4

Monitoring a LightStream Switch

This chapter tells you how to determine the status of LightStream 2020 (LS2020) enterprise ATM switches and their components. It shows command examples and explains how you can obtain additional information.

This chapter also provides the monitoring procedures for the CLI, the LS2020 monitor and the LS2020 topology map. The monitor displays a graphical representation of an LS2020 switch, its cards and ports, and the topology map displays a graphical representation of the LS2020 network.

Introduction to Monitoring

Two tools are available for monitoring the LS2020: the LS2020 monitor program and the CLI. In the monitor program, you click on components to display information about them. In the CLI, you use the **show** command to monitor a switch or its components. When you issue a **show** command, the switch retrieves the requested information from the MIB. You may see a collection of MIB attributes displayed or you may see only a single attribute. You can monitor the following LS2020 components and subsystems:

- Bridge, IP, and IPX filters
- Card
- Chassis
- CLI display
- Collector
- Connections
- Modem
- Switch cards, NPs, and power supplies
- Port
- CLI attribute settings
- Processes (global information distribution and neighborhood discovery)
- Test and Control System (TCS)
- SNMP parameters
- Traps

CLI procedures to monitor all of these components and subsystems, except traps, are described next. See the *LightStream 2020 Traps Reference Manual* for descriptions on trap monitoring.

Using the CLI to Monitor Hardware Components

This section provides the steps for monitoring the hardware components of an LS2020 switch:

- Chassis

- Cards
- Ports
- DSU/CSUs
- Modems
- Redundant components

Monitoring a Chassis

To monitor the chassis, follow these steps. The information that displays applies to the LS2020 switch.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see the section on "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 Enter the following at the cli> prompt:

```
cli> show chassis <parameter>
```

where

<parameter>= all (default)
general
agent
congestion
primaryswitch
powersupply
card
listff
listdlci
listvci
listtrunk
listpvc

Figure 4-1 and Figure 4-2 show what information displays when you enter **show chassis all**.

Figure 4-1 Example of the show chassis all Command

```
cli> show chassis all
Name:                          Light7
Description:                   ATM Data Switch
Contact:                       Jim Smith
Location:                      New York
System Up Time:                39 Hr 26 Min 27 Sec

R2.1:
Software Version: xxxxx
Console Trap Level:            Oper
Chassis ID:                    5143
Slot of Primary NP:            1
Slot of This NP:               1
Primary Addr:                  127.1.32.47
Secondary Addr:                0.0.0.0
Subnet Mask:                   255.255.255.0
Ethernet Address:              127.1.22.47
Ethernet IP Mask:              255.255.255.0
Default Router:                127.1.22.1

MMA Trap Filter Level:         Oper
MMA Trap Logging State:        On
MMA Collection Size:           32 KB
Config DB Active:              On
MMA PID:                       11
Configuration Host:            Light2
Configuration Author:          rwilliams
Configuration ID:              26

Maximum Interval between Permit Limit Updates:       5000 ms.
Minimum Interval between Permit Limit Updates:       1000 ms.
Minimum Interval between CA Updates:                 1000 ms.
Primary Switch:                Switch A
Power Supply A:                Empty
Power Supply A Type:           Empty
Power Supply B:                Good
Power Supply B Type:           Todd Power Supply

Slot 1:          NP
Slot 2:          LS Trunk
Slot 3:          LS Edge
Slot 4:          LS Edge
Slot 5:          MS Trunk
Slot 6:          ATM-UNI
Slot 7:          Empty
                                                    (Continued)
```

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Figure 4-2 Example of the show chassis all Command (continued)

```
Slot 8:          Empty
Slot 9:          Empty
Slot 10:         Empty
Slot SA:         Switch
Slot SB:         Empty

                    Frame forwarding connections list:

S Node    Port      Node   Port      IR        IB        MR        MB
* Light7  4.4 <±> Light2   7.0       511841    1491      511841    1491
  Light7  4.5 <±> Light2   7.3       511841    1491      511841    1491
* Light7  4.6 <±> Light2   3.1       1791955   1491      1791955   1491
  Light7  4.7 <±> Light2   3.2       1791955   1491      1791955   1491

                          Frame Relay DLCI list:

S  Node   Port  DLCI     Node  Port  DLCI  IR        IB       MR       MB
* Light7  3.0   31 <±> Light2  2.1   12    31713     1491     63767    3026
* Light7  3.0   32 <±> Light2  2.3   15    31713     1419     63767    3026
  Light7  3.0   33 <±> Light4  3.2   42    31713     1419     63767    3026
  Light7  3.0   34 <±> Light4  3.3   43    31713     1419     63767    3026
* Light7  3.0   35 <±> Light4  9.1   44    31713     1419     63767    3026
  Light7  3.0   36 <±> Light6  9.2   45    31713     1491     63767    3026

                          ATM±UNI VCI list:

S Node    Port  VCI       Node   Port   VCI  IR      IB     MR     MB
  Light7  6.0   1023 <±> Light2  6.0    16   9434    1000   9434   1000
* Light7  6.0   1025 <±> Light2  6.0    16   9434    1000   9434   1000
  Light7  6.0   1026 <±> Light2  6.0    16   9434    1000   9434   1000
  Light7  6.1   1025 <±> Light2  6.1    16   9434    1000   9434   1000
...

cli>
```

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Note The column labeled S indicates the state of the connection. If there is an asterisk in the state column for a particular connection, the connection is down. If the state column is blank, the connection is up.

If you enter any parameter except **all**, a subset of the previous screen shown displays. For example, if you enter the command **show chassis agent**, information similar to the following is displayed:

```
cli> show chassis agent
MMA Trap filter Level:            Oper
MMA Trap Logging State:           On
MMA Collection Size:              32 KB
Config DB Active:                 On
MMA PID:                          11
Configuration Host:               boston
Configuration Author:             Bob Williams
Configuration ID:                 26
cli>
```

Monitoring Cards

You can monitor network processor (NP) cards, edge cards, trunk cards, and switch cards. You select the card you want to monitor by specifying its card number (slot number).To determine a card's slot number, you can look at the front of the system to see the numbered slots as shown in Figure 4-19. When you specify a card, you also get information on its associated access card. To monitor the cards in the LS2020 switch, follow these steps.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see the section on "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 Enter the following at the cli> prompt:

```
cli> show card <card #> <parameter>
```

where

<card #> = The slot in which the card you want to monitor is located.
1 - 2 for NP cards
2 - 10 for line cards
switcha or switchb for switch cards

<parameter>= all (default)
name (no information available for switch cards)
processid
status
version
peak-cell-rate
hardware
ports (no information available for NP or switch cards)

The results of this command will vary, depending on the type of card in the slot. If you enter any parameter except the **all** parameter, a subset of the attributes displays.

When you enter **show card 5 all**, information similar to the following (for a low-speed edge card) is displayed as shown in Figure 4-3:

Figure 4-3 Example of the show card all Command

```
cli> show card 5 all
Card Name:                    Light7.5_ls-e
Card PID:                     19
Operational Status:           Up
Administrative Status:        Up
Configuration Register:       Up

LC Software Version:          Version: 1.2 Compiled cp_ms1.aout:compiled
Jul 21 1994 @ 01:59:54

LCC Software Version:         LCC (Version 1.000 of Jul 21 1994)

Card Type:                              LS Edge
Temperature Top:                        88 F
Temperature Bottom:                     76 F
TCS Voltage:                            5.151 volts
VCC Voltage:                            5.078 volts
Vee Voltage:                            ±4.978 volts
Temperature Paddle Card Region 1:       89 F
Temperature Paddle Card Region 2:       78 F

Port  5000 Frame Forwarding Name:       Light7.5.0_ff
Port  5001 Frame Relay  Name:           Light7.5.1_fr
Port  5002 Frame Relay  Name:           Light7.5.2_fr
Port  5003 Frame Relay  Name:           Light7.5.3_fr
Port  5004 Frame Relay  Name:           Light7.5.4_fr
Port  5005 Frame Forwarding Name:       Light7.5.5_ff
Port  5006 Frame Forwarding Name:       Light7.5.6_ff
Port  5007 Frame Forwarding Name:       Light7.5.7_ff

cli>
```

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Monitoring DSU/CSU Statistics

The **csumon** tool, available from the bash shell, lets you monitor the DSU/CSU for the following:

- Low-speed line card
- Medium-speed line card

In addition, you can use **csumon** to issue commands to an external DSU/CSU attached to a low-speed interface.

Monitoring the DSU/CSU on a Low-Speed Line Card

You can obtain CSU statistics by connecting to an external data service unit/channel service unit (DSU/CSU) from an LS2020 switch through a serial line. This provides a terminal to the DSU/CSU. You use its own interface to set up and monitor the DSU/CSU. (See the documentation for the DSU/CSU for details.)

Step 1 Connect the LS2020 switch to the external DSU/CSU by connecting an EIA/TIA-232 serial cable from the control port on the fantail to the CSU craft (or console) port.

Note EIA/TIA-232 and EIA/TIA-449 were known as recommended standards RS-232 and RS449 before their acceptance as standards by the Electronic Industries Association (EIA) and Telecommunications Industry Association (TIA).

Step 2 To access the bash prompt, log in as root or fldsup on the LS2020 switch to which the DSU/CSU you want to monitor is attached.

Step 3 Test the connection by using the following command:

```
bash csumon <.card.port#>
```

where

<.card.port#> = The target switch card and port number in the LS2020 switch, entered in .card.port format (card 2 - 10; port 0 - 7)

Note You must use the leading "." in the card and port entry shown above.

Figure 4-4 shows a screen displaying the kind of information you might see in a DSU/CSU status display. The display you see may vary, depending on the DSU/CSU you are using.

Figure 4-4 Example - csumon Display for a Low-Speed Line Card

```
bash$ csumon .7.5

    ========== P O R T 5 ==========   ========== P O R T 6 ==========

     Current   Intrvl 7      Total    Current   Intrvl 7        Total

PES       0          0         2          0          0            2
PSES      0          0         2          0          0            2
SEFS      0          0         2          0          0            2
UAS       0          0         6          0          0            9
LCV       0          0         0          0          0            0
PCV       0          0         2          0          0            0
LES       0          0         0          0          0            0
CCV       0          0         2          0          0            0
CES       0          0         2          0          0            2
CSES      0          0         2          0          0            2

CONFIG T1,  NORM,  CBIT, SHORT          T1,  NORM, CBIT, SHORT
STATUS OK                               OK

CELLS IN:   20936  OUT:       20998     IN   20925   OUT:        20990
================================        ============================
Enter: ? to refresh, + to increment interval, ± to decrement interval
```

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Step 4 While the statistics are displayed, you can enter the following input to refresh the screen or alter the counter display.

