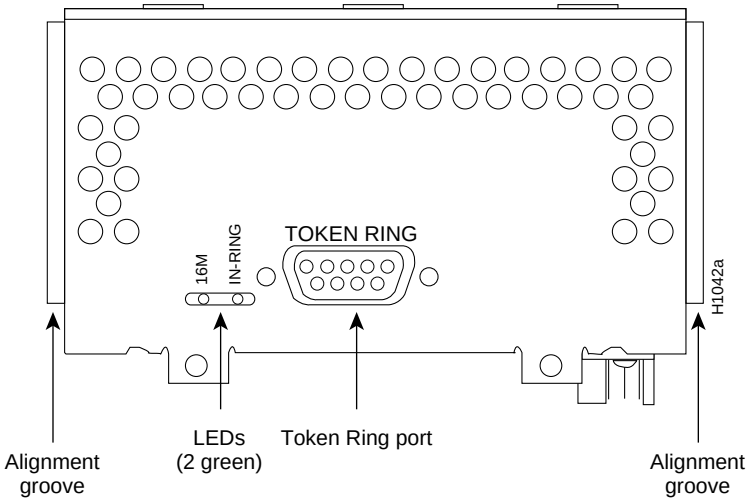
The two LEDs in the Token Ring network processor module are labeled 16M and IN-RING. (See Figure A-5.)

The 16M LED indicates ring speed. When on, it indicates a ring speed of 16 Mbps; when off, it indicates a ring speed of 4 Mbps.

The in-ring LED, when on, indicates that the network processor module is inserted into the ring. If the LED is off, the network processor module is not inserted into the ring.

Timesaver When the in-ring LED is off, you can unplug the Token Ring cable without causing a problem on the ring.

Figure A-5 Token Ring Module Network Connector



Four-Port Serial Module LEDs

The four-port serial network processor module has six LEDs per port. (See Figure A-6 and Table A-2.) The functions of the LEDs on the four-port serial module are the same as the functions on the G.703/G.704 module and are different from the functions of the LEDs on the dual-port serial module.

G.703/G.704 Module LEDs

The G.703/G.704 network processor module has six LEDs per port. (See Figure A-7 and Table A-2.) The functions of the LEDs on the G.703/G.704 module are the same as the function on the four-port serial module and are different from the functions of the LEDs on the dual-port serial module.

Figure A-6 Four-Port Serial Network Processor Module Ports

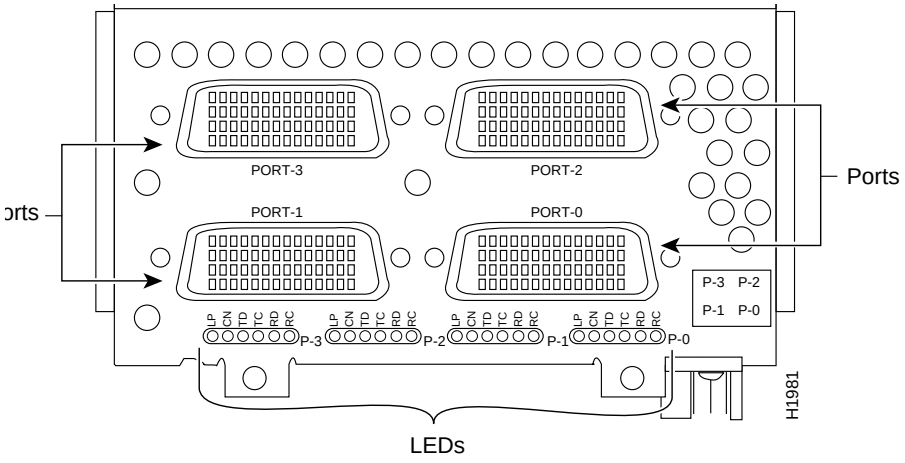


Figure A-7 G.703/G.704 Serial Network Processor Module Ports (DB-15)

