56 Managing Channelized DS3 Modules

Introduction

Traffic patterns in the early days of the Internet were markedly different from those observed today. Early applications were text-based (ftp, telnet, email) and were mostly symmetrical in terms of traffic flow (i.e., client and server generally transmitted and received the roughly equal amounts of data). The advent of the Web browser and graphical user interface for the Internet has simultaneously increased by an order of magnitude the number of users and servers on the Internet. This combined with advanced applications, such as video conferencing software, has upset both the symmetry and pattern of traffic flows, markedly reducing the overall throughput the average Internet user sees.

The channelized DS3 module (WSX-M013 and WSM-M013 for the Omni Switch/Router and OmniSwitch, respectively) addresses this problem by allowing customers to buy bandwidth based on their traffic needs. The channelized DS-3 module uses channelized DS3 lines to split up the high performance capabilities of the line and divide it among several customers.

The channelized DS3 module is designed exclusively for high-density IP access and industrial strength routing, making it ideally suited to the task of providing and maintaining high-performance throughput with low delay. It easily fits into the Internet Provider landscape as a Point of Presence (PoP) at a national level (National Backbone Operator or NBO), a regional level (Regional Network Operator or RNO), and at local level (Internet Service Provider or ISP).

To achieve high-density IP access, the channelized DS3 module supports a channelized DS3 interface for Frame Relay and Point-to-Point Protocol (PPP) termination of DSO's, NxDSO bundles (or groups), DS1's and clear-channel DS3's (see the subsequent section for a description of these terms).

The channelized DS3 module is a daughtercard that plugs into the High Speed Switching Module. Each daughtercard has 2 DS3 ports. There can be two daughtercards per High Speed Switching Module, giving a total of 4 DS3 ports per chassis slot.

Each channelized DS3 is comprised of 28 DS1 channels, which in turn contain 24 DS0 time slots. Each time slot can be configured for 64kbs. DS0 time slots can be bundled together and assigned to logical ports (otherwise known as groups), increasing the bandwidth capabilities of a group by n x 64kbs, where n is the number of DS0s bundled into the logical port. A single daughtercard can support up to 512 logical channels, for a total of 1024 logical channels per chassis slot.

The channelized DS3 module can also run as a *clear channel*, which allows for the full use of the bandwidth of the DS3 connection (44.736Mbs).

Digital Signal Level X (DSX)

A Digital Signal Level X (DSX) is a term for the series of standard digital transmission rates or levels based on DS0, a transmission rate of 64 Kbps. Both the North American T-carrier system and the European E-carrier systems of transmission operate using the DS series as a base multiple. The digital signal is what is carried inside the carrier system.

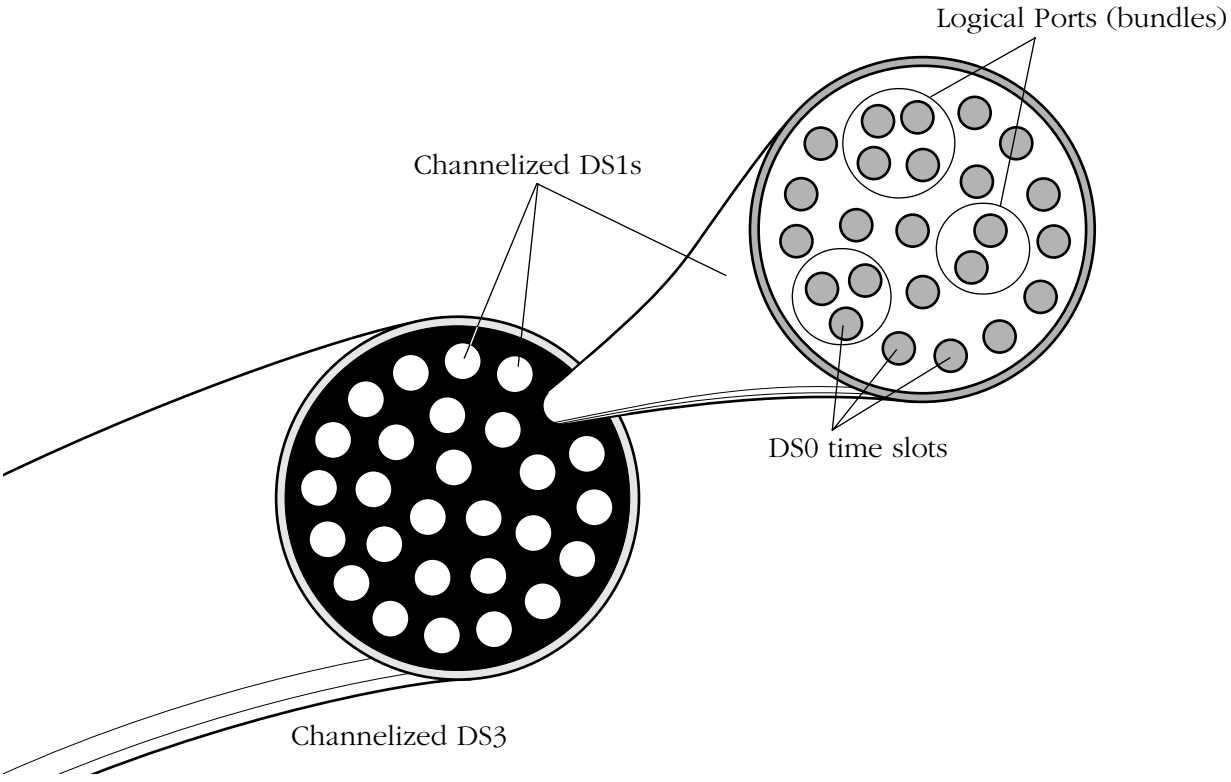
DS0 is the base for the digital signal X series. DS1, used as the signal in the T-1 carrier, is 24 DS0 (64 Kbps) signals transmitted using pulse-code modulation (PCM) and time-division multiplexing (TDM). DS2 is four DS1 signals multiplexed together to produce a rate of 6.312 Mbps. DS3, the signal in the T-3 carrier, carries a multiple of 28 DS1 signals or 672 DS0s or 44.736 Mbps.

