CHAPTER 6

Isolating Problems

This chapter describes trunk line monitoring and some troubleshooting procedures that you can follow if you encounter a problem.

Trunk Line Monitoring

Loss of data can cause external protocols to retransmit, resulting in network congestion and delays. To avoid loss of data, line quality must be kept very high. The line card control process (LCC) continually monitors line quality on each trunk using the switch's Trunk Up-Down (TUD) protocol. This protocol detects a trunk that is down or line quality that is poor. When a trunk that was down comes back up, the TUD protocol returns it to service.

The TUD protocol monitors line quality by having each switch send short test messages at regular intervals. When a switch starts up, it begins sending TUD messages down each trunk that it supports. If the local switch receives TUD messages consistently from the remote switch, it declares the trunk up.

If a switch misses an established number of TUD messages from a trunk, it declares the trunk down. When the trunk is declared down, a trap displays indicating the change of status. The following is a typical trunk down message:

```
Link down trap from Light7, System Up Time: 23 Hr 29 Min 50 Sec Port: 5.0
```

When the trunk comes up again, the switch sends another trap. The following is a typical trunk up message:

```
Link up trap from Light7, System Up Time: 23 Hr 29 Min 55 Sec Port: 5.0
```

Isolating Trunk Problems

A trunk may go down temporarily and come back up shortly without intervention. However, if the trunk remains down or transitions constantly in and out of service, you must find and correct the problem. Use the *loopback tests* described in this section to isolate the faulty component. A loopback test is a software or hardware test that alters the flow of data so that an electronic signal is returned to its sender.

Trunks can be directly connected or they can be connected with data service unit/channel service unit (DSU/CSU) devices through telephone lines. Figure 6-1, Figure 6-2, and Figure 6-3 illustrate the major components of the switch-to-switch connection over a trunk. A trunk interface loop occurs in the circuitry within the switch and does not involve components external to the switch.

Figure 6-1 Components of a Telco Connection Between Low-Speed Modules or Serial Interface Modules in Two Switches

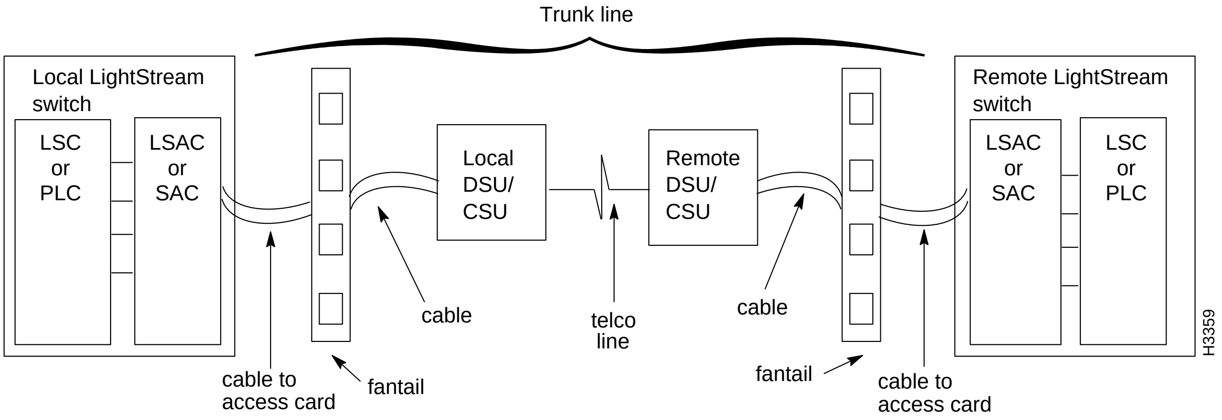


Figure 6-2 Components of a Direct Connection Between Low-Speed Modules or Serial Interface Modules in Two Switches

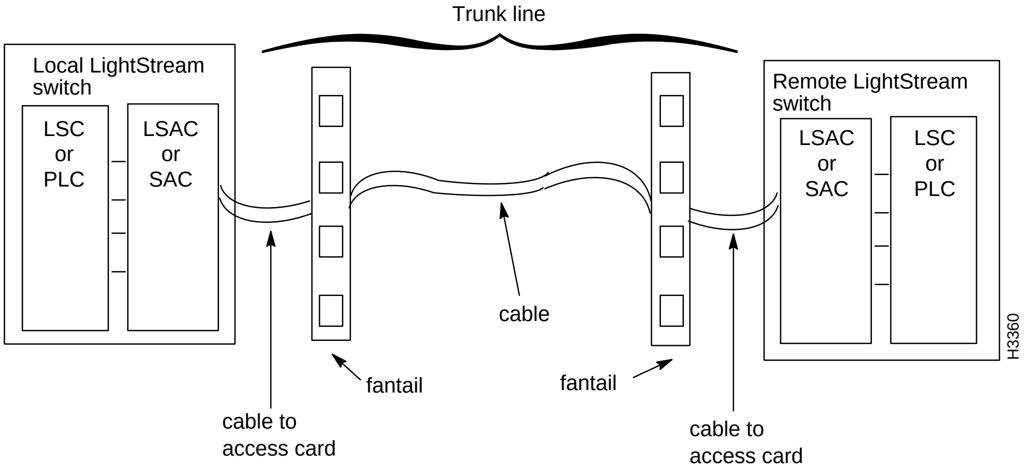
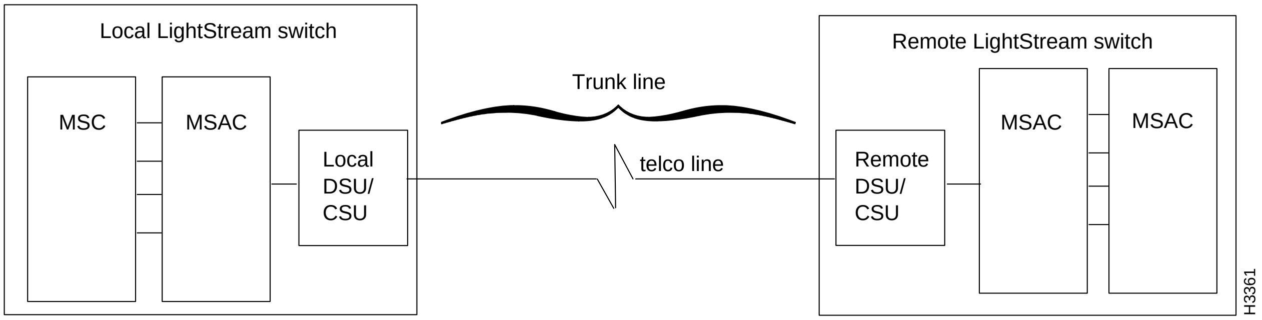


Figure 6-3 Components of a Connection Between Medium-Speed Modules in Switches with Integral DSU/CSUs



Fault Isolation for Link Down Events

Most trunk failures are temporary, caused by problems on the telephone company line. A trunk is usually returned to service within a short period without any intervention on your part and before the telephone company finds anything wrong.