Input	Action
?	Refresh screen
+	Display the next interval counters
-	Display the previous interval counters

Step 5 Terminate the display by pressing **^C**. This returns you to the bash prompt.

Step 6 To learn about commands you can issue to the DSU/CSU, consult its documentation. To obtain help on **csumon**, enter the following command at the bash prompt:

```
bash csumon
```

Monitoring the DSU/CSU on a Medium-Speed Line Card

The medium-speed line card (MSC) has a built-in DSU/CSU. Use the following steps to monitor and display the DS3 MIB statistics for MSC ports. MSC CSU statistics are available using the standard DS3 MIB variables.

Step 1 To access the bash prompt, log in as root or fldsup to the LS2020 switch.

Step 2 Enter the following at the bash prompt:

```
bash csumon <.card.port#>
```

where

<.card.port#> = The target switch card and port number in the LS2020 switch, entered in .card.port format (card 2 - 10; port 0 - 7).

Note You must use the leading "." in the card and port entry shown above.

A screen similar to the one in Figure 4-5 is displayed. Although you enter only one port number, information for both ports on the MSC displays.

Figure 4-5 Example - csumon Display for a Medium-Speed Line Card

```
LSnode:2$ csumon .7.0

MS1 Line Card S/W Version:      1.2
Time Since Line Card Boot:      1 hour 46 minutes 9 seconds
Current Interval Elapsed Time:  1 minute 7 seconds
Number of Valid Intervals:      7

    ========== P O R T 0 ==========   ========== P O R T 1 ==========

     Current   Intrvl 7      Total    Current   Intrvl 7        Total

PES        0          0          2          0          0            2
PSES       0          0          2          0          0            2
SEFS       0          0          2          0          0            2
UAS        0          0        804          0          0          804
LCV        0          0       1786          0          0         1786
PCV        0          0          2          0          0            0
LES        0          0          0          0          0            0
CCV        0          0          2          0          0            0
CES        0          0          2          0          0            2
CSES       0          0          2          0          0            2

CONFIG T3,  NORM,  CBIT, SHORT          T3,  NORM, CBIT, SHORT
STATUS OK                               OK

CELLS IN:   20936  OUT:        20998    IN   20925   OUT:        20990
=================================       ==============================
Enter: ? to refresh, + to increment interval, ± to decrement interval
```

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The DS3 MIB maintains these counters over a 24-hour period in 15-minute intervals. The Total column in the display includes up to 96 complete intervals. The Current column includes all counts that will make up the next complete interval. The Intrvl column shows the selected complete interval (from 1 to 96), depending on the actual number of complete intervals. The values that change are updated once per second.

Table 4-1 lists the counters and their definitions.

Table 4-1 csumon Display Term Definitions

Counter[1]	Definition
PES	P-bit Errored Seconds
PSES	P-bit Severely Errored Seconds
SEFS	Severely Errored Framing Seconds
UAS	UnAvailable Seconds
LCV	Line Coding Violations
PCV	P-bit Coding Violations
LES	Line Error Seconds
CCV	C-bit Coding Violations
CES	C-bit Errored Seconds
CSES	C1-bit Severely Errored Seconds
Status Term	**Definition**
OK	No alarms present
RED	Loss of Framing
YELLOW	Far End Receive Failure
BLUE	Receiving an Alarm Indication Signal

[1] See RFC 1407 for a further description of these counters.

Step 3 While the statistics are displayed, you can enter the input shown below to refresh the screen or alter the counter display.

Input	Action
?	Refresh screen
+	Display the next interval counters
-	Display the previous interval counters

Step 4 Terminate the display by pressing **^C**. This returns you to the bash prompt.

Step 5 To obtain help on **csumon**, enter the following command at the bash prompt:

```
bash csumon
```

Monitoring Ports

These steps allows you to monitor the ports on a particular card. You can look at information for a single port, a collection of ports, or a range of ports.

Note No information is available for ports on NP and switch cards.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 Enter the following at the cli> prompt:

```
cli> show port <port#> <parameter1> <parameter2>
```

where

<port#> = The number of the port for which information displays. The port number is in card.port format (card = 2 - 10; port = 0 - 7).

<parameter> = all (default)
name
status
statistics
physical
frameforward
framerelay
listdlci
listpvc
listvci
dlci
vci
vpi
fddi
datarate
wgrp
bflt
ipflt
ipxflt
np-deliver
sonet
stb
bflt-def
ipflt-def
ipxflt-def
bcast-limit

An example for each of the port types is shown in this section. Figure 4-6 is an example of the display you see when you enter **show port 5.0 all** for an MS trunk port.

Figure 4-6 Example of the show port all Command for an MS Trunk Port

```
cli> show port 5.0 all
Description:                  Medium Speed Trunk Line Card Rev 1.0
Port Name:                    Light5.5.0_t3
Port Type:                    MS Trunk
MIB2 Type:                    ds3
Port MTU:                     53 Octets
Port Speed:                   44736000 bps

Admin Status:                 Up
Oper Status:                  Up
Last Oper Change:             13 Hr 45 Min 21 Sec ago

Octets Rcvd:                  7247432
Normal Packets Rcvd:          136744
Multicast Packets Rcvd:       0
Discarded Rcvd Packets:       26
Receive Errors:               294
Unknown Protocols Rcvd:       0
Octets Sent:                  7347920
Normal Packets Sent:          164430
Multicast Packets Sent:       0
Discarded Output Packets:     0
Output Errors:                26

Oper Protocol:                T3 Trunk
Admin Protocol:               T3 Trunk
Port Data Cell Capacity:      93120 cells
Port Available Capacity:      93120 cells
Link Transmit Utilization:    22
Cell Payload Scrambling:      Disabled
Cable Length (in feet):       0±450
Framing Type:                 Clear Channel
cli>
```

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Note When the Operational Status for the trunk port is down, the Port Available Capacity field shows the capacity that has been configured for the trunk port, rather than a capacity of zero (0).

Figure 4-7 and Figure 4-8 are examples of the display you see when you enter **show port 3.0 all** for a frame forwarding port.

Figure 4-7 Example of the show port all Command for a Frame Forwarding Port

```
cli> show port 3.0 all
Description:                Low Speed Edge Line Card Rev 1.0
Port Name:                  Light5.3.0_ff
Port Type:                  LS Edge
MIB2 Type:                  ds1
Port MTU:                   1516 Octets
Port Speed:                 1536000 bps

Admin Status:               Up
Oper Status:                Up
Oper loop:                  none
Admin loop:                 none
Last Oper Change:           13 Hr 43 Min 56 Sec ago

Octets Rcvd:                42162
Normal Packets Rcvd:        4885
Multicast Packets Rcvd:     0
Discarded Rcvd Packets:     0
Receive Errors:             0
Unknown Protocols Rcvd:     0
Octets Sent:                42564
Normal Packets Sent:        4945
Multicast Packets Sent:     0
Discarded Output Packets:   0
Output Errors:              0

Port Type:                  v35
Oper CSU Type:              Unknown
Admin CSU Type:             Unknown
Oper DCE Bit Rate:          1536000 bps
Admin DCE Rcv Bit Rate:     1536000 bps
Oper DCE Xmit Bit Rate:     1536000 bps
Measured Bit Rate:          1536000 bps
Link Transmit Utilization:  0 cells/sec
Admin Expected DTE Rate:    1536000 bps
Oper Net Interface Type:    dte
Admin Net Interface Type:   dte
Oper Protocol:              Frame Forwarding
Admin Protocol:             Frame Forwarding
LC Auto Enable State:       Disabled
LC Debug Level:             0
Port Data Cell Capacity:    0 cells
Port Available Capacity:    0 cells
```

(Continued)

Figure 4-8 Example of the show port all Command for a Frame Forwarding Port (Concluded)

```
Call Setup Retry Time:          0
Call Setup Backoff Time:        0
Oper Max Frame Size:            1516
Modem Status:                   DCD:0  DSR:0

Src Node:                       Light5
Src Port:                       3.0
Dest Admin Node:                Light3
Dest Operational Node:          Light3
Dest Admin Port:                7.3
Dest Operational Port:          7.3

Src Admin Insured Rate:         1536000 bps
Src Oper Insured Rate:          1535864 bps
Src Admin Insured Burst:        3000 bytes
Src Oper Insured Burst:         2983 bytes
Src Admin Max Rate:             1536000 bps
Src Oper Max Rate:              1535864 bps
Src Admin Max Burst:            3000 bytes
Src Oper Max Burst:             2983 bytes

Dest Oper Insured Rate:         1535864 bps
Dest Oper Insured Burst:        2983 bytes
Dest Oper Max Rate:             1535864 bps
Dest Oper Max Burst:            0 bytes

To-Net Circuit ID:              6
To-Net Circuit State:           Active
From-Net Circuit ID:            4
From-Net Circuit State:         Active
Last ATMM Error:                OK
Cells Required:                 4504

CLP=0 Frames to Switch:         2855597
CLP=0 Cells to Switch:          5706365
CLP=1 Frames to Switch:         2293693
CLP=1 Cells to Switch:          4587386
Discarded Frames:               0
Discarded Cells:                0
CLP=0 Frames from Switch:       1344755
CLP=0 Cells from Switch:        4033323
CLP=1 Frames from Switch:       448244
CLP=1 Cells from Switch:        1344623

cli>
```

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Monitoring Modems

To monitor the modem port on the switch card's console/modem assembly, follow these steps:

Note If you have a redundant switch card, you can monitor the modem port on either the active or backup switch card. This command is not used for monitoring modems connected to line card ports and is not available on the SUN4 version of the CLI.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 Enter the following at the cli> prompt:

```
cli> show modem <slot #> <parameter>
```

where

<slot #> = sa or sb for the switch cards

<parameter> =all
initstring

The following is an example of the display you see when you enter **show modem sa all:**

```
cli> show modem sa all
Initstring: AT&S&D2&&C1SO=1S7=3OS36=7S95=44
cli>
```

Monitoring Switch Cards, NPs, and Power Supplies

These steps tell you how to monitor the status of your redundant components (switch cards, NPs, and power supplies).