The term "channelized" DS3 denotes the preservation within the DS3 of either the 28 DS1 signals (multiplexed DS1 to DS3, or "M13") or the 672 DS0 and 28 DS1 signals (multiplexed DS0 to DS1 to DS3, or "M013). (The diagram below illustrates this idea.) A "clear channel" DS3 denotes that the entire interface is treated as a single signal (no preservation of lower signals).

The channelized DS3 module supports channelized DS3 by preserving the 28 DS1 signals and 672 DS0s (24 time slots per DS1).

♦ Note ♦

The channelized DS3 module does not support the European E-carrier system.



Channelization of a DS3 and DS1

Supported Physical Interfaces

The channelized DS3 module uses a BNC physical interface (port) for data traffic, and a separate balanced T1 physical interface as an external clocking mechanism.

BNC

The BNC connectors on the channelized DS3 module daughtercard consist of two female ports, one for transmit (TX) and one for receive (RX). Both are used for a single DS3 connection and must attach to a RG-59 coaxial cable (75 ohms). Data is transmitted at a rate of 44.736MHz (+/- 20ppm) and received at a rate of 44.736MHz (+/- 50ppm).

The pinouts for transmitted and received signals of the BNC connectors are the same. Signals are transmitted and received on the center contact, while the outer shield is ground for the RG-59 (75 ohm) coaxial cable.

To reduce the effects of electromagnetic interference (EMI), it is strongly recommended that you use common-mode choke procedures. These are small ferrite sleeves that attach to the coaxial cable as close to the BNC connector as possible. It is also recommend that you attach the transmit and receive coaxial cables together along their entire length using heat activated shrink tubing or cable ties to further reduce the effects of EMI.

Balanced T1

The balanced T1 port is used exclusively as a link to an external clocking source, and will not transmit any other type of data. It uses a RJ-48C type cable.

♦ Note ♦

In order for external clocking to be employed, you must configure the channelized DS3 module to use external clocking at the DS1 channel level with the **ds1mod** command. See *Configuring a DS1 Channel* on page 56-27 for more information.

Supported Protocols

The channelized DS3 module supports both Frame Relay and synchronous Point-To-Point Protocol (PPP). For an overview of these protocols, see the “Managing Frame Relay” and “Point-to-Point Protocol” chapters. For information on selecting and configuring these protocols for use with logical ports, see *Adding a Logical Port Configuration* on page 56-38 and *Modify the Protocol Configuration of a Logical Port using PPP* on page 56-47 of this chapter.

Application Examples

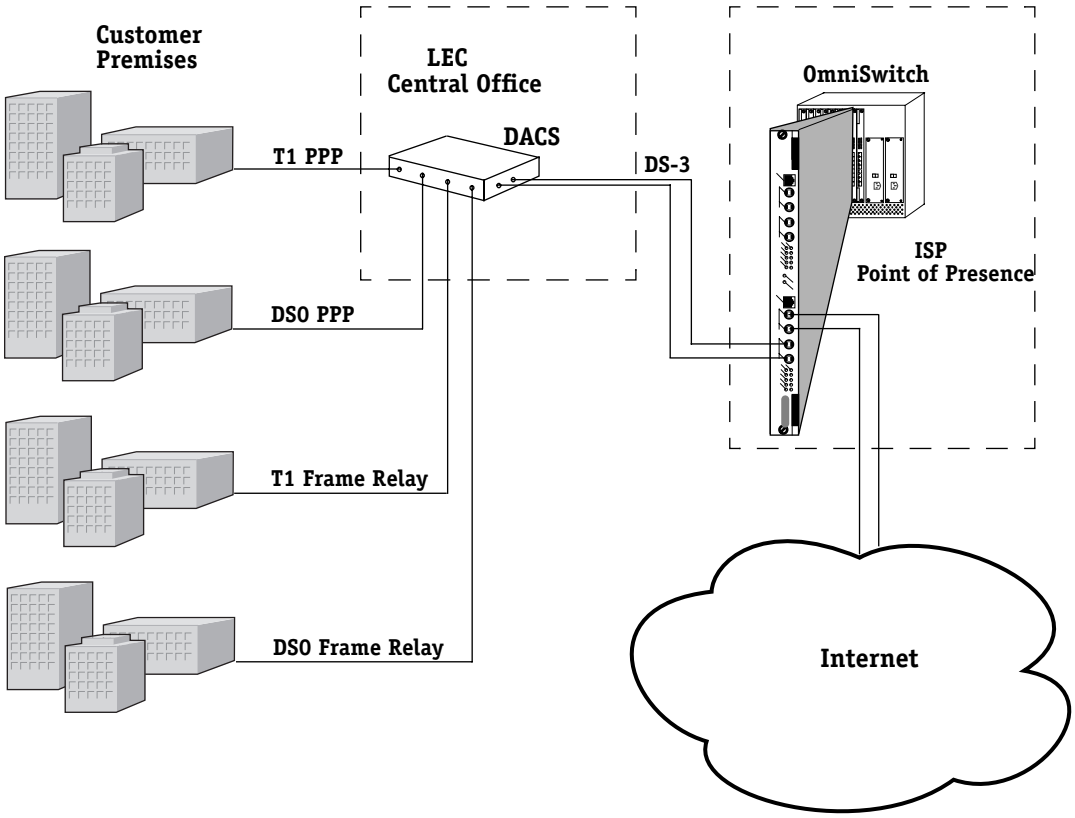
This section provides examples of the types of WAN networking possible using the channelized DS3 module.

Internet Services Provider Point-of-Presence

One ideal application for the channelized DS3 module is as an Internet Services Provider (ISP) Point of Presence (PoP). In this application, various customer access lines are combined into a single DS3 line through a Digital Access Cross-Connect System (DACS) at the Local Exchange Carrier's (LEC) central office.

The DS3 line is leased by the ISP and uses the channelized DS3 module to channelize the line into 28 DS1 channels, each with 24 DS0 time slots. Time slots are grouped together into logical ports (bundles) that can be assigned to accommodate the required bandwidth of the customer. As an ISP PoP, the channelized DS3 module terminates the layer two access protocol (Frame Relay or PPP) and then routes the traffic over the Internet.

The channelized DS3 module in this application could also be located at the LEC central office, depending upon the layout of the specific ISP service.