You must identify the failed portion of the trunk. To do this, you run a series of loopback tests to segment the trunk from end to end, starting at the I/O board of the switch and progressing out from the switch. This progressive process tests each segment in sequence to find the exact location of the failure.

Loopback Tests

The loopback tests allow you to pinpoint a fault by successively looping a signal at various points. The LS2020 switch provides two loopback tests: remote and internal.

Only Frame Relay ports and trunk ports have active port management protocols that automatically verify the port's ability to process data.

Note FDDI and Ethernet ports do not support loopback testing.

Remote Loopback Test

The remote loopback test loops data from an external device through the I/O module and back. This test verifies that the data sent from the remote end can cross the telco line or cable, pass through the I/O module, and return to the remote end.

Note The serial interface module does not support remote loopback testing.

Internal Loopback Test

The internal loopback test loops data from the line card to the line chip or to the physical layer protocol processor (PLPP) I/O module to see if the relevant I/O module is able to receive intact data. If this loop is successful, you know that the data can reach the I/O module properly. However, you do not know if the I/O module correctly encodes the data that will be sent out onto the line.

The line chip and the PLPP I/O module take bytes from the line card and convert them into the required form to be sent out from the access card. The line chip encodes frames or cells into SDLC frames. The PLPP I/O module encodes cells into the ATM standard cell payload format for T3 or E3, depending on the access card.

Note Always call the sites involved and ask permission before looping a trunk.

Looping Trunk Ports

This procedure tells you how to loop data through a trunk between two LS2020 trunk ports. If you know that data is not passing on a trunk between two trunk ports, follow these steps to set up a remote loop on one of the trunk ports:

Step 1 Enter the following at the `cli>` prompt:

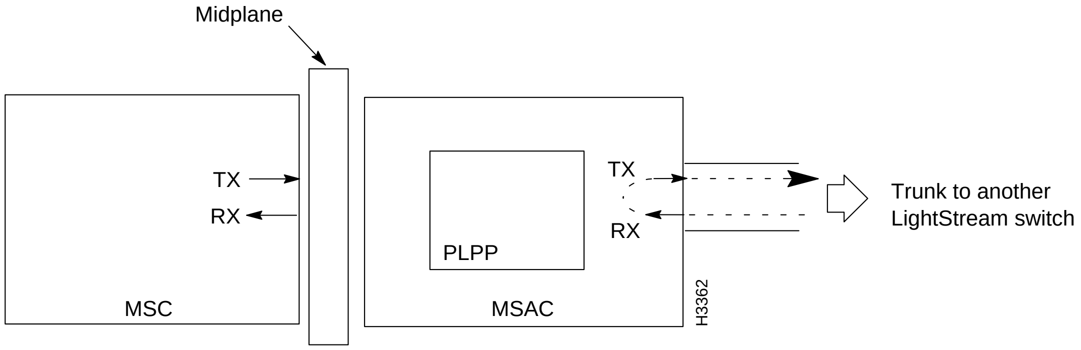
```
cli> set port <c.p> loop remote
```

Where

<c.p> is the port you want to loop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

The command line interface (CLI) automatically sets the administrative status of the selected port to *testing* and starts the loopback test. Figure 6-4 shows how the data is looped during a remote loopback test.

Figure 6-4 Remote Loop on an MS Trunk Port



- - - - - - represents path of looped data
PLPP = Physical Layer Protocol Processor I/O module
TX = transmit data
RX = receive data

Note The loop remote option sets the local port into a remote loop for the remote port. It does not loop the remote port. Verification of a successful remote loopback must be made at the remote system.

If the remote loop succeeds, the trunk port reports up at the remote end. In this case, it is likely that a problem with the local port which is providing the remote loop exists. While providing the remote loopback, the local port displays an Operational Status of down. Proceed to Step 3.

If the remote loop fails (the trunk does not come up), a problem exists somewhere between the local access card and the remote system.

Step 2 To run an internal loop on the port, enter the following at the `cli>` prompt:

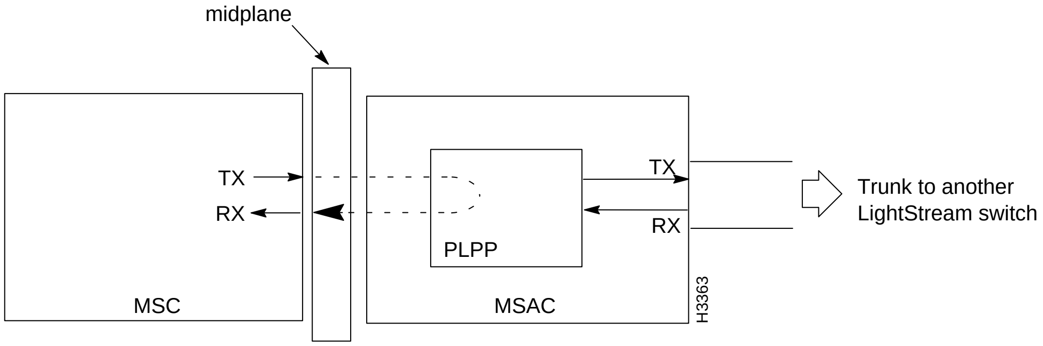
```
cli> set port <c.p> loop internal
```

Where

<c.p> is the port you want to loop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

The CLI automatically sets the administrative status of the selected port to *testing* and starts the loopback test. Figure 6-5 shows how the data is looped during an internal loopback test.

Figure 6-5 Internal Loop on an MS Trunk Port



- - - - - - represents path of looped data

PLPP	=	Physical Layer Protocol Processor I/O module
TX	=	transmit data
RX	=	receive data

If the internal loop succeeds, and the local trunk comes up, you have isolated the problem with the local access card.

Step 3 To stop the loopback test, enter the following at the `cli>` prompt:

```
cli> set port <c.p> unloop
```

Where

<c.p> is the port you want to loop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

Always use the unloop procedure to stop the loopback test once you obtain the test results, whether or not the test was successful. Leaving a loop up blocks the flow of data and could contribute to congestion on the network.

Looping Edge Ports

This section describes the procedure for looping data through a Frame Relay port. The line from the port connects an LS2020 switch to an external device provided by another vendor. If you receive an indication that data is not passing between the LS2020 switch Frame Relay port and the host, or that the line is unreliable, use this looping procedure to isolate the problem.

Note Internal loopback tests do not work on Frame Relay ports with the LMI type set to UNI.