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 To look at the status of switch cards, enter the following at the cli> prompt:

```
cli> show chassis primaryswitch
```

This command indicates which switch card is the active switch card. If you have a second switch card, you can assume it is the backup switch card.

Step 3 To look at the slot associated with each of the NPs, enter the following at the cli> prompt:

```
cli> show chassis general
```

This command displays a number of details including the slot for the active NP, the slot of this NP, and the system up time. The system up time indicates how long this NP has been up.

Step 4 To look at the status of power supplies, enter the following at the cli> prompt:

```
cli> show chassis powersupply
```

This command displays the status and type of the two power supplies, A and B.

Figure 4-9 shows the output for the three commands previously described.

Figure 4-9 Example of the show chassis Commands

```
cli> show chassis primaryswitch
Primary Switch:      Switch A

cli> show chassis general
Name:                Light7
Description:         LightStream Data Switch
Contact:             Bob Williams
Location:            Cambridge
System Up Time:      63 Hr 28 Min 43 Sec

Software Version: xxxx
Console Trap Level: Oper
Chassis ID:          5145
Slot of Primary NP:  1
Slot of This NP:     1

Primary Addr:        192.1.74.77
Secondary Addr:      0.0.0.0
Subnet Mask:         255.255.255.0
Ethernet Address:    192.1.71.77
Ethernet IP Mask:    255.255.255.0
Default Router:      192.1.71.1

cli> show chassis powersupply
Power Supply A:      Empty
Power Supply A Type: Empty
Power Supply B:      Good
Power Supply B Type: 1200W AC Power Supply

cli>
```

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Using the CLI to Monitor Configuration and Status

This section provides steps to monitor configuration and status of the following connections and processes of an LS2020 switch:

- Connections (ATM UNI, frame relay, frame forwarding, Ethernet, FDDI, OC3, and CBR)
- Processes (CLI, collector, GID, and ND)

Monitoring ATM Connections

To monitor the ATM UNI virtual channel identifiers (VCIs) configured on a particular ATM UNI port, follow these steps. They provide you with information on the individual connections configured on each port. This information is available for ATM UNI ports only.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface." To get a list of all VCIs configured on a particular ATM UNI port, enter the following at the cli> prompt:

```
cli> show port <port#> listvci
```

where

<port#> = The number of the port for which information displays. The port number is in card.port format (card = 2 - 10; port =0 - 7).

Step 2 Once you have a list of all ATM-UNI VCIs, you can look at a particular VCI by entering the following at the cli> prompt:

```
cli> show port <port#> vci <vci#>
```

where

<vci#> = The number of the VCI for which information displays.

Figure 4-10 is an example of the display you see when you enter **show port 6.0 vci 16**.

Figure 4-10 Example of the show port vci Display

```
cli> show port 6.0 vci 16

Source Node:                 Light8
Source Port:                 6.0
Source VCI:                  16
Src Admin Insured Rate:      9434 cells/sec
Src Oper Insured Rate:       9434 cells/sec
Src Admin Insured Burst:     1000 cells
Src Oper Insured Burst:      1000 cells
Src Admin Max Rate:          9434 cells/sec
Src Oper Max Rate:           9434 cells/sec
Src Admin Max Burst:         1000 cells
Src Oper Max Burst:          1000 cells

Dest Oper Node:              Light6
Dest Oper Port:              9.0
Dest Oper VCI:               16
Dest Oper Insured Rate:      9434 cells/sec
Dest Oper Insured Burst:     1000 cells
Dest Oper Max Rate:          9434 cells/sec
Dest Oper Max Burst:         1000 cells
Oper Bandwidth Type:         guraranteed
Admin Bandwidth Type         guaranteed
Oper Transfer Priority       1
Admin Transfer Priority      1
To-Net Circuit ID:           16
To-Net Circuit State:        Active
From-Net Circuit ID          16
From-Net Circuit State:      Active
Last ATMM Error:             OK

Cells Required:              9434
CLP=0 Cells to Switch:       0
CLP=0/1 Cells to Swtich:     0
CLP=1 Cells to Switch:       0
Discarded Cells:             0

cli>
```

3333

You can also get a list of all the ATM UNI VCIs for the entire chassis by entering the **show chassis listvci** command.

Monitoring Frame Relay Connections

These steps allow you to monitor individual data link connections configured on frame relay ports. These connections are recognized by their data link connection identifiers (DLCIs).

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface." To get a list of all data link connections configured on a particular frame relay port, enter the following at the cli> prompt:

```
cli> show port <port#> listdlci
```

where

<port#> = The number of the port for which information displays. The port number is in card.port format (card = 2 - 10; port = 0 - 7).

Step 2 Once you have a list of DLCIs, you can look at a particular circuit by entering the following at the cli> prompt:

```
cli> show port <port#> dlci <dlci#>
```

where

<dlci#> = The DLCI number for which information displays. The DLCI number must be between 16 and 991.

Note See the *LightStream 2020 CLI Reference Manual* for information on setting and showing port attributes with the CLI.

Figure 4-11 is an example of the display you see when you enter **show port 10.7 dlci 141**.

Figure 4-11 Example of the show port dlci Display

```
cli> show port 10.7 dlci 141

Src Node:                              Light8
Src Port:                              10.7
Src DLCI:                              141
Src Admin Insured Rate:                32000 bps
Src Oper Insured Rate:                 31713 bps
Src Admin Insured Burst:               1516 bytes
Src Oper Insured Burst:                1491 bytes
Src Admin Max Rate:                    64000 bps
Src Oper Max Rate:                     63767 bps
Src Admin Max Burst:                   3032 bytes
Src Oper Max Burst:                    2983 bytes

Dest Admin Node:                       Light6
Dest Admin Port:                       3.4
Dest Admin DLCI:                       141

Dest Oper Node:                        Light6
Dest Oper Port:                        3.4
Dest Oper DLCI:                        141

Dest Oper Insured Rate:                31713 bps
Dest Oper Insured Burst:               1491 bytes
Dest Oper Max Rate:                    63767 bps
Dest Oper Max Burst:                   2983 bytes

Local LMI State:                       Inactive
Remote LMI State:                      Active
To-Net Circuit ID:                     36
To-Net Circuit State:                  Active
From-Net Circuit ID:                   31
From-Net Circuit State:                Active
Last ATMM Error:                       OK
Last ATM Error Location:
Cells Required:                        116


cli>
```


You can also get a list of all the frame relay connections for the entire chassis by entering the **show chassis listdlci** command.

Monitoring CLI Attribute Settings

These steps let you monitor the attribute settings for the CLI program itself.

Step 1 Enter the following at the cli> prompt:

```
cli> show cli <parameter>
```

where

<parameter> =all (default)
echosource
lineedit
log
term
time
timer
timestamp
timeout
traplevel
debug
banner

The following is an example of the display you see when you enter **show cli.**

cli> **show cli**

```
Echo source:         on
Line Edit:           on
Logging:             off
Terminal Type:       vt100
Date/Time:           Thu Jun 15 16:02:40 1995
SNMP Timeout value=  6 seconds
Timestamp:           off
Timer:               4 Hour(s) 37 Minute(s)  38 seconds
Traplevel:           Debug
Debug:               off
Banner:              CLI (Version 2.100 of May 24 1995
PROGRAM: cli:        compiled May 24 1995 @ 02:31:40
```

Monitoring the Collector

The collector lets you run up to 25 collections at one time. You can set up the collections to save user-defined data for a specified time interval and you can use this data for future analysis. For further information on creating collections, see the “Statistics and Data Collection” chapter.

To monitor the status of a particular collection, follow these steps:

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see “Setting the Target Switch for CLI Commands” in the chapter entitled “The Command Line Interface.” To look at the status of a particular collection, enter the following at the cli> prompt:

```
cli> show collection [<collection #>]
```

where

[<collection #>] = The number of any collection that has been defined. If you do not enter a collection number, CLI displays all collections that have been defined.

The following is an example of the display you see when you enter **show collection 1.**

```
*cli> show collection 1
            *** Collection 1 ***
Collection Status:            Under Creation
Operational Status:           Under Creation
Begin Time:                   06/22/1995 08:02:43 EDT (06/22/1995 12:02:43 GMT)
End Time:                     01/18/2038 22:14:07 EST (01/19/2038 03:14:07 GMT)
Interval:                     60 sec
File:                         /usr/tmp/collector/collect.1

Collection Items:
Name: CollectDBObjectID.1.1   Value: ifInOctets.3000
Name: CollectDBObjectID.1.2   Value: ifInOctets.3001
Name: CollectDBObjectID.1.3   Value: ifInOctets.3002
Name: CollectDBObjectID.1.4   Value: ifInOctets.3003
```

Monitoring GID

To monitor the status of the global information distribution (GID) software, follow these steps.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see the section on "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 Enter the following at the cli> prompt:

```
cli> show gid <parameter>
```

where

<parameter> = all (default)
general
synchronization
cards
clients
neighbors
ports
ip

Figure 4-12 is an example of the display you see when you enter **show gid all.**

Figure 4-12 Example of the show gid all Command

```
cli> show gid all
Software Version Number:                        Jul 29 1994 @ 19:49:33
GID Process ID (PID):                           10
Memory In Use:                                  0 Bytes
Memory Allocation Failures:                     0

Neighbors in Existent Sync State:               0
Neighbors in Exchange Start State:              0
Neighbors in Exchange State:                    0
Neighbors in Loading Sync State:                0
Neighbors in Full Sync State:                   3

                    Cards Managed by Gid:
Chassis     Slot     Seq#       Age    Originating-NP  Ports
Light8        1   3348489269   1503        Light8.1       0
Light8        4   3348491724   1511        Light8.1       8
Light8        5   3348491404   1489        Light8.1       8
Light5        1   3348488326   1513        Light5.1       0
Light5        3   3348488339   1497        Light5.1       8
. . .

                    Clients Managed by Gid:
Client PID    LSA-Rx     IPA-Rx   Gen-Rx   Events-Tx   Paths-Generated
     11      1317124        46        0           0          18492
     12      1317130        37        0           0           7132
     13      1317121        22       45          33             24
     14      1317123      2224        0           0          19888
     15      1317125        29        0           0              0
     17      1317122      2386        0           0              0
```