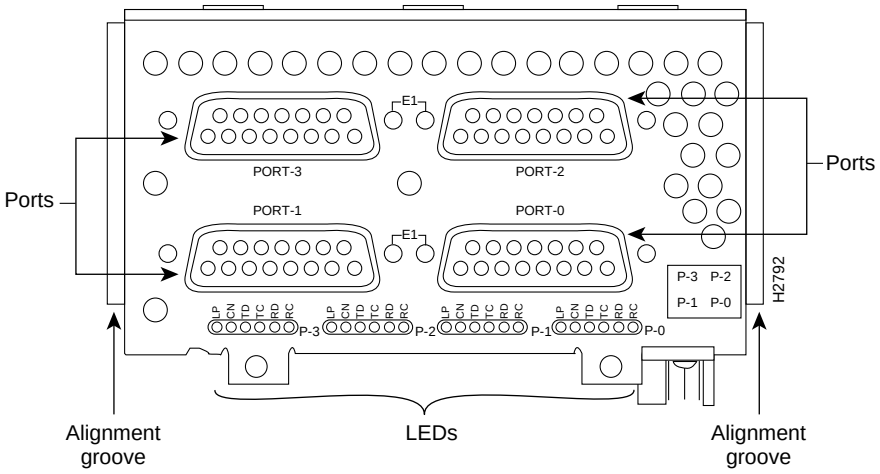


Table A-2 Four Port Serial Network Processor Module LEDs

LEDs	LED Colors	Indication
LP	Yellow	Loop
CN	Green	Connect (DSR, DTR, DCD, RTS, CTS)
TD	Green	Transmit Data
TC	Green	Transmit Clock
RD	Green	Receive Data
RC	Green	Receive Clock

TC, RC, TD, and RD are on only when the associated line is changing state; if a line is stuck high or low, the LED is off.

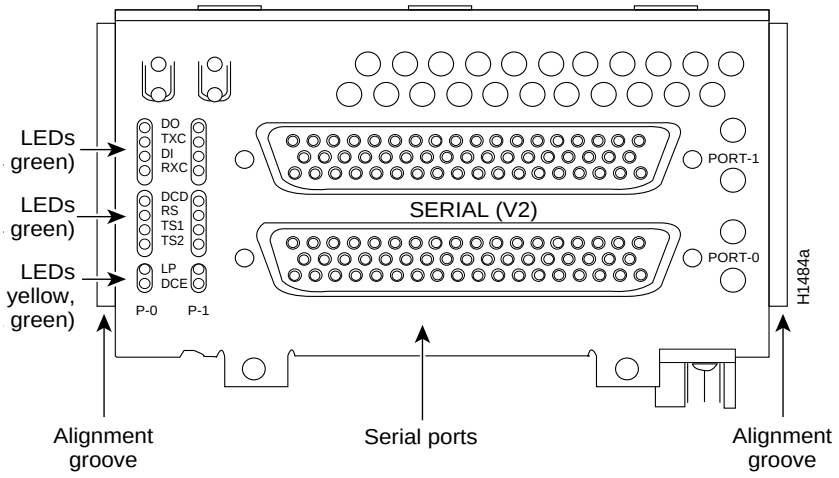
The CN LED on whenever activity is detected on any of the following circuits: data set ready (DSR), data terminal ready (DTR), data carrier detect (DCD), request to send (RTS), and clear to send (CTS).

TD is always associated with the data that is driven by the DTE port, regardless whether the port on the module is a DTE port or a DCE port. This means that TD reflects output data when the port is a DTE port and input data when the port is a DCE port. RD is controlled in a similar way. TC and RC are always associated with the clocks that are driven by the DCE: outputs for a DCE port and inputs for a DTE port.

Dual-Port Serial Network Processor Module LEDs

The dual-port serial network processor module has two columns of LEDs. As viewed from the front (see Figure A-8), the left column is labeled P-0 (for port 0), and the right column is labeled P-1 (for port 1). There are ten LEDs per port. Serial network processor modules can be configured for either DTE or DCE.