Step 1 If the Frame Relay port is a UNI port, enter the following at the `cli>` prompt to set the netinterfacetype attribute to NNI:

```
cli> set port <c.p> framerelay netinterfacetype nni
```

Step 2 To run an remote loop on the Frame Relay port on the LS2020 switch, enter the following at the `cli>` prompt:

```
cli> set port <c.p> loop remote
```

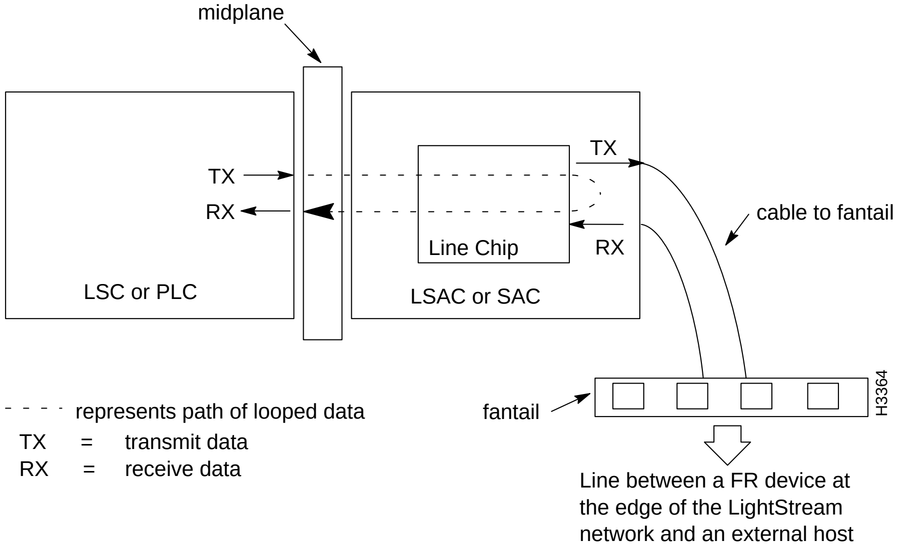
Where

<c.p> is the port you want to loop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

The CLI automatically sets the administrative status of the selected port to *testing* and starts the loopback test.

Figure 6-6 depicts a remote loopback test.

Figure 6-6 Remote Loop on an LS Edge Port


midplane
TX
RX
LSC or PLC
Line Chip
LSAC or SAC
TX
RX
cable to fantail
fantail
H3364
- - - - represents path of looped data
TX = transmit data
RX = receive data
Line between a FR device at the edge of the LightStream network and an external host

Step 3 Run an internal loop on the port by entering the following at the cli> prompt:

```
cli> set port <c.p> loop remote
```

Where

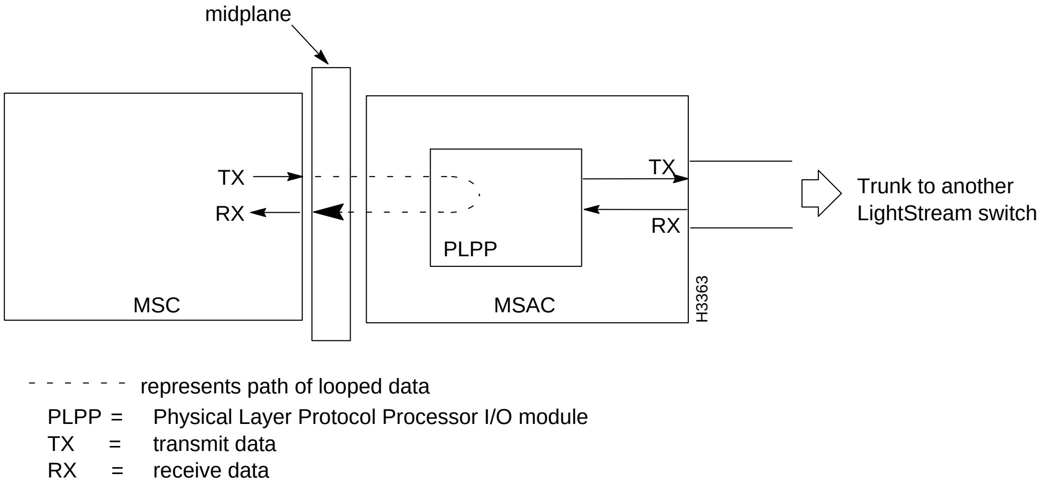
<c.p> is the port you want to loop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

The CLI automatically sets the administrative status of the selected port to *testing* and starts the loopback test.

If the internal loop fails and the line does not come up, you have isolated the problem to the line or access card.

Figure 6-7 depicts an internal loopback test.

Figure 6-7 Intermal Loop on an LS Edge Port



Step 4 To stop the loopback test, enter the following at the `cli>` prompt:

```
cli> set port <c.p> unloop
```

Where

<c.p> is the port you want to unloop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

Always use the unloop procedure to stop the loopback test once you obtain the test results, whether or not the test was successful. Leaving a loop up blocks the flow of data and could contribute to congestion on the network.

Step 5 If the Frame Relay port is a UNI port, reset the port to the UNI net interface type by entering the following at the `cli>` prompt:

```
cli>  set port <c.p> framerelay netinterfacetype uni
```

Other Edge Ports

The procedure for looping other (non-Frame Relay) edge ports is nearly identical to the procedure for looping Frame Relay ports, except that there is no need to reconfigure the net interface type. Therefore, to loop test any other type of edge port, follow the steps in the preceding “Looping Edge Ports” section, but disregard Steps 1 and 5.

Unlooping Ports

This procedure allows you to unloop the port when you finish a loopback test. Whenever you run a loopback test on a port, you must unloop the port when you finish. However, if you proceed from one type of loopback test to another type on a particular port (from internal to remote, for example), you need not unloop the port before you start the next loopback test.

To unloop a port, enter the following at the `cli>` prompt:

```
cli> set port <c.p> unloop
```

Where

<c.p> is the port you want to unloop. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

The administrative status on the port changes from *testing* to *up* and the operational status changes from *testing* to either *up* or *down*.

Activating (or Deactivating) a Port

This procedure allows you to set a particular port (except a frame forwarding port) to *active*, *inactive*, or *testing*. If a port is set to *active*, it is up and passing data. If a port is set to *inactive*, it is down and cannot pass data. If a port is set to *testing*, you can set up software loops on the I/O components of the board itself, but not on the DSU/CSU.

Step 1 At the `cli>` prompt, enter

```
cli> set port <c.p> {active | inactive | testing}
```

Where

<c.p> is the port you want to make active or inactive. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

{active | inactive | testing} specifies whether the port is up and able to pass data, down and unable to pass data, or in diagnostics mode. The default is active.