(Continued)

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Figure 4-13 Example of the show gid all Command (concluded)

```
                        Neighbors Managed by Gid:
Chassis   VCI   State   SYNC RLL SLL Hello  LSA  NLSA  IPA  NIPA  GA NGA
Light8.1  38145 loading   7   0   0   2   4731  4731   45   45   0   0
Light5.1  29953 loading   7   0   0   2   1036   280   90   48   0   0
Light6.1  34049 loading   7   0   0   2   1056   756   87   42   0   0
...

                        Ports Managed by Gid:
Chassis  Port Service  Up/Down     BW0     BW1     BW2   Remote-Port
Light8    4.0   port   Down       4072    3868     203   Light7.4.0
Light8    4.1   port   Down       2036     114      13   Light7.4.1
Light8    4.2   port   Down       2036     114      13   Light7.4.2
Light8    4.3   port   Down       2036     114      13   Light7.4.3
Light8    4.4   port   Down       2036     114      13   Light7.4.4
Light8    4.5   port   Down       1163      12      14   Light7.4.5
...

                      IP Addresses Managed by GID:
IP Address     Age     Seq#    Advertising-NP    Net-Mask      Port
0.0.40.45    1710 3348489265   Light8.1        0.0.0.0    Light8.0.511
0.0.40.47    1718 3348488336   Light5.1        0.0.0.0    Light5.0.511
0.0.40.51    1732 3348487425   Light7.1        0.0.0.0    Light7.0.511
0.0.40.59    1731 3348487410   Light6.1        0.0.0.0    Light6.0.511
192.1.71.75  1719 3348488335   Light5.1 255.255.255.0    Light5.0.511
...

cli>
```

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If you enter any parameter except **all**, a subset of the attributes is displayed.

Monitoring ND

These steps let you monitor the status of the neighborhood discovery (ND) software. This information can tell you what hardware configuration the running software is using or the neighbors of the switch.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see the section on “Setting the Target Switch for CLI Commands” in the chapter entitled “The Command Line Interface.”

Step 2 Enter the following at the cli> prompt:

```
cli> show nd <parameter>
```

where

<parameter> =all (default)
general
ndcards
neighbors
switchupdown
switchstat

Figure 4-14 and Figure 4-15 are examples of the display you see when you enter **show nd all**.

Figure 4-14 Example of the show nd all Command

```
cli> show nd all

Software Version Number:Jul 21 1994 @ 01:59:54
ND Process ID (PID):                    22
Memory In Use:                          78165 Bytes
Timers Processed:                       19142
Number of Line Cards managed by ND:     4
Neighbor NPs known to ND:               1
Registered ND Client Processes:         8

Cards Managed by ND:
EIA: 5143:3      Channel:  9731    State: Up
EIA: 5143:5      Channel: 14341    State: Up
EIA: 5143:7      Channel:  5639    State: Up
EIA: 5143:9      Channel: 18441    State: Up

ND Neighbor Information
EIA: 5143:1      Channel: 21761   State: Up

ND Up/Down Parameters:
Slot:  1 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  2 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  3 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  4 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  5 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  6 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  7 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  8 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot:  9 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
Slot: 10 Oper Intvl: 900   J: 2     K: 31    M: 2     N: 32
         Admn Intvl: 900   J: 2     K: 31    M: 2     N: 32
```

(Continued)

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Figure 4-15 Example of the show nd all Command (concluded)

```
ND Switch Statistics:
Slot:  1  In Cells:      6413  Errs:    0  Out Cells:      6413  Errs: 0
Slot:  2  In Cells:         0  Errs:    0  Out Cells:      6413  Errs: 0
Slot:  3  In Cells:      6409  Errs:    0  Out Cells:      6413  Errs: 0
Slot:  4  In Cells:         0  Errs:    0  Out Cells:      6414  Errs: 0
Slot:  5  In Cells:      6409  Errs:    0  Out Cells:      6414  Errs: 0
Slot:  6  In Cells:         0  Errs:    0  Out Cells:      6414  Errs: 0
Slot:  7  In Cells:      6438  Errs:    0  Out Cells:      6442  Errs: 0
Slot:  8  In Cells:         0  Errs:    0  Out Cells:      6442  Errs: 0
Slot:  9  In Cells:      6438  Errs:    0  Out Cells:      6443  Errs: 0
Slot: 10  In Cells:         0  Errs:    0  Out Cells:      6443  Errs: 0

ND Clients:
PID: 11 Type: lcc      Subtype: 0      EIA: 5143:7  Mask: 0x32
PID: 13 Type: ca       Subtype: -1     EIA: 0:0     Mask: 0x2
PID: 17 Type: gid      Subtype: -1     EIA: 0:0     Mask: 0x64
PID: 27 Type: lcc      Subtype: 0      EIA: 5143:9  Mask: 0x32
PID: 33 Type: lcc      Subtype: 0      EIA: 5143:3  Mask: 0x32
PID: 37 Type: lcc      Subtype: 0      EIA: 5143:5  Mask: 0x32
PID: 38 Type: lcc      Subtype: 0      EIA: 5143:1  Mask: 0x52

cli>
```

If you enter any parameter except **all**, a subset of the attributes shown above is displayed.

Monitoring Processes

These steps let you monitor the status of a particular process. You select the process you want to monitor by entering either its number or name.

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see the section on “Setting the Target Switch for CLI Commands” in the chapter entitled “The Command Line Interface.”

Step 2 If you do not know which processes are running, enter the following at the cli> prompt:

```
cli> walksnmp pidName
```

This command lists the process identification (pid) numbers and alias names of all the processes running on this LS2020 switch. The pid numbers follow the term “Name: lwmaTrapCliAlias.” and the alias names follow the term “Value” as shown in Figure 4-16.

Figure 4-16 PID and Alias Names of All Processes Running on the LS2020 Switch

```
cli> walksnmp pidName
Name:   pidName.3            Value: lcmon
Name:   pidName.4            Value: trapmon
Name:   pidName.5            Value: watchdog
Name:   pidName.6            Value: mma
Name:   pidName.18           Value: vcc
Name:   pidName.20           Value: arpd
Name:   pidName.21           Value: sysinit
Name:   pidName.22           Value: vifm
Name:   pidName.23           Value: ip_routed
Name:   pidName.24           Value: stp
Name:   pidName.27           Value: hdp
Name:   pidName.28           Value: collector
Name:   pidName.29           Value: cac
Name:   pidName.30           Value: gid
Name:   pidName.31           Value: npcc
Name:   pidName.32           Value: lcc
Name:   pidName.33           Value: ndd

cli>
```

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Step 3 Choose the processes that you want to monitor from this list.

Step 4 To display the status of a particular process, enter the following at the cli> prompt:

```
cli> show pid {<#>|<alias>} [<parameter>]
```

where

{<#> | <alias>} = The number of the process or the alias name of the process from which you want to display status.

[<parameter>] = all (default)
name
clialias
createtime
adminstatus
operstatus
traplevel

Figure 4-17 is an example of the display you see when you enter **show pid 9 all.**

Figure 4-17 show pid all Command

```
cli> show pid 9 all
PID Name:                    lcc
PID Alias:                   LCC9
PID Up Time:                 18 Hr 15 Min 55 Sec
PID Administrative Status:   Active
PID Operation Status:        Active
PID Trap Level:              Info
cli>
```

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The same information displays when you enter **show pid lcc9** (The lcc9 entry is the alias name for process 9).

If you enter any parameter except **all**, a subset of these attributes displays.

Monitoring SNMP Parameters

SNMP operation is controlled by a number of parameters that are set to default values when the system is started. These parameters can be changed using the **set snmp** command. (See the "SNMP Commands" chapter for a discussion of this command.)

To monitor SNMP parameters, enter the **show snmp** command at the cli> prompt:

The following is an example of the display you see when you enter **show snmp.**

```
cli> show snmp

Community: public
HostName:  localhost
cli>
```

Monitoring the Test and Control System

This section provides the steps to monitor the Test and Control System (TCS).

Monitoring TCS

To monitor the values collected by the TCS on a particular card in the chassis, follow these steps. The cards you can monitor are in slots 1 - 10, switch A (SA), and switch B (SB).

Step 1 Verify that the target switch is correct by entering the following at the cli> prompt:

```
cli> show snmp
```

If you need instructions on changing the target switch, see the section on "Setting the Target Switch for CLI Commands" in the chapter entitled "The Command Line Interface."

Step 2 Enter the following at the cli> prompt:

```
cli> show tcs <card #> [<parameter1>] [<parameter2>]
```

where

<card #> =1 - 2 for NPs
2 - 10 for line cards
SA and SB for switch cards

Note This command is not available on the SUN4 version of the CLI.

Table 4-2 describes <parameter1> and <parameter2>.

Table 4-2 Parameter Options—show tcs Command

<parameter1> =	<parameter2>[1] =
all (default)	N/A
state	N/A
config	all assembly postcode serialnum slavecode type
daughter	all assembly serialnum
paddle	all assembly serialnum
oem	all assembly serialnum
midplane	all assembly serialnum nodeaddress
temperature	N/A
voltage	N/A
power	N/A

[1]Parameter2 is dependent on parameter1. When you enter a command, you first select the value of parameter1 from this table. Based on that selection, you can choose a value of parameter2 that is associated with parameter1.

When you enter **show tcs 1 all**, a display similar to Figure 4-18 displays. If you use any value except **all** for the argument, a subset of this information displays (see Figure 4-18).