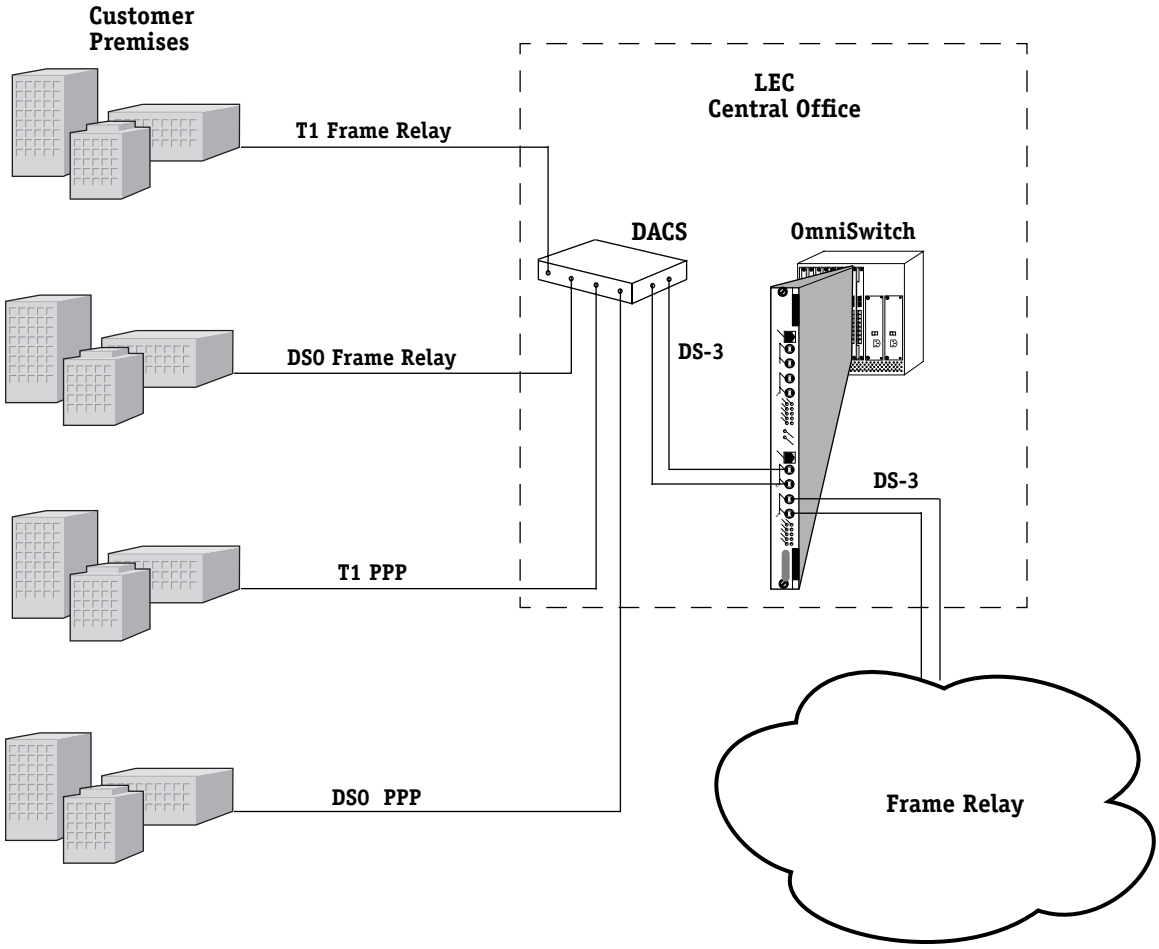


WSX Configuration with ISP Point-of-Presence

Local Exchange Carrier's Central Office

Another ideal application for the channelized DS3 module is as a layer-two concentrator at the Local Exchange Carrier's (LECs) central office (CO), where the channelized DS3 module functions primarily as a Frame Relay or PPP concentration point to trunk over an ATM backbone.

In this application, various customer lines are combined into a single DS3 line via a Digital Access Cross-connect System (DACS). The DS3 is then sent to the channelized DS3 module, where the module terminates DS3's of the LEC's DACs. The LEC can locally switch Frame Relay or PPP traffic (that is, switch from one access port to another access port) or trunk the traffic over ATM using either layer-two bridging or frame relay to ATM Interworking.



WSX Configuration From LEC Central Office

Channelized DS3 Module

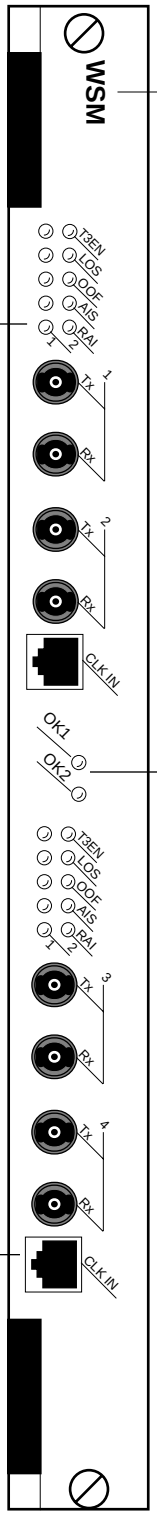
The channelized DS3 module consists of a 2-port daughter card that plugs into the High Speed Switching Module. The ports are BNC DS3 connections and use RG-59 cables. These ports use either Point-to-Point Protocol (PPP) or Frame Relay.

You can configure physical port parameters through software commands. Configuration options include line type, line coding, and facility datalink. In addition, the switch can store up to 24 hours of traffic statistics in 15 minute intervals for DS3 ports, DS1 channels, and logical ports.

The WXS-M013 is actually a submodule, or daughtercard, that attaches to a High-Speed Switching Module. The High-Speed Switching Module contains memory and processing power for switching modules that operate at speeds greater than 10 Mbps. You plug cables into the channelized DS3 submodule, and the High-Speed Switching Module connects to the switch's backplane.

Channelized DS3 Module Technical Specifications	
Number of ports	2 DS3, 1 Balanced T1
Connector Type	BNC, T1 (external clocking)
Protocols Supported	Frame Relay and Point-to-Point (PPP)
Data Rates Supported	64Kbs to 44.736Mbs
Frame Formats	DS3: M23, C-bitparity DS1: D4 (Superframe), ESF (Extended Superframe)
Line Coding	DS3: B8ZS DS1: JBZS, B8ZS, HBD3, ZBTSI, AMI
DS0 time slots	1344
Logical Ports (bundles) Supported	512
Clocking	Internal, External, or Split (i.e., "loop timing")
Virtual Circuits Supported	Permanent Virtual Circuits (PVCs)
MAC Addresses Supported	1,024; 2,048 with CAM upgrade option
Connections Supported	DS-3 and T1 (external clocking) Connections
Cable Supported	Coaxial RG-59 (75 ohms), RJ-48C
Maximum Cable Length	450 feet
FCC Rating	Class A, Class B

The module includes one column of LEDs for each port. The column number corresponds with the port number. If the module includes a total of four ports, then the module contains two sets of LEDs. The second set of LEDs displays next to the second set of ports.