Step 2 To determine the status of a particular port, enter the following at the `cli>` prompt:

```
show port <c.p> status
```

The following is an example of the show port status display:

```
cli> show port 5.0 status
Admin Status:           Up
Oper Status:            Up
Oper loop:              none
Admin loop:             none
Last Oper Change:       25 Hr 2 Min 58 Sec ago
```

Operational status is the port's actual status and administrative status is the status that you set.

The following are examples of the traps that display when the port goes up (first example) or down (second example).

```
Link up trap from Light7, System Up Time: 23 Hr 29 Min 55 Sec
Port: 5.0
Link down trap from Light7, System Up Time: 23 Hr 29 Min 50 Sec
Port: 5.0
```

Activating (or Deactivating) a Frame Forwarding Port

This section presents the procedure for activating or deactivating a particular frame forwarding port. When you activate a port, a virtual channel connection (VCC) is set up to a designated endpoint and traffic can flow over that connection. When you deactivate a port, no traffic can flow over the connection.

At the `cli>` prompt, enter

```
cli> set port <c.p> frameforwarding {activate|deactivate}
```

Where

<c.p> is the frame forwarding port you want to make active or inactive. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

{activate | deactivate} specifies whether traffic can or cannot flow over the connection. The default is activate.

Activating (or Deactivating) a Frame Relay DLCI

This section presents the procedure for activating or deactivating a particular Frame Relay data link connection identifier (DLCI). When you activate a connection, traffic can flow over that connection. When you deactivate a connection, no traffic can flow over it.

At the `cli>` prompt, enter

```
cli> set port <c.p> dlci <dlci#> {activate|deactivate}
```

Where

<c.p> is the port that contains the DLCI you want to make active or inactive. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

<dlci#> is the DLCI you want to make active or inactive. The DLCI number can be between 16 and 991.

{activate | deactivate} specifies whether traffic can or cannot flow over the connection. The default is activate.

Activating (or Deactivating) an ATM UNI VCI

This procedure enables you to activate or deactivate a particular ATM UNI virtual channel identifier (VCI). When a connection is activated, traffic can flow over it. When a connection is deactivated, no traffic can flow over it.

At the `cli>` prompt, enter

```
cli> set port <c.p> vci <vci#> {activate|deactivate}
```

Where

<c.p> is the port that contains the ATM VCI you want to activate or deactivate. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

<atm vci#> is the ATM VCI you want to activate or deactivate. The ATM VCI number must be in the range 1 through 32399, and may be further restricted depending on the type of line card.

{activate | deactivate} specifies whether traffic can or cannot flow over the connection. The default is activate.

Activating (or Deactivating) an ATM UNI VPI

This procedure enables you to activate or deactivate a particular ATM UNI virtual path identifier (VPI). When a connection is activated, traffic can flow over it. When a connection is deactivated, no traffic can flow over it.

At the `cli>` prompt, enter

```
cli> set port <c.p> vpi <vpi#> {activate|deactivate}
```

Where

<c.p> is the port that contains the ATM VPI you want to activate or deactivate. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

<atm vpi#> is the ATM VPI you want to activate or deactivate. The ATM VPI number must be in the range 1 through 32399, and may be further restricted depending on the type of line card.

{activate | deactivate} specifies whether traffic can or cannot flow over the connection. The default is activate.

Activating (or Deactivating) a Constant Bit Rate PVC

This procedure describes how to activate or deactivate a particular constant bit rate PVC. When you activate a connection, traffic can flow over that connection. When you deactivate a connection, no traffic can flow over it.

At the `cli>` prompt, enter:

```
cli> set port <c.p> cbr <PVC#> {activate|deactivate}
```

Where

<c.p> is the port that contains the cbrpvc you want to make active or inactive. The port number is in card.port format (card = 2 to 10; port = 0 to 7).

<PVC#> is the PVC you want to activate or deactivate. For the CEMAC, the PVC number is always 1.

{activate | deactivate} specifies whether traffic can or cannot flow over the connection. The default is activate.

Resetting a Card

This section describes the procedure for resetting a card from the TCS.

Be careful when resetting the active NP or switch cards. Resetting these cards brings down the entire switch and causes data loss for about 5 minutes on the card.

Step 1 At the `cli>` prompt, enter

```
cli> protected
```

Step 2 Enter the protected mode password when you see the following prompt:

```
Enter password:
```

Step 3 At the `*cli>` prompt, enter

```
*cli> set tcs <card#> reset
```

Where

<card#> is 1 to 10, SA, or SB

Loading Line Card Operational Software

This section tells you how to load line card operational software or diagnostics programs into the line cards, network processors, or switch cards. In addition to the operational software, the following diagnostic programs are available:

- Network Processor card

- Low-speed line card (T1)
- Medium-speed line card (T3)
- Packet line card
- Cell line card

If you load diagnostics into a card, see the *LightStream 2020 Hardware Reference & Troubleshooting Manual* for detailed instructions on how to run the diagnostics and how to interpret the results.

Note The **loadcard** command resets the card before loading any software.

Step 1 At the `cli>` prompt, enter

```
cli> protected
```

Step 2 Enter the protected mode password when you see the following prompt:

```
Enter password:
```

Step 3 Load the operational software or diagnostics program into the selected card by entering the following at the `*cli>` prompt:

```
*cli> loadcard <slot#> [<load address>] <file name>
```

where

<slot#> is 1 to 10

[<load address>] is the address where the diagnostic program is loaded. This is an optional argument. If you do not specify this argument, the diagnostic program is loaded into a default load address.

<file name> means do not enter a file name if you want to load line card operational software into the card. The file names for the various diagnostic programs are

/usr/diag/diag_np1.aout (NP card diags)
/usr/diag/diag_ls1.aout (low-speed line card diags)
/usr/diag/diag_ms1.aout (medium-speed line card diags)
/usr/diag/diag_plc1.aout (packet line card diags)
/usr/diag/diag_clc1.aout (cell line card diags)

Step 4 If you load a diagnostics program into a card, use the **connect** command to establish a connection to the card you want to test.

```
*cli> connect 1 diagnostic
```

When you finish running diagnostics and want to disconnect from the card and return to CLI, enter

```
~~q
```

Using the ping Command

To determine if you can communicate over a particular IP connection, use the **ping** command. The **ping** command sends an ICMP echo packet to the specified IP address. If IP is working at that address, IP sends an ICMP-echo-reply message to the sender.

To send the ICMP echo packet to a specified IP address, follow these steps:

Step 1 Log in to the root account on the LS2020 switch from which you wish to send the ICMP echo packet.

Step 2 Enter the following at the bash prompt:

```
bash# ping [packet size] <host name>
```

Where

[packet size] is the size of the packets sent to the host. This is an optional argument. The default packet size is 64 bytes.