Figure 4-18 Example show tcs 1 all

```
cli> show tcs 1 all
Slot  1 State:
          Power Supply:                OK
          Temperature:                 OK
          Clock:                       OK
          POST:                        OK
          XILINX Load:                 OK
          Application Load:            OK
          Paddle Card:                 PRESENT
          Paddle Card:                 OK
          Paddle Card Override         DISABLED
          Paddle Power Override:       DISABLED
          Flash:                       ENABLED
          CP POST:                     ENABLED
          Application:                 ENABLED
          Card:                        ENABLED
          TCS VCC Power:               OK
          VCC Power:                   OK
          VPP Power:                   OK
          SCSI Power:                  OK
          Top Temperature:             OK
          Bottom Temperature:          OK
          Board Initialization:        OK
          Flash Initialization:        OK
          TCS HUB:                     OK
Slot  1 Config Assembly:               2121701G01
Slot  1 Config Postcode:               00
Slot  1 Config Serialnum:              311±08
Slot  1 Config Slavecode:              B2
Slot  1 Config Type:                   N1
Slot  1 Daughter Assembly:             2121861G01
Slot  1 Daughter Serialnum:            308±01
Slot  1 Paddle Assembly:               2121992G01
Slot  1 Paddle Serialnum:              315±09
Slot  1 Oem Assembly:
Slot  1 Oem Serialnum:
Slot  1 State:
        Top:         85 F (warning 165 F, shutdown 174 F)
                     29 C (warning  73 C, shutdown  78 C)
        Bottom:      94 F (warning 113 F, shutdown 174 F)
                     34 C (warning  45 C, shutdown  78 C)
Slot  1 Voltage:
        TCS VCC Voltage:      5.126 (Normal Range: 4.614 / 5.371)
        VCC Voltage:          5.029 (Normal Range: 4.370 / 5.615)
        SCSI Voltage:         4.833 (Normal Range: 4.614 / 5.371)
        VPP Voltage*:         0.000 (Normal Range: 11.067 / 12.858)
           *VPP Voltage Is Valid Only During FLASH Initialization
Slot 1 power: On
cli>
```

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Using the LS2020 Monitor

The LS2020 monitor provides a graphical display of individual LS2020 switches, cards, and ports. The display shows the front of an LS2020 switch with bulkheads for the cards as they appear in the actual switch. Information pertinent to the switch displays above the bulkheads. This section explains how to access the monitor to display switches, cards, and ports. You must have a color monitor to use the monitor software.

Step 1 Log in to the NMS workstation.

Step 2 Invoke the LS2020 monitor by selecting it from the HP OpenView menu or by entering the following command at the system prompt:

```
% monitor <chassisname>
```

where

<chassisname> = the name of the node you want to view

A display similar to Figure 4-19 appears showing the front view of the LS2020 switch, its components, and their status. The area above the bulkhead in the display contains general indicators and summary information about the switch. For a description of the LEDs displayed on each card in the monitor, see the *LightStream 2020 Hardware Reference and Troubleshooting Guide*.

Step 3 To select an object in the display, point the mouse at the object and click on it with the left mouse button. The object appears highlighted. Figure 4-20 shows an LS2020 switch with a selected low-speed line card (LSC).

Step 4 To display the access card for a particular line card, click on the screw above it.

Step 5 To display more information for a particular object in the display, point the mouse at the object and double click with the left mouse button. If more information is available for the object, a screen appears with the relevant information. Figure 4-21 shows a typical monitor card and port information display.

Step 6 Select Show All Access Cards from the Slot menu to obtain a rear view of the switch (see Figure 4-22).

Figure 4-19 LS2020 Monitor Switch Display (Front)