Module Label. This label indicates which platform the module is for, either the OmniSwitch (WSM) or the OmniSwitch/Router (WSX). The module shown here is a four port OmniSwitch module. The front panel of the WSX is arranged in a slightly different manner. It is functionally identical.

Port LEDs

T3EN (T3 Enabled). On when the DS3 connection is enabled and can transmit data.

LOS (Loss of Signal). On when the WSX module observes 175 (+/- 75) contiguous pulse positions with no pulses of either positive or negative polarity from the incoming DS3 line.

OOF (Out Of Frame). On when any three or more errors within sixteen or fewer consecutive F-bits occurs within a DS3 M-frame.

AIS (Alarm Indication Signal). On when a maintenance signal is sent to the WSX by the network. If this LED is on, then there has been a change in the Alarm Indication Signal (AIS).

RAI (Remote Alarm Indication). On when an alarm signal is detected by the WSX module on the alarm channel.

Module LEDs

OK1 (Hardware Status). On Green when the module has passed diagnostic tests successfully. On Amber when the hardware has failed diagnostics or if the corresponding image file for the module is not in flash memory.

OK2 (Software Status). Blinking Green when the module software was downloaded successfully and the module is communicating with the MPM. Blinking Amber when the module is in a transitional state. On Solid Amber if the module failed to download software from the MPM.

CLK IN (Clocking Port). Balanced T1 port used when the module is set to use external clocking.

Channelized DS3 Module With Four Ports

Channelized DS3 Module Configuration Overview

The channelized DS3 module uses DS3 lines to transmit data over a Frame Relay or PPP Wide Area Network. These DS3 lines can be run as clear channel lines (using the entire bandwidth of the connection) or channelized into 28 separate DS1 channels. Logical ports are assigned to these DS1 channels, which also may be run as clear channels or broken down further into DS0 time slots. Each DS1 has 24 DS0 time slots available, and a logical port can be assigned from 1-24 (the maximum) time slots. Times slots run at 64Kbps. There are 512 possible logical ports per channelized DS3 module daughtercard (2 DS3 physical ports).

When configuring the channelized DS3 module, the management menu is set up in a practical fashion to assist you in creating your WAN network.

♦ Note ♦

Many of the specifications for DS3, DS1, and logical ports will be decided by the specifications of the Frame Relay or PPP network provider.

When setting up the channelized DS3 module:

Step 1. Physical Configuration Of DS3 Ports

Initially, you will need to configure your DS3 ports on the physical level using the **ds3mod** command. This allows you to decide the clock source, line type, line length, and other physical parameters of your DS3 connection. See *Configuring a DS3 Port* on page 56-13 for specific procedures.

Step 2. Physical Configuration Of DS1 Channels

Next, if you are not running a DS3 clear channel, you will configure the physical aspects of the DS1 channels associated with the DS3 connection using the **ds1mod** command. Many of these parameters a similar to the DS3 parameters. See *Configuring a DS1 Channel* on page 56-27 for specific procedures.

Step 3. Creating Logical Ports

Once you have configured the DS1 channels, you can assign logical ports to these channels and configure them using the **lpadd** and **lpmod** commands. See *Adding a Logical Port Configuration* on page 56-38 and *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40 for details.

Step 4. Configuring Logical Port Protocols

Once logical ports are in configured, you can modify the protocol configuration of each logical port (PPP or Frame Relay) with the **lppmod** command. See *Modify the Protocol Configuration of a Logical Port using PPP* on page 56-47 for instructions.

Step 5. Creating Virtual Circuits (Optional)

If you are using Frame Relay as your network protocol you can create virtual circuits with the **lpfradd** command. See *Add Frame Relay DLCI on a Logical Port* on page 56-64 for procedures.

Step 6. Implementing Routing Options (Optional)

If your network uses IP routing, you can establish and modify router interfaces, route records, and ARP records with the **riadd**, **rradd**, and **rarpadd** commands. For details, see *Adding a Router Interface* on page 56-66, and *Modifying a Router Interface Configuration* on page 56-67.

Static routes can be created using the **aisr** command, and deleted using the **risr** command. For more information on using these commands, see the Chapter titled "IP Routing."

Step 7. Creating a Service (Optional)

If you need to create, modify, or delete a bridging or trunking service for a logical port, this is done with the **m013cas**, **m013das**, and **m013mas** commands. For details, see *Creating a Bridging or Trunking Service* on page 56-69,

When you have set up the channelized DS3 module, there are several commands that allow you to monitor the configuration and statistics of the DS3 ports, DS1 channels, and logical ports.

The Channelized DS3 Module Management Menu

The user interface commands for configuring and monitoring the channelized DS3 module are listed in the **M013** submenu. This is located in the **Interface** menu of the main menu options. To access this submenu, enter

m013

followed by **<return>**, at the system prompt. If you are in verbose mode, a screen similar to the following is displayed. Otherwise, enter a question mark (**?**) to see the M013 menu commands:

	Command	M013 Port Management Menu
	m013	Enter M013 Port Management sub-menu
DS3 Commands	ds3mod	Modify M013 DS3 port configuration
	ds3dlts	Display 24-hour period statistics of a local DS3 port
	ds3dlcs	Display current 15-minute statistics of a local DS3 port
	ds3dlis	Display 15-minute interval statistics of a local DS3 port
	ds3clis	Clear interval statistics of a local DS3 port
	ds3dcs	Display DS3 port configuration and statistics
	ds3scs	Set DS1 statistics collection for DS3 port
	ds3dms	Display received MDL messages on DS3 port
DS1 Commands	ds1mod	Modify M013 DS1 port configuration
	ds1dlts	Display 24-hour period statistics of a local DS1 port
	ds1dlcs	Display current 15-minute statistics of a local DS1 port
	ds1dlis	Display 15-minute interval statistics of a local DS1 port
	ds1clis	Clear interval statistics of a local DS1 port
	ds1dcs	Display DS1 port configuration and statistics
Logical Port Commands	lpadd	Add logical port to M013 port configuration
	lpmod	Modify M013 logical port configuration
	lpdel	Delete logical port from M013 port configuration
	lpview	Display logical port configuration and statistics
	lpcls	Clear statistics of logical port
	lppmod	Modify protocol configuration of logical port
	lppview	Display protocol configuration and statistics of logical port
	lppcls	Clear protocol statistics of logical port
Virtual Circuit Commands	lpfradd	Add Frame Relay DLCI on a logical port
	lpfrdel	Delete Frame Relay DLCI on a logical port
Routing Commands	riadd	Add router interface
	rimod	Modify router interface
	ridel	Delete router interface
	riview	Display router interface
	ricls	Clear statistics of router interface
	rarpadd	Add ARP record
	rarpdel	Delete ARP record
Service Commands	m013cas	Create bridging or trunking service on M013 port configuration
	m013das	Delete service from M013 port configuration
	m013vas	View service on M013 port configuration
	m013mas	Modify service on M013 port configuration
	m013cfgdel	Delete current M013 configuration

Main Interface | File Security | Summary System | VLAN Services | Networking Help

The following sections give a brief description of the above groups of commands.

Physical Configuration Commands

Physical configuration commands are provided to enable you to configure physical (i.e., DS3 & DS1) ports and to view and clear local statistics associated with these ports. They are comprised of DS3 commands and DS1 commands.

DS3 commands

DS3 commands, which include **ds3mod**, **ds3dlts**, **ds3dlcs**, **ds3dlis**, **ds3dcs**, **ds3scs**, and **ds3dms** allow you to configure and view statistics for any of the DS3 ports in the channelized DS3 module. For configuration command details, see *Configuring a DS3 Port* on page 56-13. For statistics command details, see *Viewing Cumulative Statistics and Errors of a Local DS3 Port* on page 56-19, *Viewing Current 15-Minute Statistics and Errors of a Local DS3 Port* on page 56-21, *Viewing 15-Minute Interval (Historical) Statistics and Errors of a Local DS3 Port* on page 56-22, *Clearing Interval Statistics and Errors of a Local DS3 Port* on page 56-24, and *Viewing Configuration and Statistical Parameters for a DS3 Port* on page 56-24. For Maintenance Data Link (MDL) messages, see *Viewing Received MDL Messages* on page 56-26.

DS1 commands

DS1 commands, which include **ds1mod**, **ds1dlts**, **ds1dlcs**, **ds1dlta**, and **ds1dcs**, allow you to configure and view statistics for any of the DS1 channels on a DS3 port.

For configuration command details, see *Configuring a DS1 Channel* on page 56-27. For statistics command details, see *Viewing Cumulative Statistics and Errors of a Local DS1 Channel* on page 56-31, *Viewing Current 15-Minute Statistics of a Local DS1 Channel* on page 56-33, *Viewing 15-Minute Interval Statistics and Errors of a Local DS1 Channel* on page 56-34, *Clearing Interval Statistics of a Local DS1 Channel* on page 56-36, or *Viewing Configuration and Statistical Parameters for a DS1 Channel* on page 56-37.

Logical Configuration Commands

Logical configuration commands are provided to enable you to configure logical ports and view and clear statistics associated with these ports.

A logical port uses HDLC encapsulation to carry Frame Relay or Point-to-Point traffic. It can have 1 or more DS0 time slots allocated, or it can run as a clear channel DS1 or DS3. The logical channel uses either PPP or Frame Relay to transmit data.

Further, you can create virtual circuits, router interfaces, ARP records and services for logical ports. They are comprised of logical port commands, virtual circuit commands, routing commands, and service commands

Logical port commands

A logical port uses HDLC encapsulation to carry Frame Relay or Point-to-Point traffic. It can have 1 or more DS0 time slots allocated, or it can run as a clear channel DS1 or DS3. The logical channel will use either PPP or Frame Relay to transmit data. These commands, which include **lpadd**, **lpmod**, **lpdel**, **lpview**, **lpcls**, **lppmod**, **lppview**, and **lppcls**, allow you to create, modify, and delete logical ports, as well as modify and view statistics for the selected connection protocol (either PPP or Frame Relay).

For command details on creating, modifying, or deleting a logical port, see *Adding a Logical Port Configuration* on page 56-38, *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40, or *Deleting a Logical Port* on page 56-42.

For information on modifying or viewing the statistics of a logical port protocol configuration, see *Modify the Protocol Configuration of a Logical Port using PPP* on page 56-47 and *Display Protocol Configuration and Statistics of a Logical Port using PPP* on page 56-54.

Virtual circuit commands

Virtual circuits are network connections that allow data traffic to be sent over Frame Relay. The virtual circuit commands, which include **lpfradd** and **lpfrdel**, allow you to create and delete virtual circuits from a logical port.

For command details on creating a virtual circuit, see *Add Frame Relay DLCI on a Logical Port* on page 56-64. For command details on deleting a virtual circuit, see *Delete Frame Relay DLCI on a Logical Port* on page 56-65.

Routing commands

If your network uses IP routing, you will need to establish routing connections for the channelized DS3 module. The routing commands (which include **riadd**, **rimod**, **ridel**, **riview**, and **ricls**) allow you to create, delete, and view a router interface for the module.

For command details on creating, modifying, or deleting a router interface, see *Adding a Router Interface* on page 56-66, *Modifying a Router Interface Configuration* on page 56-67, or *Viewing Router Interfaces* on page 56-68.

Service commands

If you want to use bridging or trunking on a logical port, you need to create a service for that logical port. This is done with the **m013cas**, **m013das**, and **m013mas** commands.

For details, see *Creating a Bridging or Trunking Service* on page 56-69, *Viewing Service Configurations* on page 56-71, and *Deleting Services* on page 56-71.