<host name> is the name or IP address of the host to which packets are sent.

Step 3 To stop **ping** and display a summary of the results, press **^C**.

The following is an example of the ping display:

```
*cli> ping Light5
PING Light5 (127.1.24.35)    64 data bytes
64 bytes from 127.1.24.35:   icmp_seq=0  time=100ms
64 bytes from 127.1.24.35:   icmp_seq=1  time= 00ms
64 bytes from 127.1.24.35:   icmp_seq=2  time= 00ms
^C

_        Light5 PING Statistics
3 packets transmitted, 3 packets received, 0 packet loss
round-trip (ms) min/avg/max = 0/33/100
```

Verifying Software Installation

Follow these steps to verify that all files and directories that were copied from the installation diskettes to the hard disk are intact. All relevant files used to verify software installation reside on the first diskette of the following installation diskette sets:

- System
- Application
- Firmware
- Diagnostic

Step 1 Change to the root (/) directory by entering the following at the bash# prompt:

```
bash# cd /
```

Note You must run ckswinstall from the root account and from the root (/) directory.

Step 2 To verify your software installation, enter the following at the bash# prompt:

```
bash# ckswinstall
```

When you press **Return**, the following information displays after **ckswinstall** runs on the first set of software.

```
You inserted diskette 1 of the System set.
```

```
Starting verification of installation.

Verifying the System directories.
The System directories have been verified.

Verifying the System hard links.
The System hard links have been verified.

Verifying the System symbolic links.
The System symbolic links have been verified.

Verifying the System special files.
The System special files have been verified.

Finished verification of installation.
```

Step 3 When you see the message that the verification procedure is complete, repeat this process for the Application, Firmware, and Diagnostic installation diskettes.

Because the software has been running for a period of time when you run **ckswinstall**, some files may have changed from the original installation. The software is probably not corrupted if you receive messages that any of the following directories or files have changed**:**

- Any files in the /usr/app/base/config directory
- The following .profile files for the standard accounts:

  /.profile
  /usr/oper/.profile
  /usr/npadmin/.profile
  /usr/fldsup/.profile

- Log files in the /usr/etc directory:

  /usr/etc/ftpdlog
  /usr/etc/inetdlog
  /usr/etc/rlogindlog
  /usr/etc/rshdlog
  /usr/etc/telnetdlog
  /usr/etc/tftpdlog

- /.rhosts
- /etc/group
- /etc/motd
- /etc/passwd
- /usr/etc/hosts
- /usr/etc/host.equivalent

If **ckswinstall** detects errors in other directories or files, reinstall the software and repeat this procedure. For software installation instructions, see the *LightStream 2020 Installation Guide* and the *LightStream 2020 Release Notes*.

Copying a File Between LS2020 Switches

This section tells you how to copy files between different LS2020 switches. You can copy files from remote NP disks to local NP disks and vice versa. You may choose to copy files for a number of reasons, such as moving log files from a remote disk to a local disk so you can view them.

You move these files by using the file transfer protocol (ftp) from within the CLI **shell** command.

Step 1 At the `cli>` prompt, enter

```
cli> protected
```

Step 2 Enter the protected mode password when you see the following prompt:

```
Enter password:
```

Step 3 At the `*cli>` prompt, enter

```
*cli> shell ”ftp <IP address or name of the NP you want to copy files to or from>”
```

The LS2020 switch responds with output similar to the following:

```
Connected to 127.1.22.25.
220 emtb5 FTP server (Version 4.162 Tue Nov 1 10:50:37 PST 1988) ready.
```

Step 4 Enter your LS2020 login name (oper, npadmin, fldsup, or root) when you see the following prompt:

```
Name (127.1.22.25:oper):
```

Step 5 Enter the LS2020 password for this account on the destination NP when you see the following prompt:

```
331 Password required for oper.
Password:
```

If you entered the login name and password correctly, the LS2020 switch displays the following information:

```
230 User oper logged in.
ftp>
```

Step 6 Enter the following at the ftp> prompt:

```
ftp> put /usr/tmp/mma/mma.traplog [<new name>]
```

Where

<new name> is the name of the file that identifies the chassis or appropriate directory name for the file. For example, if you are copying a trap log for a switch called Light5, the new name could be mma_Light5.traplog.

This command sends the log file to the specified workstation or host. The system tells you when the copy is complete.

Step 7 To exit the file transfer program and return to CLI when you are finished, enter **bye** or **quit**.

Step 8 To verify that the files and directories were transferred correctly, enter the following at the `*cli>` prompt:

```
*cli> shell ”ls -l”
```

The files and directories are copied to the specified switch.

```
cli> set tcs <card#> power {on|off}
```

Diagnosing Port Problems

This section tells you how to diagnose port problems. The procedures (to be performed in sequence) described below include:

1 Performing basic port checks

2 Checking bit rates

3 Configuring medium-speed parameters

4 Checking connections

5 Checking receive data

6 Checking line statistics

7 Checking CSU statistics

8 Checking LSC trunks

9 Diagnosing VC problems

Performing Basic Port Checks

This procedure contains the basic port checks and verifies that the port is enabled.

Step 1 To display port information and ensure that the port is enabled, enter the following at the `cli>` prompt:

```
cli> show port <c.p> all
```

Where

<c.p> is the port number for which information is displayed. The port number is in card.port format (card = 2 to 10; port = 0 to 1).

Step 2 Check the receive data entry for excessive line errors, dropped packets, or the lack of receive data.

Step 3 Check the remaining line statistics for excessive line errors, dropped packets, or lack of receive data.

Step 4 Check that the Admin Status entry to is set to *up*.

Step 5 If the port is an LSC port, check the Measured Bit Rate entry. (See the section "Checking Bit Rates.")

Step 6 If the port is an MSC port, check the MSC port configuration parameters. (See the "Medium-Speed Configuration Parameters" section later in this chapter.)

Checking Bit Rates

To check the Measured Bit Rate entry, follow these steps.

Note The Measured Bit Rate entry applies only to low-speed cards.

Step 1 To display the port information, enter the following at the `cli>` prompt:

```
cli> show port <c.p> all
```

Where

<c.p> is the port number for which information is displayed. The port number is in card.port format (card = 2 to 10; port = 0 to 1).

Step 2 Review the Measured Bit Rate entry to ensure that it is legal.

Step 3 Compare the Measured Bit Rate with the Admin DCE Rcv Bit Rate entry**.** If the Measured Bit Rate is significantly different from the Admin DCE Bit Rate, a problem exists.

If the LS port is set as the DCE, it provides a clocking function. If it is set as DTE, it uses clocking supplied by the attached device (CSU/DSU or router).