Figure A-8 Dual-Port Serial Network Processor Module



When DCE cables are used and when the port is configured with the **clockrate** command as a DCE port, the DCE LED will go on. (See Figure A-8.) (For more information about the **clockrate** command, see the Cisco IOS configuration guides and command references.)

Note An error message will be generated if there is a mismatch between the cable and the software configuration of the port—for example, if the cable is DTE and the clock rate is set, or if the cable is DCE and the clock rate is not configured.

The convention used in this publication to indicate corresponding signals for DTE and DCE is to list DTE first. For example, Figure A-8 shows the top LED, D0, indicates transmit data (TXD) in DTE mode or receive data (RXD) in DCE mode.

The dual-port serial network processor module LEDs are explained in Table A-3.

Table A-3 Dual-Port Serial Network Processor Module LEDs

LEDs	Indication (DTE/DCE)
DO	Data Out (TXD/RXD)
TXC	Transmit Clock
DI	Data In (RXD/TXD)
RXC	Receive Clock
DCD	Data Carrier Detect
RS	Receive Signaling
TS1	Transmit Signaling
TS2	Transmit Signaling
LP	Loop
DCE	On if the serial interface is DCE

FDDI Network Processor Module LEDs

Dual-attachment FDDI network processor modules have one LED per port, which is located adjacent to the corresponding port on the module panel (see Figure A-9 and Figure A-10). Single-attachment modules have one LED, which is adjacent to the single port on the module panel. (See Figure A-11.)