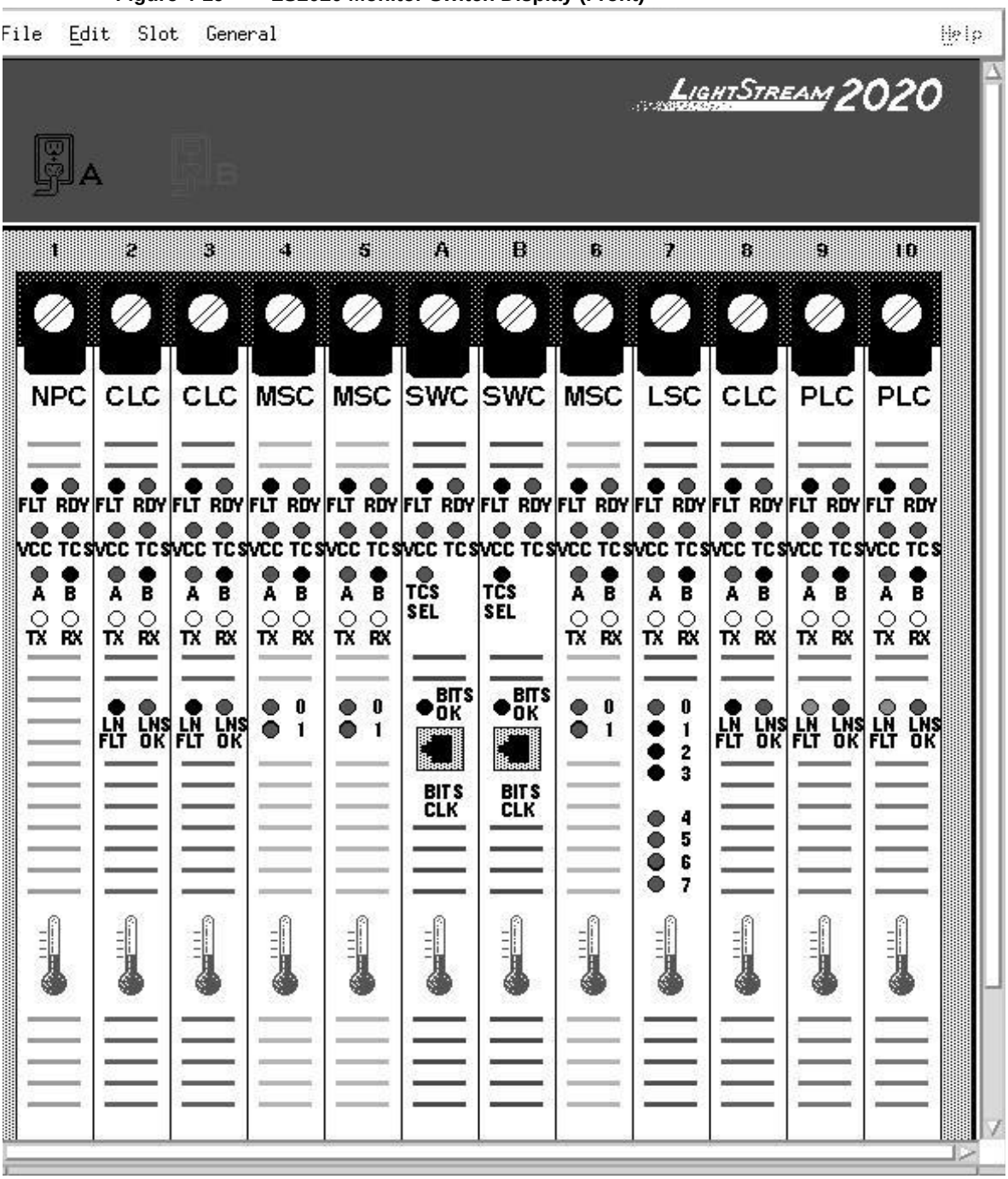


Figure 4-20 LS2020 Monitor Switch Display (Front) with Selected Card

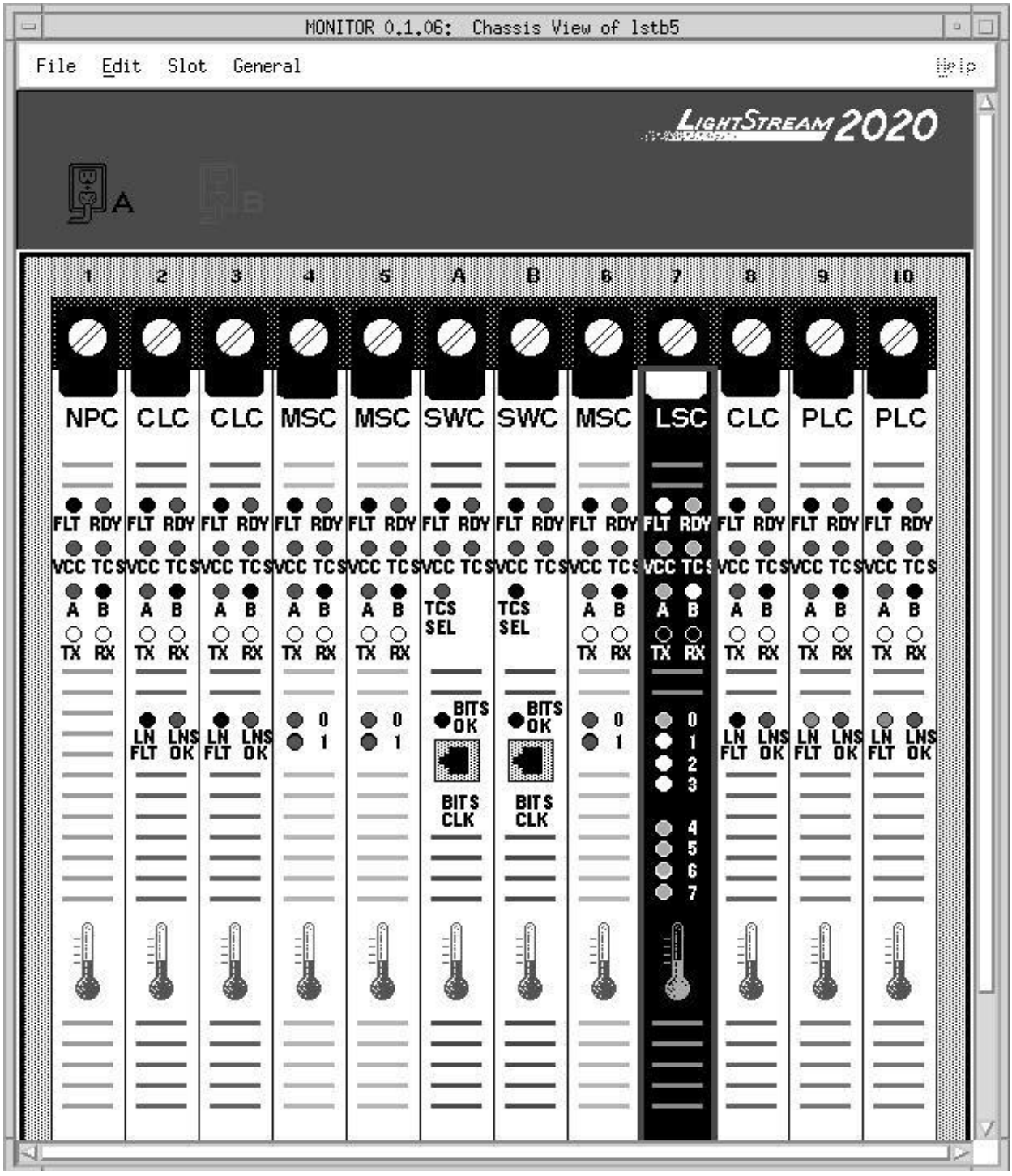
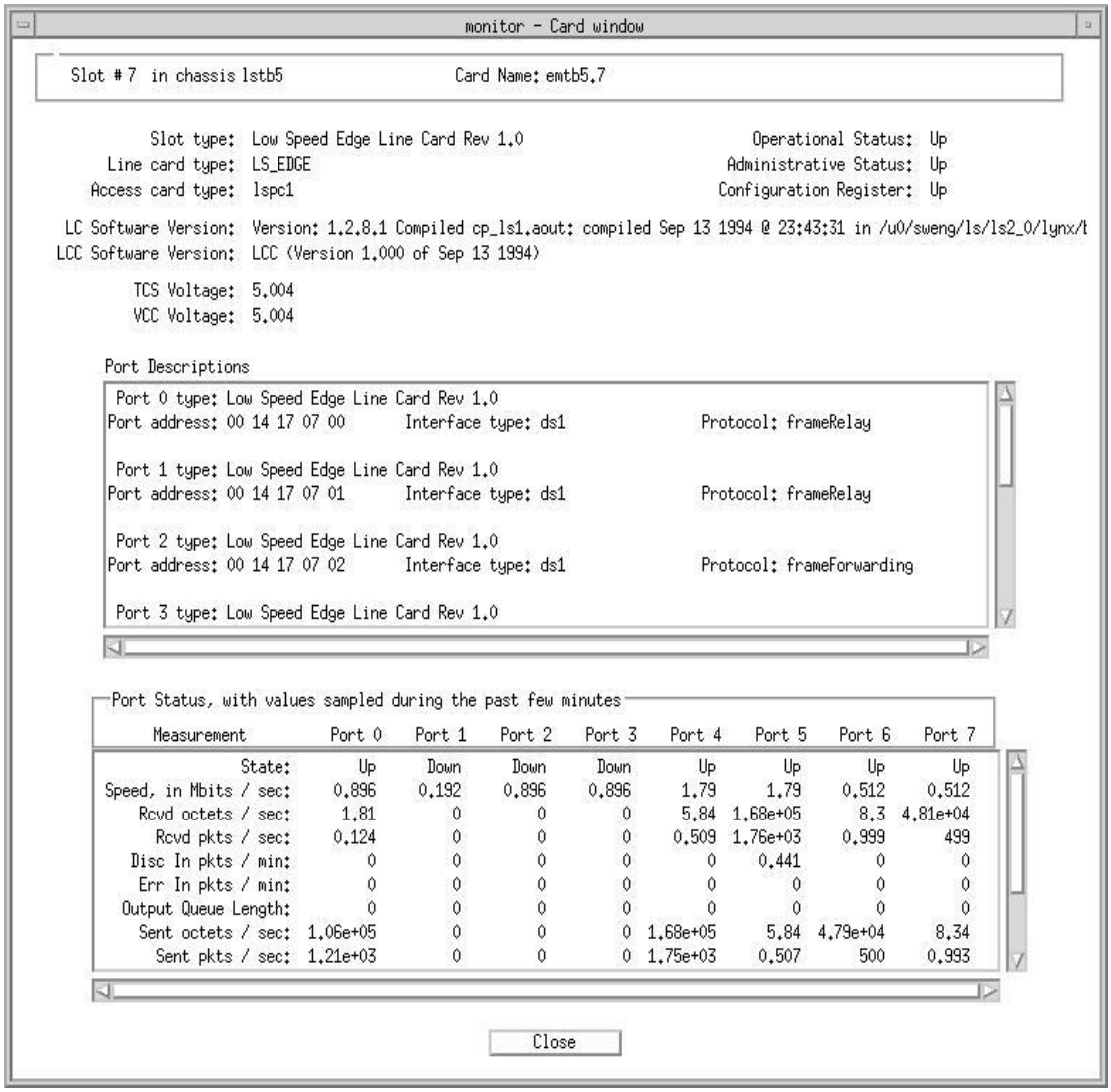
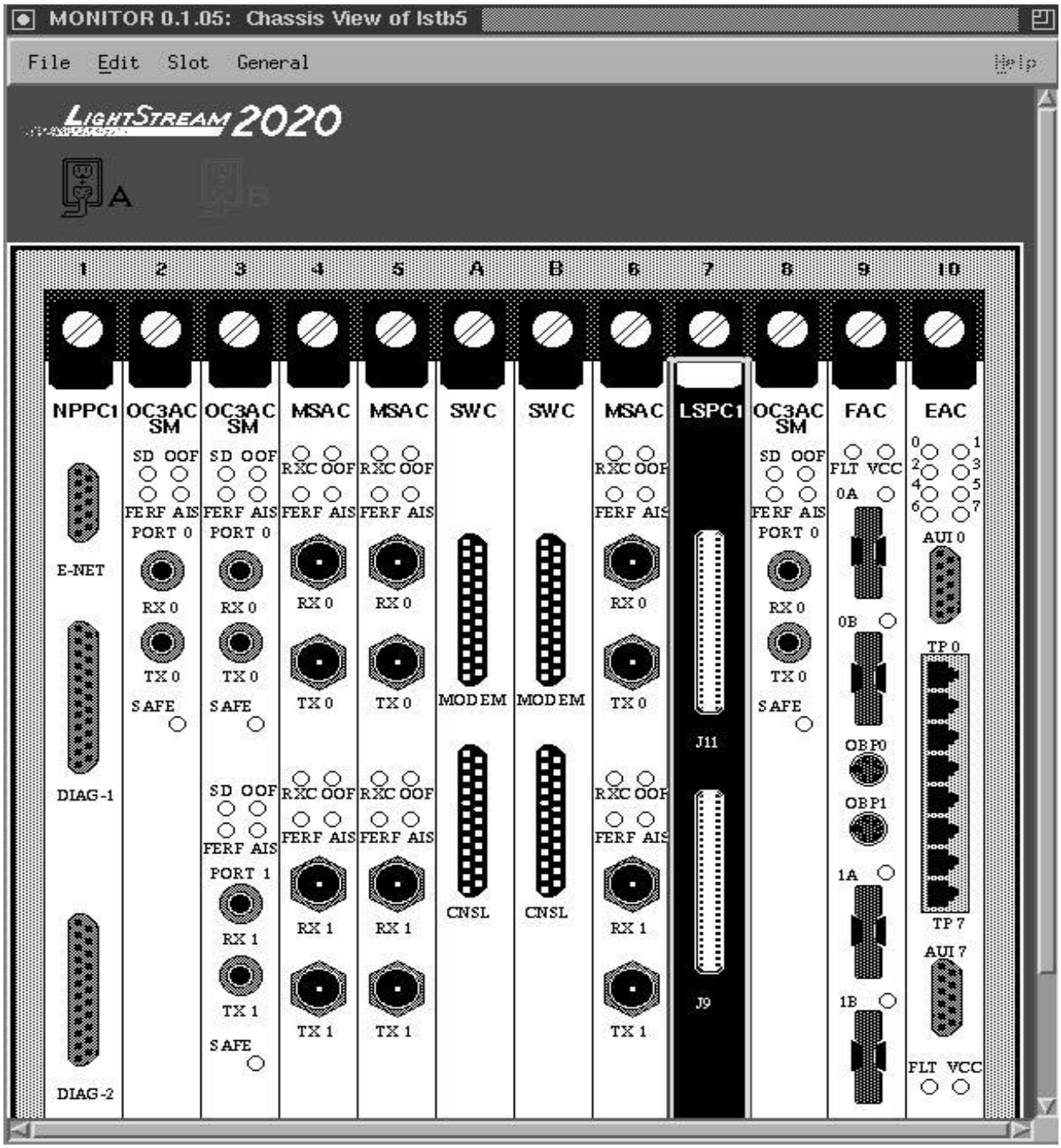


Figure 4-21 LS2020 Monitor Card and Port Display



Measurement	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7
State:	Up	Down	Down	Down	Up	Up	Up	Up
Speed, in Mbits / sec:	0.896	0.192	0.896	0.896	1.79	1.79	0.512	0.512
Rcvd octets / sec:	1.81	0	0	0	5.84	1.68e+05	8.3	4.81e+04
Rcvd pkts / sec:	0.124	0	0	0	0.509	1.76e+03	0.999	499
Disc In pkts / min:	0	0	0	0	0	0.441	0	0
Err In pkts / min:	0	0	0	0	0	0	0	0
Output Queue Length:	0	0	0	0	0	0	0	0
Sent octets / sec:	1.06e+05	0	0	0	1.68e+05	5.84	4.79e+04	8.34
Sent pkts / sec:	1.21e+03	0	0	0	1.75e+03	0.507	500	0.993

Figure 4-22 LS2020 Monitor Switch Display (Rear)



Step 7 To select a menu option from the menus at the top left of your display:

- Point to the menu name.
- Click on the menu name and hold the button down.
- Slide the mouse button down to display the available menu options.
- Release the button on the option to select it.

Table 4-3 lists the possible options. All menu options may not be available at all times. Availability depends on the display in the window. Available options are highlighted.

Table 4-3 Monitor Menu Options

Menu Name	Options
File	Open
	New Chassis
	Exit
Edit	No Options Available
Slot	Open Selected Object
	Show Access Card for Slot
	Show Line Card for Slot
	Show All Access Cards
	Show All Line Cards
General	snmp CLI

Step 8 You can also display the additional information for an object (discussed in Step 5) by selecting the object with a single click of the left mouse button and then choosing the Open Selected Object option from the Slot menu.

The color of the objects displayed by the monitor provides you with valuable information, as listed in Table 4-4. As you view an object with the monitor, note its color and see the table for an explanation. LEDs on the rear view of the switch are unreadable and appear in white.