A DCE provides a set of clock rates limited by the clock crystals it has available. If an attempt is made to activate an invalid bit rate, the following trap displays:

```
(INFO) LCC_3037 at 19.28/94 14:27:52 EDT (10/28/94 18:27:52 GMT)
LCC port 7000 unable to source clock at 70001 bits/second.
```

If that trap is displayed, the Admin DCE Bit Rate does not equal the Oper DCE Bit Rate**.** Otherwise, if the port is a DTE, one of several problems could exist. Since the correct clock is not being detected, one of two problems may exist:

- The wrong cable type was used to connect the local LS2020 port and the device.
- The device being connected to is not providing a clock function.

Step 4 If the Measured Bit Rate is correct**,** a problem may still exist. Check to see if there is a total lack of receive data or a very high Receive Errors rate. Make a note of the Octets Rcvd and Normal Packets Rcvd entries.

If the port is configured as DCE, the measured bit rate simply shows that the port is correctly generating transmit clock. Receive clock is provided by the host or external trunk, which must reflect the transmit clock. (Some vendors do not adhere to the physical layer requirement in this regard.) This situation is marked by a total lack of receive data or a very high Receive Errors rate on the receive data.

Step 5 If there is a total lack of receive data or a very high error rate on the receive data, review the physical layer connection.

Medium-Speed Configuration Parameters

On a medium-speed line card (MSC), a high error rate or a total lack of errors with data transfer not working can be caused by an incorrect setting of the cell payload scrambling attribute, the DS3 line type, or the cable length attributes. The next sections describe two parameter mismatches and some of their symptoms.

Note Cell payload scrambling appears as PLCP scrambling in some displays.

Mismatched Cell Payload Scrambling

On MSC trunks, cell payload scrambling is disabled by default. If one end of a trunk has cell payload scrambling *enabled* and the other end has cell payload scrambling *disabled*, packets appear to be received and transmitted without error in the port statistics display. The trunks will never come up, however, because the payload of the cells is scrambled at one end and not unscrambled at the other end. This causes the TUD protocol to fail.

A UNI port also appears to function normally without transmit or receive errors. However, the hosts that eventually try to reassemble the cells into useful data find that the data is corrupted. A series of AAL5 CRC errors occur if the calls carry AAL5-encoded data.

Incorrect Line Type

If the Line Type parameter is set incorrectly (dsx3Linetype mismatch), a very low error rate appears. An idle trunk regularly counts a receive error every 3 to 5 seconds.

Mismatched Framing on T3/E3 Ports

If you have difficulty bringing up a trunk port or UNI port, it may be because the two ends are not configured for the same framing type. Both ends must use the same framing type (PLCP, HEC, or G.804).

If there is a mismatch, the line status field in the output of the **show port** command displays the value “DS3_other_failure” for both ports.

To check the line status parameter, enter the **show port c.p physical** command.

To set the framing type so that it matches the other end, enter the **set port c.p characteristics framing type {plcp | t3-hec | g-804}** command.

Checking Connections

To check connections, follow these steps:

Step 1 If LS2020 ports are directly connected to a host, ensure that one side is configured as a DCE and that the other side is configured as a DTE.

Step 2 If the LS2020 ports are connected through CSUs, ensure that both ports are configured as DTEs.

Step 3 To display the port information, enter the following at the `cli>` prompt:

```
cli> show port <c.p> all
```

Where

<c.p> is the port number for which information is displayed. The port number is in card.port format (card = 2 to 10; port = 0 to 1).

If a port is configured as a DTE, the clock rate being received and used to transmit is shown as the Measured Bit Rate entry.

Step 4 Check the Measured Bit Rate entry (for low-speed cards only). If it is not similar to the Admin DCE Bit Rate entry and the port is correctly configured as a DTE, a hardware fault or cable problem exists. Run diagnostics on the port. See the *LightStream 2020 Hardware Reference and Troubleshooting Manual* for detailed instructions on how to run the diagnostics and how to interpret the results.

Checking Receive Data

To check the receive data, follow these steps:

Step 1 To display the line statistics, enter the following at the `cli>` prompt:

```
cli> show port <c.p> statistics
```

Step 2 Note the Octets Rcvd and Normal Cells Rcvd statistics:

```
cli> show port 5001 statistics
Octets Rcvd:              256748059
Normal Cells Rcvd:        4844303
```

Step 3 To determine if the statistics are increasing, repeat the command by entering the following at the `cli>` prompt or by entering ^P:

```
cli> show port <c.p> statistics
```

Step 4 Review the Octets Rcvd and Normal Cells Rcvd statistics. (See the changes in the following statistics.) If the statistics increase, the port is receiving data.

```
cli> show port 5001
Octets Rcvd:             256748059   (Delta: 5830   Rate: 971.66/sec)
Normal Cells Rcvd:       4844303     (Delta: 109    Rate: 18.16/sec)
```

Step 5 If the Octets Rcvd and Normal Cells Rcvd statistics do not increase, the port is not receiving data. Check clocking and cabling.

Checking Line Statistics

To check line statistics, follow these steps:

Step 1 To display the line statistics, enter the following at the `cli>` prompt:

```
cli> show port <c.p> statistics
```

Step 2 Note the Octets Rcvd and Normal Cells Rcvd statistics:

```
cli> show port 5001 statistics
Octets Rcvd:               256748059
Normal Cells Rcvd:         4844303
```

Step 3 To determine if the statistics are increasing, repeat the command by typing the following at the `cli>` prompt or by entering ^P:

```
cli> show port <c.p> statistics
```

Step 4 Review the Octets Rcvd and Normal Cells Rcvd statistics. If the statistics increase, the host or remote trunk is sending data.

Step 5 If the Octets Rcvd and Normal Cells Rcvd statistics do not increase, see the previous sections entitled “Performing Basic Port Checks,” “Checking Bit Rates,” and “Checking Connections.”

Step 6 Review the Discarded Rcvd Cells statistic. If no VCs exist to carry the incoming data or if that data is being dropped by the UPC code for the given VCs, the Discarded Rcvd Cells statistic increases. See the “Diagnosing VC Problems” section later in this chapter.

Step 7 Review the Receive Errors statistic. If the incoming data is being received incorrectly, the Receive Errors statistic increases. If the statistic is increasing, see the sections entitled “Performing Basic Port Checks,” “Checking Bit Rates,” and “Checking Connections.” If CSUs are in use, review the CSU statistics for that CSU.

Step 8 Review the Octets Sent and Normal Cells Sent statistics. If data is being sent out from a port, the Octets Sent and Normal Cells Sent statistics increase. This should always be the case for a trunk, and it should also occur with FR if NNI is selected with a non-null LMI type.

Step 9 Review the Output Errors statistic. If there is a problem transmitting data, the Output Errors statistic increases.