Figure A-9 Dual-Attachment Single-Mode FDDI Network Processor Module—End View

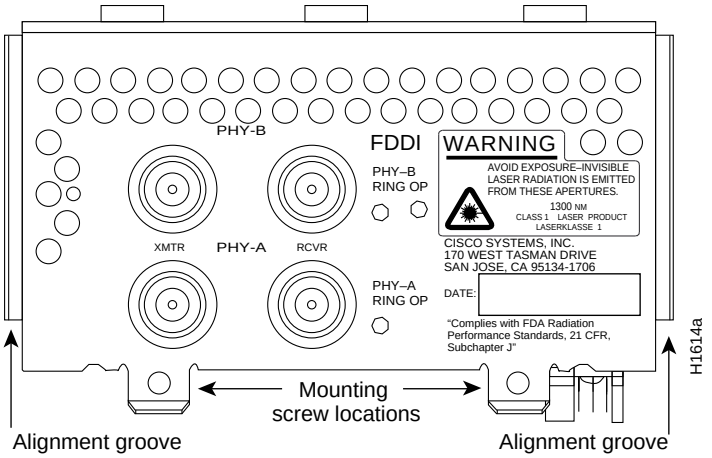


Figure A-10 Dual-Attachment Multimode FDDI Network Processor Module—End View

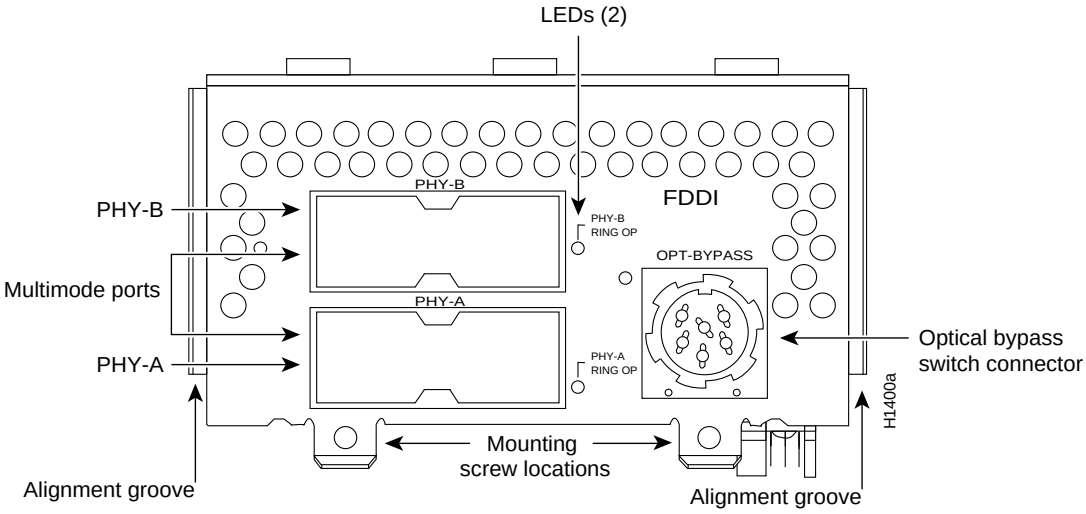
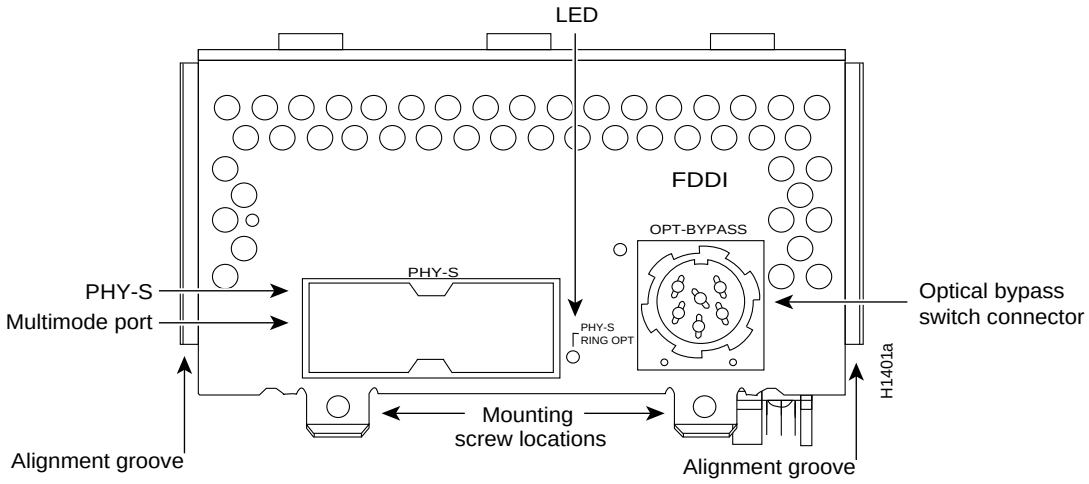


Figure A-11 Single-Attachment Multimode FDDI Module—End View



When on, a module LED indicates a ring up condition. Dual-attachment FDDI module LEDs indicate which PHY on the network processor module is inserted into the ring; if a PHY is not actively inserted into the ring, the LED is off. On a single-attachment module, the LED indicates ring up when it is on; when the LED is off, it indicates that the module is not inserted into a ring.

BRI Network Processor Module LEDs

When on, the multiport BRI network processor module status LEDs indicate a Layer 1 connection on the corresponding port. When off, the LEDs indicate that the link is not established on the corresponding port.