Configuring a DS3 Port

The **ds3mod** command configures a DS3 port at the physical level. It is generic to all such ports, regardless of the logical level service that controls them and regardless of the board type. To configure a DS3 port, enter the **ds3mod** command as follows:

```
ds3mod <slot>/<ds3port>
```

where **<slot>** is the slot number of the board on which the port is located and **<ds3port>** is the port number on the board you want to modify. For example, to modify port number 2 on switch slot 5, enter

```
ds3mod 5/2
```

A screen similar to the following is displayed:

```
1)  Circuit Id (30 chars max) :
2)  Framing Type  { M23(1), C-bit(3) } :
3)  Channelization  { Channelized(1), Unchannelized(2) } :
4)  Loopback Configuration {No Loop(1), Payload Loop(2),
    Line Loop(3), Other Loop(4) } :
5)  Transmit Clock Source { Loop(1), Local(2), Through(3) } :
6)  Line Length {More than 255 feet(1), Less than 255 feet(2) } :
7)  Line Status Trap Generation  {enabled (1), disabled (2) } :
8)  Send FEAC Far End Alarm Signals  {enabled (1), disabled (2) } :

Enter (option=value/save/cancel) :
```

You make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

For example, to set the **Line Type** to **M23**, you would enter **2** (the line number for **Framing Type**), an equals sign, and then 1 (the value that represents **M23**) as follows:

```
2=1
```

After you are finished, be sure to save your configuration changes by typing **save**.

Field Descriptions

The following section explains the fields in the **ds3mod** command and their corresponding values.

1) Circuit Identifier

Enter a textual description of the DS3 port, up to 30 characters. This text will be used in other screen displays to identify the port.

2) Line Type

Enter the physical format of the DS3 port. The line type chosen specifies the characteristics of the frame format. The possible line types for a DS3 port are:

M23(1)

Uses C-bits as stuff (null) bits to maintain the 7 rows by 8 column frame format.

C-bit(3)

Uses C-bits for specific uses (such as Far End Alarm and Control channels) rather than stuff bits. If you select C-bit parity, the configuration menu changes to reflect more configuration options. See *Configuring a DS3 Port using C-Bit Parity* on page 56-16 for more details.

♦ Note ♦

The value entered must match the type specified by your service provider.

3) Channelization

Specifies whether channelization is enabled or not. A channelized DS3 line maintains the distinctions of the 28 DS1 channels that account for the DS3's bandwidth. The possible values are **Channelized(1)** and **Unchannelized(2)**. If disabled, the DS3 line is a clear channel and the 28 DS1 channels are used together as a single line.

4) Loopback Configuration

This field is used for diagnostic purposes to set various receive-to-transmit data loops. Loopback Detection is a common method for Carrier Service Providers to test clients' circuits in the event of suspected line transmission problems.

For both Frame Relay and PPP, loopback detection involves periodically transmitting a message and looking for that message to be received. When implementing Loopback Detection, it is important to keep two issues in mind: the message must not violate any standards; the message must be unique in such a way that it can be differentiated from a message sent by a remote node. For more on loopback detection, see the chapter "Managing WAN Switching Modules."

Possible types are:

No Loop(1)

The port is not in a loopback state. This is the typical live network state for a DS3 port.

Payload Loop(2)

All 28 receive DS1s are looped back to the outgoing transmit DS1s. The received signal (bit level) at this DS3 port is looped through the port after passing through the port's framing functionality.

Line Loop(3)

The entire DS3 receive line is looped back to the outgoing DS3 transmit line. The received signal at this DS3 port does not go through the port's framing functionality, and is instead looped straight back out the transmit function of the port. This state should only be used for debugging purposes.

Remote Loop(4)

In this state the interface obeys any loopback command sent from other source on the Far End Alarm and Control (FEAC) channel.

5) Transmit Clock Source

This field specifies the transmit clock timing source of the DS3 port. The possible values are:

Loop(1).

In loop timing, the transmit timing is recovered from the receive data stream and then the timing "looped" back onto the transmit data stream. This is different from loop diagnostics modes (see below), in which the actual receive data stream is looped back to the transmit data stream).

Local(2).

In local timing, the timing for the transmit data stream is generated internally, rather than using the clock recovered from the receive data stream of the DS3 port.

Through(3).

In through timing, the transmit timing is recovered from the receive data stream of another interface and then used as the transmit clock.

6) Line Length

Specify the line length of the cable to be used for this port. The available values for a DS3 port are **More than 255 feet(1)** or **Less than 255 feet(2)**. (255 feet is approximately 78 meters.)

7) Line Status Trap Generation

Specifies whether the line status SNMP-related trap for this port is enabled. The possible values are **enabled(1)** and **disabled(2)**.

8) Send FEAC Far End Alarm Signals

Allows the DS3 port to send the following alarms on the FEAC channel when detected locally:

- DS3 equipment failure.
- LOS (Loss of Signal).
- OOF (Out of Frame).
- AIS (Alarm Indication Signal) received.

This option is either enabled (alarms will be sent when problems are detected) or disabled (alarms will not be sent).

Configuring a DS3 Port using C-Bit Parity

When configuring a DS3 port, one of the options available is what type of framing the DS3 line uses (either M23 or C-bit parity). If you choose C-bit parity as your framing type, the configuration menu changes. More configuration options are available for a DS3 port using C-bit parity.

To view the configuration menu with the expanded options:

1. Enter the **ds3mod** command as described above in *Configuring a DS3 Port* on page 56-13. The regular configuration menu is shown.

2. At the system prompt, set the framing type to C-bit parity by entering a **2** (the line number for framing type), and equal sign (**=**), and a **3** (the value for C-bit parity), in the following manner:

   2=3

3. Press **<return>** to display the expanded menu as shown below:

   1) Circuit Id (30 chars max):
   2) Framing Type { M23(1), C-bit(3) }:
   3) Channelization { Channelized(1), Unchannelized(2) }:
   4) Loopback Configuration {No Loop(1), Payload Loop(2), Line Loop(3), Other Loop(4) }:
   5) Transmit Clock Source { Loop(1), Local(2), Through(3) }:
   6) Line Length {More than 255 feet(1), Less than 255 feet(2) }:
   7) Line Status Trap Generation {enabled (1), disabled (2) }:
   8) Send FEAC Far End Alarm Signals {enabled (1), disabled (2) }:
   9) Send FEAC Code {No Code(1), DS-3 Line Loopback(2), DS-3 Payload Loopback(3), Deactivate(4)}:
   10)Remote Error Indications (FEBE) {enabled(1), disabled(2)}:
   20)MDL Transmit Path {enabled(1), disabled(2)}:
   21)MDL Transmit Idle Signal {enabled(1), disabled(2)}:
   22)MDL Transmit Test Signal {enabled(1), disabled(2)}:
   23)MDL Rx Enable {enabled(1), disabled(2)}:
   24)MDL Tx Equipment Id Code (EIC) (10 chars max):
   25)MDL Tx Location Id Code (LIC) (11 chars max):
   26)MDL Tx Frame Id Code (FIC) (10 chars max):
   27)MDL Tx Unit Id Code (UIC) (6 chars max):
   28)MDL Tx Path Facility Id (PFI) (38 chars max):
   29)MDL Tx Port Idle Signal Code (38 chars max):
   30)MDL Tx Generator (38 chars max):