Checking CSU Statistics

The LSC CSU statistics are available only by means of a connection to the CSU through a serial line. If the CSU is connected to the DSU/CSU control port, the CSU can be reached with the **csumon** command from the Lynx shell. The CSU statistics for the MSC are available through use of the standard DS3 MIB variables; some can also be displayed through use of csumon. The CSU statistics for the CLC/OC3 card are available through use of the SONET MIB.

Checking LSC Trunks

If the trunk does not come up or the Frame Relay port does not come up, perform the following steps to determine the problem.

Trunk Does Not Come Up

Step 1 To display the port information, enter the following at the `cli>` prompt:

```
cli> show port <c.p> statistics
```

The following is an example of the show port statistics display:

```
cli> show port 5001 statistics

Octets Rcvd:               234061260
Normal Packets Rcvd:       294944229
Multicast Pacets Rcvd:     0
Discarded Rcvd Packets:    107
Receive Errors:            56702
Unknown Protocols Rcvd:    0
Octets Sent:               1068586222
Normal Packets Sent:       2046089974
Multicast Packets Sent:    0
Discarded Output Packets:  8490
Output Errors:             12
```

Step 2 Check the port at each end of the trunk with the command shown in Step 1. Make sure that both ports are periodically sending cells.

Step 3 Review the Octets Sent statistic to verify that it is increasing.

Step 4 If one side of the trunk is not sending, make sure it is enabled as a trunk. See the section "Performing Basic Port Checks" earlier in this chapter. If one port never sends Trunk-Up-Down messages, make sure the card is correctly configured as a trunk card.

If port 0 is not configured on a card, the card type as configured in the line card EEPROM determines the operational type of the card. In this case, the configuration values on the remaining ports are rejected and a trap is generated.

To solve this problem, configure a trunk on port 0. You can configure it as *inactive*, if desired. When the configuration is downloaded, the line card EEPROM is updated and the line card and LCC process are both restarted.

Step 5 If both sides of the trunk show that they are sending cells, find out which side is not receiving cells. Follow the steps in the section "Performing Basic Port Checks" earlier in this chapter to determine why the trunk ports cannot communicate.

If a Frame Relay port does not come up (the administrative status is *up*, but the operational status is *down*), follow the steps in the section "Frame Relay Port Does Not Come Up" to determine the problem.

Frame Relay Port Does Not Come Up

Step 1 Follow the steps in "Performing Basic Port Checks" earlier in this chapter.

Step 2 Make sure that both the Frame Relay DCE and the Frame Relay host are configured to use the same LMI protocol. Both must use FRIF, ANSI, or ITU/TSS**.**

Step 3 Make sure that the LS2020 port is correctly configured as a UNI port or NNI port. A UNI protocol should usually be used as the NNI protocol is designed for network device to network device connection and is rarely used.

Step 4 To display the port information, enter the following at the `cli>` prompt:

```
cli> show port <c.p> all
```

Step 5 Check that the Normal Packets Received statistic is increasing. A packet should be received every 10 seconds. The FR host is responsible for sending a status enquiry at periodic intervals. (The default for this interval is 10 seconds.) If the Normal Packets Received statistic is increasing, continue with Step 7, below.

Step 6 Review the Discarded Received Packets statistic. If the Discarded Received Packets entry is increasing, the packets are coming in, but on a different DLCI.

This occurs when an incorrect LMI type is selected. (The FRIF LMI DLCI is 1023. The ANSI and ITU/TSS LMIs use DLCI 0.) Check these settings again or test by switching the LMI type to see if the FR port becomes active.

Step 7 If the LMI does not come up, make sure that packets are being received on the LMI DLCI.

Each time a frame is received with the FR LMI DLCI, the MIB variable frameRelayDlciToSwCLP0Frames.port.lmidlci should increase. For example, using an ANSI LMI on card 7 port 4, read the MIB variable frameRelayDlciToSwCLP0Frames.7004.0. If that variable is not readable, it means the port is not configured as an active FR port with that same LMI. Review the MIB variables to be sure.

Step 8 If the frameRelayDlciToSwCLP0Frames variable increases, check to see that it is being processed correctly. You may need more trap information from the FR DCE port. Proceed to Step 9, below.

If the frameRelayDlciToSwCLP0Frames variable is not increasing, the frames are not being received with the correct DLCI.

Step 9 To determine if the LCC is having trouble receiving or interpreting the LMI packets, enter the following at the `cli>` prompt:

```
cli> set trap “LCC_3*”
```

If the LCC-based LMI module is enabled and is not responding to STATUS_ENQUIRY messages, an LCC trap should be seen periodically. (The default is every 10 seconds.) Table 6-1 lists some of the potential LCC traps, their meanings, and some possible or required actions.

Table 6-1 LCC Traps Text, Definitions, and Actions

Trap Text	Definition	Action
LCC_3000 “lccFrLmiSendVc write error portid %d”	Indicates an internal error.	Report this problem to Cisco Systems, Inc.
LCC_3008 “Frame Relay Port %d - data unused DLCI %d”	An LMI type mismatch exists. If the DLCI reported is 1023, the host is sending FRIF frames and the Frame Relay edge port is configured for ANSI or ITU/TSS. If the DLCI reported is 0, the host is sending ANSI or ITU/TSS frames to an FR edge port configured for FRIF.	Verify the configuration on the attached equipment, and change the LS2020 Frame Relay port to match.
LCC_3013 “Frame Relay Port %d - LMI unknown IE %d at offset %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify the configuration on the attached equipment, and change the LS2020 Frame Relay port to match.
LCC_3017 “Frame Relay Port %d - LMI missing mandatory IE, mask=%x”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify the configuration on the attached equipment, and change the LS2020 Frame Relay port to match.
LCC_3027 “Frame Relay Port %d - LMI missing lockshift5”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify the configuration on the attached equipment, and change the LS2020 Frame Relay port to match.
LCC_3005 “Frame Relay Port %d - frame too small”	There are serious incompatibilities or corruption of data.	Check that the attached equipment is configured for Frame Relay and check the line quality.