Figure A-12 Eight-Port BRI Network Processor Module

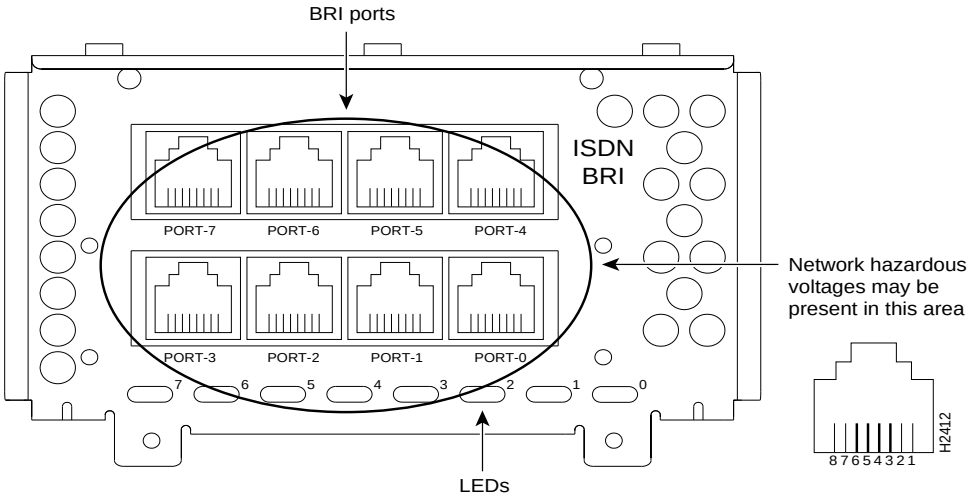
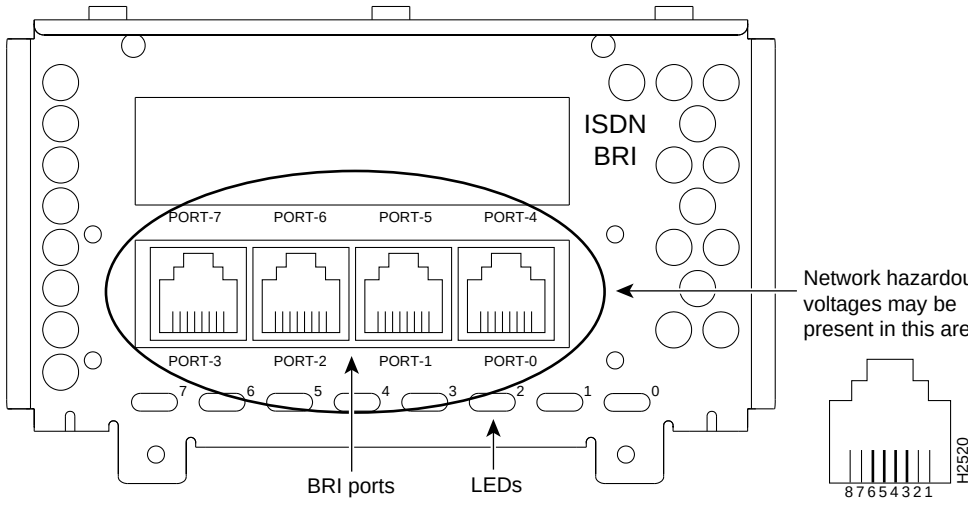


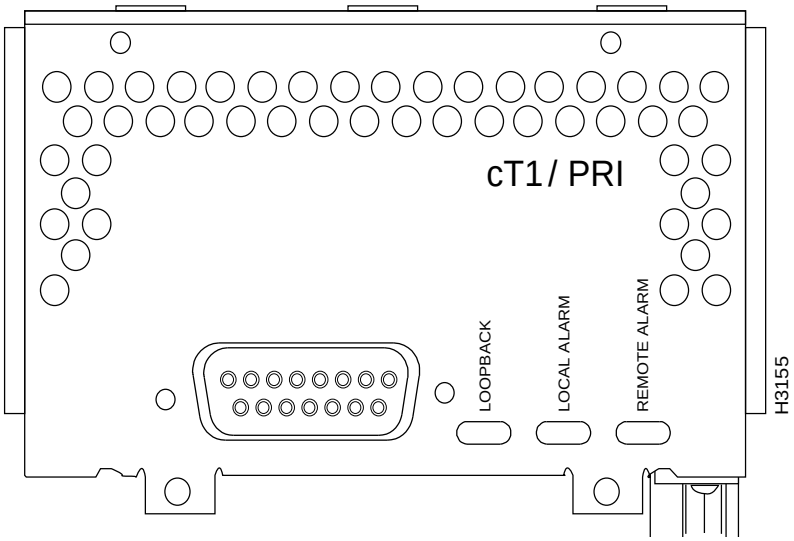
Figure A-13 Four-Port BRI Network Processor Module