   Enter (option=value/save/cancel) :

4. You make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

   For example, to set the **Framing Type** to **M23**, you would enter 2 (the line number for **Framing Type**), an equals sign, and then 1 (the value that represents **M23**) as follows:

   2=1

After you are finished, be sure to save your configuration changes by typing **save**.

Field Descriptions

The following section describes the options in the **ds3mod** menu when C-bit parity is employed. Options 1 through 8 are the same as described in *Configuring a DS3 Port* on page 56-13.

9) Send FEAC Code

A send code is a loopback command sent from this switch to a remote location. If the remote location is configured to accept FEAC commands, it will perform the specified loopback. Commands are send on the reserved FEAC C-bit in the M-frame. The options specify what type of code is being sent across the DS3 interface by the device. Possible types are:

No Code(1)

Sending looped or normal data with no FEAC command.

DS-3 Line Loopback(2)

Sending a request for a line loopback for the DS3 line using the "DS3 Line" command on the FEAC channel.

DS-3 Payload Loopback(3)

Sending a request for a payload loopback (i.e., all DS1s in a DS3 frame) using the "DS1 Line All" command on the FEAC channel.

Deactivate(4)

Sending a request to deactivate a previous request on the FEAC channel.

10) Remote Error Indications (FEBE)

When set to **enabled**, this DS3 port is configured to receive Far End Block Errors (FEBE), which is an indication that the far end equipment is receiving C-bit Coding Violations (CCVs). The options are **enabled (1)** and **disabled (2)**.

Maintenance Data Link (MDL) Field Descriptions

The remaining fields in the above display are related to Maintenance Data Link (MDL) messages that are sent between DS3 devices configured to use C-bit parity. MDL messages are used to verify connection integrity and network accuracy.

The three types of messages that can be sent are Path, Idle Signals, and Test Signals. Sent messages use similar components (specified in the **ds3mod** menu) with an additional component specific to each type of message. You can specify one type of message to be sent, or all three types in sequence.

Received MDL messages can be viewed using the **ds3dms** command. For more information on viewing received MDL messages, see *Viewing Received MDL Messages* on page 56-26.

20) MDL Transmit Path

This field allows the switch to send Path message to another device. The message contains specified MDL information and the information entered in the **Tx Path Facility Id (PFI)**. Setting this option to **enable** allows Path messages to be sent, while setting this option to **disable** prevents messages from being sent.

21) MDL Transmit Idle Signal

This field allows the switch to send Idle Signal message to another device. The message contains specified MDL information plus the information entered in the **MDL Tx Port Idle Signal Code**. Setting this option to **enable** allows Idle Signal messages to be sent, while setting this option to **disable** prevents messages from being sent.

22) MDL Transmit Test Signal

This field allows the switch to send Idle Signal message to another device. The message contains specified MDL information plus the information entered in the **MDL Tx Generator**. Setting this option to **enable** allows Test Signal messages to be set, while setting this option to **disable** prevents messages from being sent.

23) MDL Rx Enable

This option sets the DS3 port to be able to receive transmitted MDL messages from a remote location. Setting this option to **enable** allows messages to be received, while setting this option to **disable** prevents messages from being received.

24) MDL Tx Equipment Id Code (EIC)

A 10 character text string used to identify the module.

25) MDL Tx Location Id Code (LIC)

An 11 character text string used to identify the module's geographic location.

26) MDL Tx Frame Id Code (FIC)

A 10 character text string used to identify the module's location in a building.

27) MDL Tx Unit Id Code (UIC)

A 6 character text string used to identify the module location in a bay.

28) MDL Tx Path Facility Id (PFI)

A 38 character text string used to identify a specific DS3 path for Path messages. This information is only sent when Path messages have been enabled, as stated above.

29) MDL Tx Port Idle Signal Code

A 38 character text string used to identify a specific DS3 port for Idle Signal messages. This information is only sent when Idle Signal messages have been enabled, as stated above.

30) MDL Tx Generator:

A 38 character text string used to identify a specific DS3 signal generator for Test Signal messages. This information is only sent when Test Signal messages have been enabled, as stated above.

Viewing Cumulative Statistics and Errors of a Local DS3 Port

The **ds3dlts** command allows you to view the statistics totals for events occurring during the past 24 hours on a single DS3 port. To view these statistics, enter the **ds3dlts** command, as follows:

ds3dlts <slot>/<ds3port>/<option>

where **<slot>** is the slot number of the board the port is located on, **<ds3port>** is the port number on the board for which you want statistics, and **<option>** is the type of statistics you would like to display. Available options for this command are:

all. Both statistics and errors are shown in the command display.

stat. Only statistics are shown in the command display.

errors. Only errors are shown in the command display.

For example, to get the statistics for port number 3 on switch slot 2, enter

ds3dlts 2/3/stat

A screen similar to the following is displayed:

```
Local Cumulative Total Statistics for DS-3 on Slot 2 /ds3port 3
Circuit Id: test
Valid intervals   : 96 of 96,  elapsed time (sec)  : 504 of 900
    PES    PSES   SEFS     UAS     LES     CES   CSES
 ======= ======= ======= ======= ======= ======= =======
      0       0       0       0       0       0       0
```

To get the errors for the same port, enter

ds3dlts 2/3/errors

A screen similar to the following is displayed;

```
Local Cumulative Total Errors for DS-3 on Slot 2/ds3port 3
Circuit Id: test
Valid intervals: 96 of 96, elapsed time (sec): 600 of 900
   LCV      PCV      CCV      REI
======= ======= ======= =======
      0       0       0       0
```

Using the option **all** with the **ds3dlts** command shows a combined display of both the statistics and the errors.