Table 4-4 Monitor Object/Color Display Explanations

Object	Color	Meaning/Cause
LED	Amber	LED is lit.
LED	Black	Shut off the machine. Bad connection.
LED	Green	LED is lit.
LED	Red	Shut off the machine. Over voltage condition exists. Serious power supply problem.
LED	White	LED state is unknown.
Screw	Black	No information available for card.
Screw	Gray	Card is missing.
Screw	Red	Card is not operational. (The card has failed or it has been powered off.)
Screw	White	Normal card.
Any Icon	Red	Abnormal condition. The orange rectangle around a red icon emphasizes the abnormal condition.
Any Icon	Yellow	Abnormal condition. The orange rectangle around a yellow icon emphasizes the abnormal condition.
Power Supply	Red	Power supply is not operational.
Thermometer	Blue	Temperature is within normal range.
Thermometer	Red	Temperature is over normal range. Cause unknown.
Thermometer	Orange	Temperature is in the warning range. Cause unknown.
Thermometer	Yellow	Temperature is in the warning range. Cause unknown.

Step 9 To iconify a monitor display, click in the Close box in the bar at the top of the window.

Using the LS2020 Topology Map

The LS2020 topology map application displays a map that represents the actual topology of an LS2020 network. The map is a set of related objects, symbols, and submaps that provide a graphical and hierarchical presentation of the network.

The LS2020 topology map application runs on HP OpenView. If you are not familiar with the HP OpenView Windows product, see the *HP OpenView User's Guide*. When you start HP OpenView, the LS2020 Topology map application is automatically invoked. Once you start the application, it builds the current LS2020 submap and then periodically polls each LS2020 node for status information. When creating a new HP OpenView map, you can turn off the LS2020 topology function. You must have a color monitor to use the LS2020 topology map application.

The LS2020 topology map provides:

- A view of the physical topology of an LS2020 network
- Autodiscovery and automatic entry of LS2020 nodes and trunks between nodes
- Verification of new nodes and trunks added to or removed from the LS2020 network
- Automatic placement of nodes
- Status information about each node and trunk
- A display of trunk connections between two LS2020 nodes
- Invocation of other LS2020 applications (configurator and monitor)

Once the LS2020 submap is created, you can modify it by

- Moving nodes
- Changing node or trunk labels
- Grouping nodes into domains
- Deleting nodes or trunks
- Changing map attributes

You can also show multiple trunk connections, which are represented by meta-connection symbols. The symbol for a meta-connection is <*n*> where *n* is the number of connections being represented (see Figure 4-24).

Building a Topology

As previously mentioned, once you start HP OpenView, it can create any number of maps and each map is able to be configured to build an LS2020 topology. However, you do not view a map directly. You view the submaps that make up the map. A submap is a particular view of the network environment. Each submap displays a different view of your map. The application creates a Root submap for each LS2020 map. The Root submap provides a standard, top-level submap for every network map.

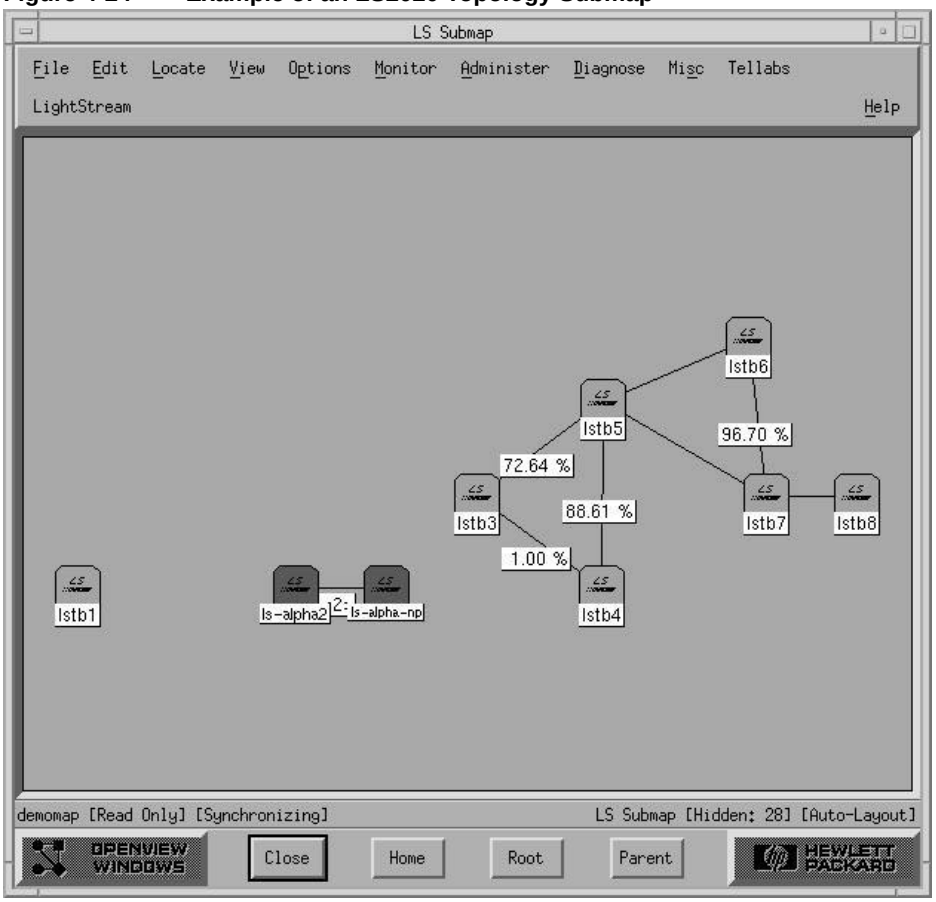
Figure 4-23 shows an example of a Root submap. In this figure, the Root submap contains two symbols: one that represents the Internet and another that represents an LS2020 network.

Figure 4-23 Example of a Root Submap

When you open a map, you actually view submaps of the map. To open the LS2020 submap, double click on the LightStream symbol. Figure 4-24 shows a sample LS2020 topology submap.

In this example, the trunk between the ls-alpha2 and ls-alpha-np nodes actually represents two trunks as indicated by the meta-connection symbol <2>.

Figure 4-24 Example of an LS2020 Topology Submap



Displaying Meta-Connections

When a meta-connection is first drawn, its symbol is not displayed. To display a meta-connection symbol (see Figure 4-25), follow these steps.

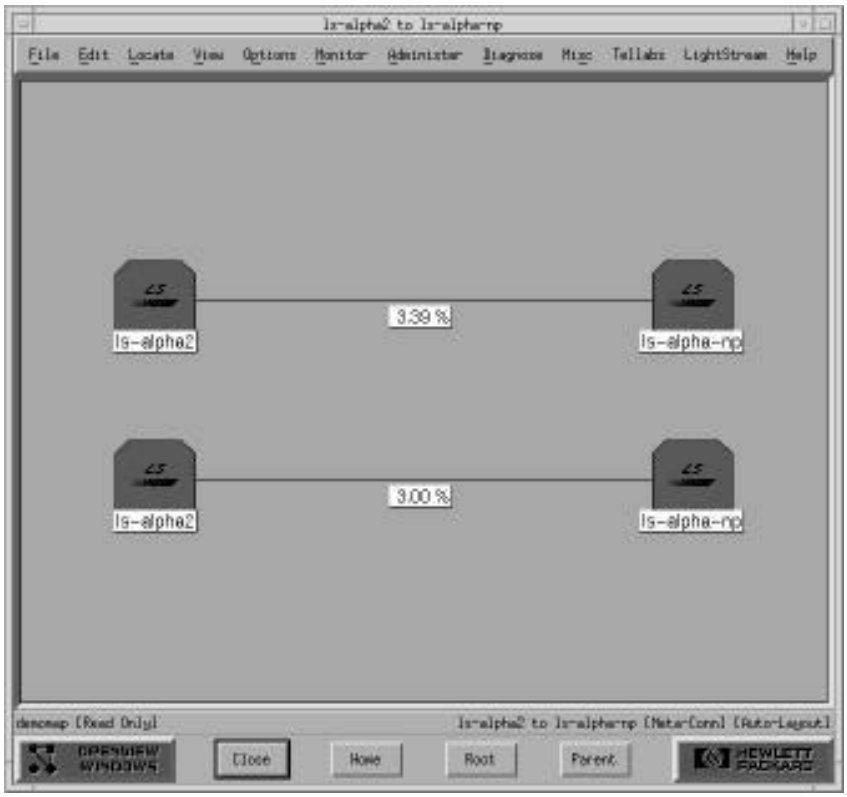
Step 1 Click the right mouse button on the trunk.

Step 2 Select Describe/Modify Symbol... from the option menu.

Step 3 Select the Display Label.

The next sections describe how to modify the LS2020 submap and view its meta-connection submap.

Figure 4-25 Meta-connection Submap



Creating LS2020 Domains

LightStream domains (logical groups of nodes) can consist of any number of LS2020 nodes. All trunk connections between selected nodes and non-selected nodes are redrawn between the LS2020 domain and the non-selected nodes. Any meta-connections between an LS2020 domain icon and either another LS2020 domain or a node show the two nodes that are connected. When you show an exploded view of an LS2020 domain icon, the nodes that make up the domain and any trunk connections between these nodes are displayed.

To create an LS2020 domain, follow these steps:

Step 1 Select the LS2020 nodes that you want grouped together.

Step 2 Pull down the LightStream menu from the menu bar, and click on Topology...Build Domain.

The selected nodes are removed from the map and replaced by a single domain icon.

Removing an LS2020 Domain

When you remove a domain from the topology map, the LS2020 nodes that were originally grouped in that domain are redrawn onto the current submap. To remove an LS2020 domain, follow these steps.

Step 1 Select the domain you want to remove.

Step 2 Pull down the LightStream menu from the menu bar, and click on Topology...Remove Domain.

Deleting a Node or Connection

If you want to remove a node or connection from the LS2020 submap, follow these steps:

Step 1 Double click on the node or trunk that you want to delete.