CT1/PRI Network Processor Module LEDs

The three LEDs on the CT1/PRI network processor module are labeled LOOPBACK, LOCAL ALARM, and REMOTE ALARM. (See Figure A-14.)

Figure A-14 Channelized T1 Network Interface Processor



The three LEDs on the CT1/PRI network processor module front panel are explained in Table A-4.

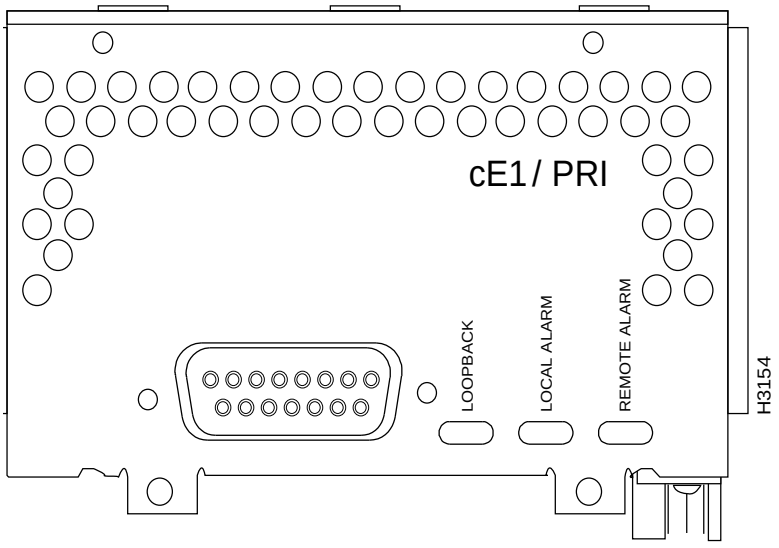
Table A-4 CT1/PRI Network Processor Module LEDs

LEDs	Indication (DTE/DCE)
Loopback	Controller loopback
Local alarm	Loss of signal, loss of frame, or unavailability due to excessive errors
Remote alarm	Remote end in local alarm

CE1/PRI Network Processor Module LEDs

The three LEDs on the CE1/PRI network processor module are labeled LOOPBACK, LOCAL ALARM, and REMOTE ALARM. (See Figure A-15.)

Figure A-15 CE1/PRI Network Processor Module



The three LEDs on the CE1/PRI network processor module front panel are explained in Table A-5.

Table A-5 CE1/PRI Network Processor Module LEDs

LEDs	Indication (DTE/DCE)
Loopback	Controller loopback
Local alarm	Loss of signal, loss of frame, or unavailability due to excessive errors
Remote alarm	Remote end in local alarm

ATM Network Processor Module LEDs

The four LEDs on the ATM network processor module are labeled BUSY, READY, RX CELLS, and RX ALARM. (See Figure A-16, Figure A-17, and Figure A-18.)