Trap Text	Definition	Action
LCC_3006 “Frame Relay Port %d - EA bit incorrect”	This indicates serious incompatibilities or corruption of data.	Verify that the attached equipment is configured for Frame Relay and check the line quality.
LCC_3007 “Frame Relay Port %d - data on unstarted DLCI %d”	The edgeport device is sending data on a DLCI that does not have PVCs configured for it.	Verify the end user equipment configuration. You may need to configure a new PVC for the LS2020 network.
LCC_3009 “Frame Relay Port %d - Frame too small, size %d”	This indicates serious incompatibilities or corruption of data.	Verify that the attached equipment is configured for Frame Relay and check the line quality.
LCC_3010 “Frame Relay Port %d - Invalid LMI header at offset %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify the configuration on the attached equipment and change the LS2020 Frame Relay port to match.
LCC_3011 “Frame Relay Port %d - Invalid LMI message type %d”	The equipment is noncompliant, the port is configured as an LMI type Q.933-a, or the edge port device supports a feature that the LS2020 switch does not. For example, the asynchronous status notification message.	Ignore the message or configure the edge port device not to send the asynchronous status notification message (if applicable).
LCC_3012 “Frame Relay Port %d - LMI IE Truncated at offset %d”	This indicates serious incompatibilities or corruption of data.	Verify that the attached equipment is configured for Frame Relay, and verify the line quality.
LCC_3014 “Frame Relay Port %d - Repeated LMI mandatory IE %d at offset %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3015 “Frame Relay Port %d - LMI frame contains wrong IE %d at offset %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3016 “Frame Relay Port %d - LMI message contains %d excess bytes”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3018 “Frame Relay Port %d - LMI received invalid report type %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.

Trap Text	Definition	Action
LCC_3019 “Frame Relay Port %d - LMI frame contained invalid PVC DLCI %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3020 “Frame Relay Port %d - LMI frame reported too many PVCs”	The Frame Relay LMI has been configured for too few PVCs for a port.	Increase the Max Supported Vc variable to be equal to or greater than the number of VCs allowed on that port.
LCC_3021 “Frame Relay Port %d - LMI frame received with DLCIs misordered”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3022 “Frame Relay Port %d - LMI expected report type %d, got %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3026 “Frame Relay Port %d - LMI out of buffers to send message”	The NP is being overused.	Report this problem to Cisco Systems, Inc.
LCC_3028 “Frame Relay Port %d - LMI frame contained invalid PVC status”	Either noncompliant equipment problems or a piece of the equipment does not have the same revision of the standard the LS2020 equipment has.	Check the configuration on the attached equipment or configure the standards to match one another.
LCC_3029 “Frame Relay Port %d - Provider Primitives invalid/incomplete”	Failed internal consistency checks.	Report this problem to Cisco Systems, Inc.
LCC_3030 “Frame Relay Port %d - LMI bad IE length %d at offset %d”	The equipment is noncompliant or the port is configured as an LMI type Q.933-a.	Verify that the attached equipment is configured for Frame Relay, and check the line quality.
LCC_3025 “Frame Relay Port %d - LMI”	The Max Supported VCs was set incorrectly, or the card Max Supported VCs was set incorrectly.	Reset the Max Supported VC and card Max Supported VC attributes correctly.
LCC_3036 “FR Port %d LMI timer expired without required message, Imi DLCI %d, user (1)/net(2) %d”	The local LMI sends this trap if it is not receiving valid STATUS_ENQUIRY messages or if an NNI is not receiving valid STATUS messages.	Verify that both the LS2020 port and edge equipment have compatible values for the net request interval and polling interval.
LCC_3023 “Frame Relay Port %d - LMI sequence number mismatch, expected %d received %d”	Some messages are being lost between the edge port and the host.	Verify that edge equipment can support the data rate being used.
LCC_3024 “Frame Relay Port %d - LMI reply is not for last enquiry, current %d last %d”	Some messages are being lost between the edge port and the host.	Verify that edge equipment can support the data rate being used.

Diagnosing VC Problems

If an FR, FF, UNI, or CBR VC is not created or if no data is being delivered over an FR VC, perform the procedures in this section.

An FR, FF, UNI, or CBR PVC Fails to Be Created

Step 1 Verify that the VC is configured on both end points with the CLI **show port <c.p>** command. If one end point is missing, is inactive, or is on an inactive port, the VC is not created.

Step 2 Look at the explanation in the Last ATM Error variable for that VC. Table 6-2 lists the most common errors, their definitions, and user actions.

If no data is being delivered over an FR VC, perform the steps in the next section, "No Data Being Delivered over a Frame Relay VC."

Table 6-2 lastAtmError Text, Definitions, and Actions

Error Text	Definition	What to Do
No flow resources	The cardMaxVCs attribute is set too low.	Increase this value and reboot that line card.
No connect resources	The cardMaxVCs attribute is set too low.	Increase this value and reboot that line card.
Invalid connect request	The VC has illegal attributes set.	Review the bandwidth values in particular. A VC cannot have a MaxRate larger than the port. Also, certain combinations of parameters are illegal. If a VC uses "guaranteed" bandwidth, it is not allowed to have any excess bandwidth; the insured rate must equal the max rate.
Unknown destination	The local node is out of communication with the destination node.	Check to see if any trunks are down that are supposed to connect the nodes.
Not enough outbound bandwidth	No path exists with sufficient bandwidth to support the VC.	Review the VC attributes. The Cells Required attribute shows how many cells worth of bandwidth are needed to carry that VC over a trunk.
No path	No path exists with sufficient bandwidth to support the VC.	Review the VC attributes. The Cells Required attribute shows how many cells worth of bandwidth are needed to carry that VC over a trunk.
Destination refused connection	The remote end of the VC is refusing the connection.	Review the VC settings on the remote end point.
Not enough inbound bandwidth	Not enough bandwidth exists on the source port for this VC.	Check the Cells Required attributes to determine the bandwidth required to carry that VC over the source port. Check the Cells Available attribute to determine the bandwidth that has not been allocated to other VCs.

No Data Being Delivered over a Frame Relay VC

Step 1 To check the VC status, enter the following at the `cli>` prompt:

```
cli> show port <c.p> dlci <dlci#>
```

Where

<c.p> is the port that contains the DLCI you want to view. The port number is in ccppp or card.port format (card = 2 to 10; port = 0 to 7).

<dlci#> is the number of the DLCI you want to view. The DLCI number can be between 16 and 991.

Step 2 If the VC has been established, review the statistics for the VC by typing the following at the `cli>` prompt:

```
cli> walksnmp lsFrameRelayDlciStatTable
```

As a result, text similar to the following appears:

```
Name:  frameRelayDlciStatPortIndex.3003.39 Value: 3003
Name:  frameRelayDlciStatPortIndex.3003.40 Value: 3003
Name:  frameRelayDlciStatPortIndex.3003.41 Value: 3003
Name:  frameRelayDlciStatPortIndex.3003.42 Value: 3003
.
.
.
cli>
```

Partial Data Is Being Delivered over the FR, FF, or UNI PVC

If partial data is being delivered over the FR, FF, or UNI PVC, check to see if the network is congested.

Partial Data Is Being Delivered over the CBR PVC

If partial data is being delivered over the CBR PVC, you need to reconfigure your targetdepth and maxdepth parameters to compensate for random cell delay variation.