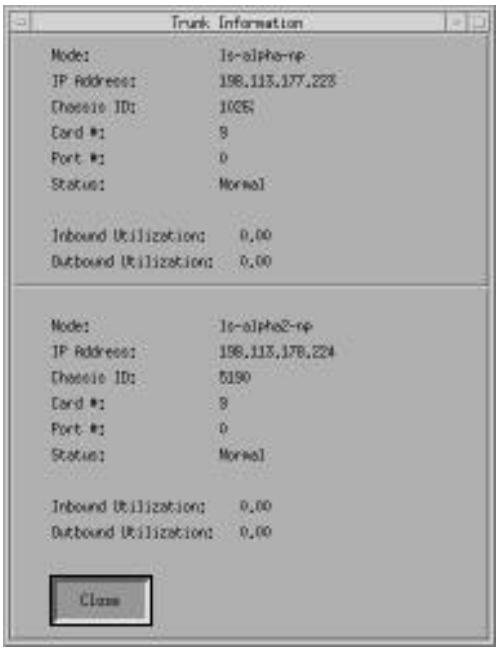
Step 2 Pull down the Edit menu on the menu bar, and click on Delete.

When you remove a node or trunk connection from the LS2020 submap, it is rediscovered and placed back on the map. To prevent this from happening, click on Hide on the Edit menu. This option keeps a node or trunk connection from being rediscovered and placed back into the submap.

Displaying Trunk Information

Within the LS2020 submap, a trunk connection is displayed including its interface bandwidth. If you want to get chassis, port, and utilization information about this connection, you click the left mouse button on a trunk. A pop-up dialog box appears and information similar to the following displays (see Figure 4-26).

Figure 4-26 Example of a Trunk Connection



Updating a Topology

The LS2020 Topology Manager periodically queries each LS2020 node for its trunk information to see if new trunks have been added or known trunks have been removed. It also communicates with HP OpenView for any new objects that are discovered. If new objects are found, the LS2020 Topology Manager (LTM) checks to see if the object's SysOid number matches its own.

Changing LS2020 Topology Map Attributes

The LS2020 submap attributes that you can modify are

- LTM enabled/disabled
- Status polling interval
- Timeout for trunk removal
- Rules
- Timeout to clear a rule
- Marginal/major status timeout

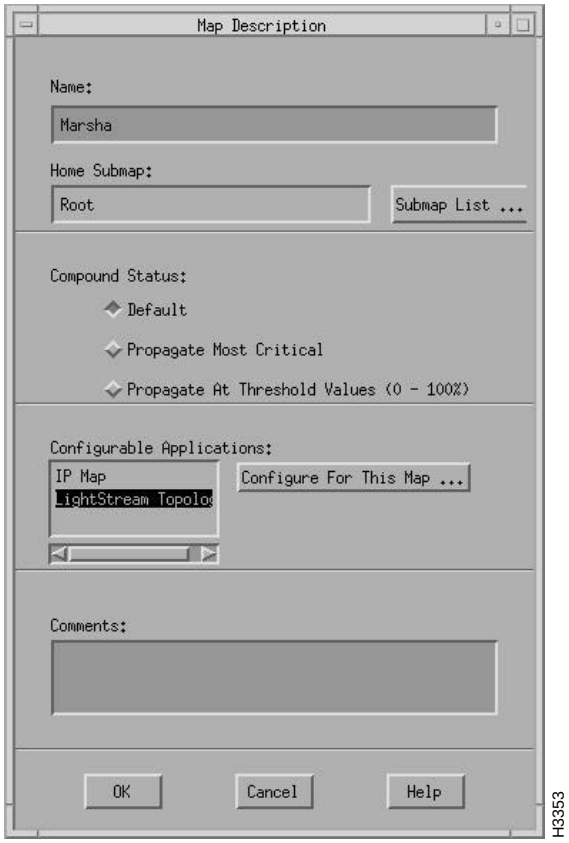
The next sections provide a brief description of the attributes and the steps for changing them.

Procedure to Change the LS2020 Topology Map Attributes

You can modify these attributes from either the OpenView Root dialog box or the LS2020 Submap dialog box.

Step 1 Pull down the File menu on the menu bar, and click on Describe/Modify Map. The Map Description dialog box appears (see Figure 4-27).

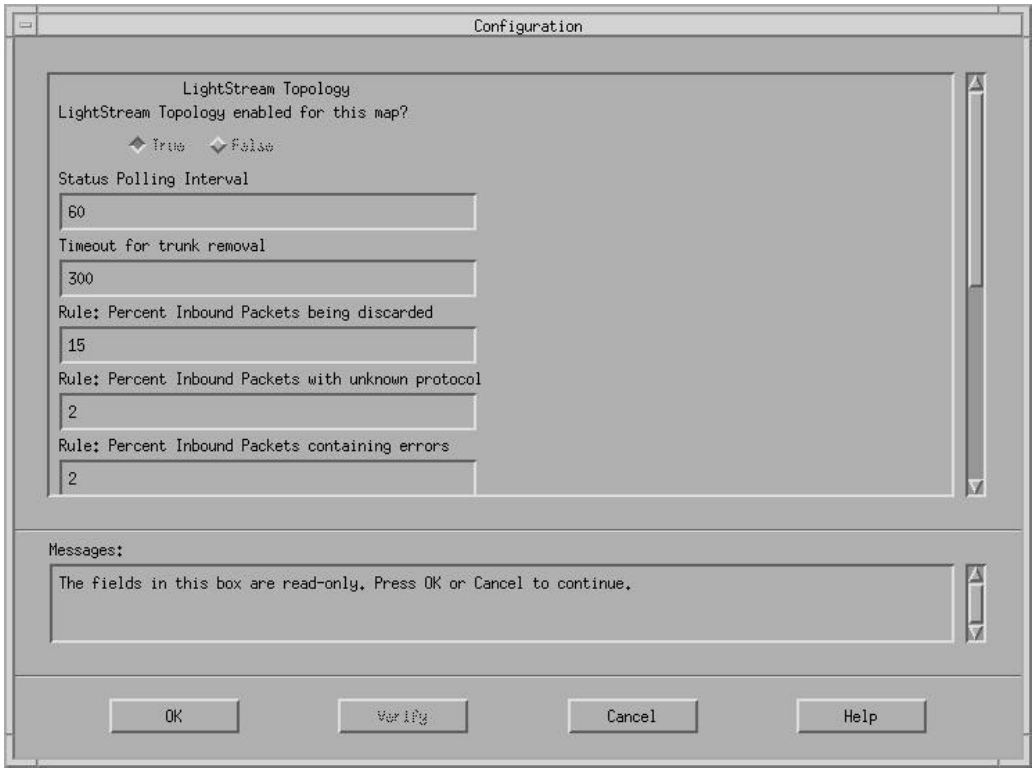
Figure 4-27 Example of Map Description Dialog Box



Step 2 Click on the appropriate entry in the Configurable Applications list.

Step 3 Click on the Configure for this Map button. For example, if you click on the LS2020 Topology Map, the Configuration box appears (see Figure 4-28).

Figure 4-28 Example of Configuration Dialog Box



From the Configuration box, you can enable or disable the LS2020 Topology Manager (LTM) and select the attributes that you want to modify, such as status polling interval, timeout for trunk removal, and so on.

LTM Enabled/Disabled

The default is to enable the LS2020 Topology Manager (LTM) when you start HP OpenView.

Status Polling Interval

The LS2020 topology map application polls each LS2020 node periodically for status information (the default polling time is 60 seconds).

Status changes in the network are displayed through changing colors on the network map and writing messages to HP OpenView Alert window.

Status Definitions

Table 4-5 lists the possible status conditions of a node in the network and their meanings. Table 4-6 lists the same information for a trunk connection in the network.

Table 4-5 Node Status Definitions

Status	Meaning
Unknown	Unable to access the node through SNMP.
Critical	One of the following problems has been detected: a chassis ID conflict, a bad power supply, abnormal temperature, or a diagnostic error on a card.
Major	One or more cards within the node reported a down operational status.
Marginal	One of the following problems on an edge port has been detected: congestion, high error rate, large amount of discarded traffic, or attempt to use an improperly configured PVC. If any of these problems is detected, a message appears in the HP OpenView Events window. Note that for release 2.1 edge port monitoring is turned off.
Normal	No known problems detected.
Unmanaged	The user has configured the node to be unmanaged.

Table 4-6 Trunk Connection Status Definitions

Status	Meaning
Critical	The ifOperStatus reported down for either port in the connection, or the trunk is no longer being discovered in the GID table.
Testing	The ifOperStatus reported testing for either port in the connection.
Normal	No known problems detected.
Major	One of the following problems on either of the ports on the trunk connection has been detected: high number of packets being discarded, high trunk utilization, high error rate, or attempt to use an improperly configured PVC. If any of these problems is detected, a message appears in the HP OpenView Events window.
Warning	One of the following problems on either of the ports on the trunk connection has been detected: high number of packets with unknown protocols being received or the output queue length is excessively high.
Unmanaged	The user has configured the trunk to be unmanaged.
Unknown	Unable to get port information through SNMP.

Timeout for Trunk Removal

The default for the timeout for trunk removal attribute is 300 seconds.

Rules

The LS2020 topology map application collects information for each interface to determine the condition of the LS2020 network. There are rule definitions that apply to the data collected. For example, the default value for the percent inbound packets being discarded is 15%. If the percent of packets being discarded exceeds either the default value or the value you set, a message gets logged to the HP OpenView Alert window. You can change the rate of the default value according to your network needs. Table 4-7 lists the rules and their default values that are applied to the data collected.

Table 4-7 Rule Definitions

Rule	Default Value
Percent inbound packets being discarded	15%
Percent inbound packets with unknown protocol	2%
Percent inbound packets containing errors	2%
Percent outbound packets being discarded	15%
Percent outbound packets containing errors	2%
High output queue length	10

Marginal/Major Status Timeout

Marginal status indications for nodes and major status indications for connections indicate potential network integrity problems. Once a problem is discovered, such as a large number of packets being discarded, the appropriate status is set. The status remains in effect until a time period (the default is 5 minutes) elapses without the problem being rediscovered. To change the default, select the File...Describe/Modify Map menu item.

In an LS2020 network, traffic shaping is applied at all packet interfaces, as shown in Figure 4-6. Traffic entering ATM UNI interfaces does not need to be shaped, since it obeys the traffic policing parameters set for each virtual circuit.