Figure A-16 ATM Network Processor Module with STS-3c/STM-1 Single-Mode PLIM

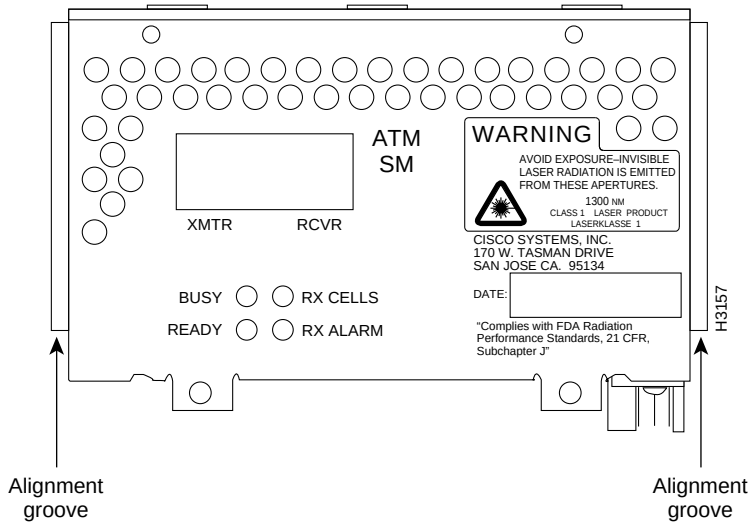


Figure A-17 ATM Network Processor Module with STS-3c/STM-1 Multimode PLIM

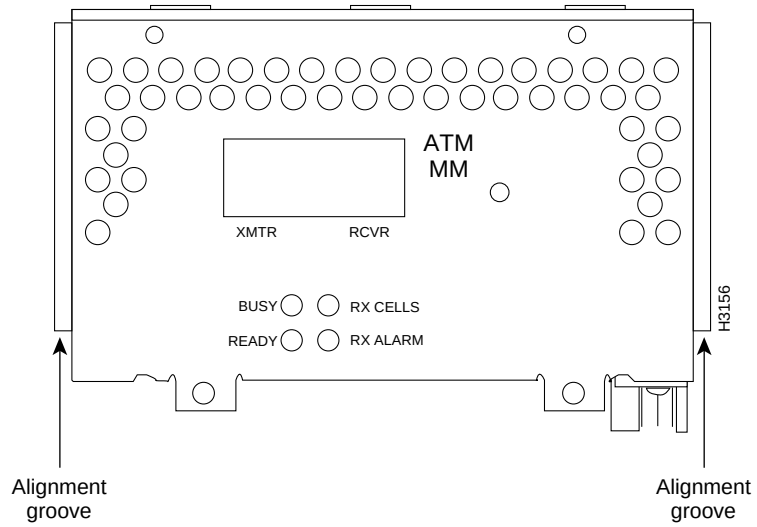
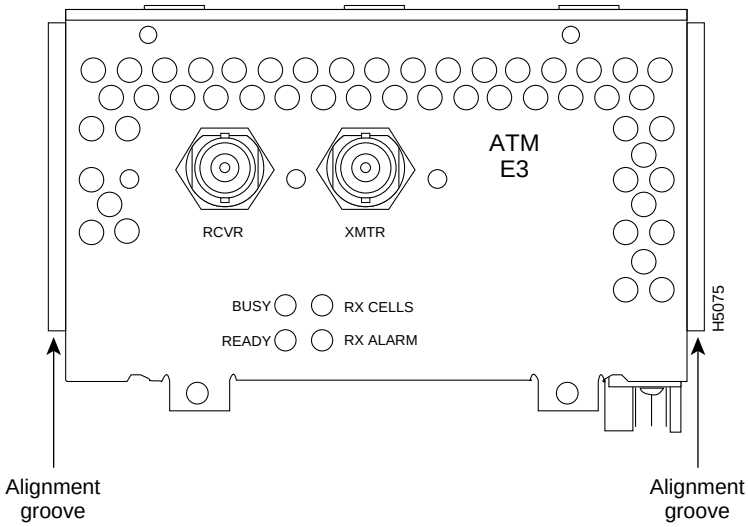


Figure A-18 ATM Network Processor Module With E3/DS-3 PLIM



The four LEDs on the ATM network processor module front panel are explained in Table A-6.

Table A-6 ATM Network Processor Module LEDs

LEDs	Indication
Busy	Not applicable in normal use
Ready	When on, configuration is complete and module is ready for use
RX cells	The module is receiving traffic (cells)
RX alarm	Loss of signal or remote alarm