As a variation to this command, you can enter **ds3dlts <slot>/<option>**. This displays the statistics, errors, or both for all DS3 ports in a slot (up to four total).

Field Descriptions

The following section explains the fields and their corresponding values.

Configuration Information

Circuit Identifier. The textual description of this DS3 port as configured through the **ds3mod** command.

Valid Intervals. This field indicates the number of 15-minute intervals for which valid statistics were gathered over the last 24 hours. Statistics may be gathered and stored for up to 96, 15-minute intervals. The number of valid intervals will be 96 unless the interface was brought on-line within the last 24 hours.

Elapsed Time. This field indicates the number of seconds that have elapsed since the beginning of the current error-measurement 15 minute sample. This time will be reset to zero when a 15-minute session of statistics gathering is complete (and stored) and the next 15-minute interval begins.

Statistic and Errors Information

PES - P-bit Errored Seconds. A P-bit Errored Second is a second with one or more P-bit Coding Violations, one or more Out Of Frame defects, or a detected incoming Alarm Indication Signal. This counter is not incremented when Unavailable Seconds statistics are counted.

PSES - P-bit Severely Errored Seconds. A P-bit Severely Errored Second is a second with 44 or more P-bit Coding Violations, one or more Out Of Frame defects, or a detected incoming Alarm Indication Signal. This counter is not incremented when Unavailable Seconds statistics are counted.

SEFS - Severely Errored Framing Seconds. A Severely Errored Framing Second is a second with one or more Out Of Frame defects or a detected incoming Alarm Indication Signal. This statistic is not incremented during unavailable seconds.

UAS - Unavailable Seconds. Unavailable Seconds are calculated by counting the number of seconds that the interface is “unavailable”. The DS3 interface is said to be unavailable from the onset of 10 contiguous P-bit Severely Errored Seconds, or the onset of the condition leading to a failure.

LES - Line Errored Seconds. A Line Errored Second is a second in which one or more Coding Violations occurred or one or more Loss Of Signal defects are detected.

CES - C-bit Errored Seconds. A C-bit Errored Second is a second with one or more C-bit coding violations, or one or more Out Of Frame defects, or a detected incoming Alarm Indication Signal. This count is applicable only to SYNTRAN and C-bit Parity DS3 applications. This statistic is not incremented when Unavailable Seconds statistics are counted.

CSES - C-bit Severely Errored Seconds. A C-bit Severely Errored Second is a second with 44 or more C-bit coding violations, or one or more Out Of Frame defects, or a detected incoming Alarm Indication Signal. This count is applicable only to SYNTRAN and C-bit Parity DS3 applications. This statistic is not incremented when Unavailable Seconds statistics are counted.

LCV - Line Coding Violations. This statistic is a count of both Bipolar Violations and Excess Zeros occurring during the sample period.

PCV - P-bit Coding Violations. A P-bit Coding violation error event is equivalent to P-bit Parity Error event. A P-bit Parity Error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally-calculated code.

CCV - C-bit Coding Violations. For C-bit Parity DS3 applications, this is the count of coding violations reported via the C-bits. Specifically, it is a count of CP-bit parity errors occurring in the sample period.

REI - Remote Error Indication. Also known as a Far End Block Error (FEBE). For C-bit parity applications, an indication that the far end equipment is receiving CCVs.

Viewing Current 15-Minute Statistics and Errors of a Local DS3 Port

The **ds3dlcs** command allows you to view the statistics totals for events occurring during the current 15-minute sample period on a single DS3 port. To view these statistics, enter the **ds3lcs** command, as follows:

ds3dlcs <slot>/<ds3port>/<option>

where **<slot>** is the slot number of the board the port is located on, **<ds3port>** is the port number on the board for which you want statistics, and **<option>** is the type of statistics you would like to display. Available options for this command are:

all. Both statistics and errors are shown in the command display.

stat. Only statistics are shown in the command display.

errors. Only errors are shown in the command display.

For example, to get the statistics for port number 3 on switch slot 2, enter

ds3dlcs 2/3/stat

A screen similar to the following is displayed:

```
Local Current 15-minute Statistics for DS-3 on Slot 2 /ds3port 3
Circuit Id: test
Valid intervals   : 96 of 96,  elapsed time (sec)  : 504 of 900
    PES    PSES   SEFS     UAS     LES     CES    CSES
 ======= ======= ======= ======= ======= ======= =======
       0       0       0       0       0       0       0
```

To view the errors for the same port, enter

ds3dlcs 2/3/errors

A screen similar to the following is displayed:

```
Local Current 15-minute Errors for DS-3 on Slot 2/ds3port 3
Circuit Id: test
Valid intervals: 96 of 96, elapsed time (sec): 600 of 900
   LCV     PCV     CCV      REI
======= ======= ======= ======
      0       0       0       0
```

Using the option **all** with the **ds3dlcs** command shows a combined display of both the statistics and the errors.

As a variation to this command, you can enter **ds3dlcs <slot>/<option>**. This displays the statistics, errors, or both for all DS3 ports in a slot (up to four total).

Definitions of the fields and columns in this display are the same as those used for the **ds3dlts** command. See *Viewing Cumulative Statistics and Errors of a Local DS3 Port* on page 56-19 for an explanation of these statistics.

Viewing 15-Minute Interval (Historical) Statistics and Errors of a Local DS3 Port

The **ds3dlis** command allows you to view the statistics totals for events occurring during all currently stored 15-minute sample periods on a single DS3 port. To view these statistics, enter the **ds3dlis** command, as follows:

ds3dlis <slot>/<ds3port>/<option>

where **<slot>** is the slot number of the board on which the port is located, **<ds3port>** is the port number on the board for which you want to get statistics, and **<option>** is the type of statistics you would like to display. Available options for this command are:

all. Both statistics and errors are shown in the command display.

stat. Only statistics are shown in the command display.

errors. Only errors are shown in the command display.

For example, to get statistics for port number 3 on switch slot 2, enter

ds3dlis 2/3/stat

A screen similar to the following is displayed:

Local 15-minute Interval Statistics for DS-3 on Slot 2/ds3port 3
Circuit Id: Alcatel DS3 Circuit
Valid Intervals : 96 of 96, elapsed time (sec): 47 of 900

#	PES	PSES	SEFS	UAS	LEV	CES	CSES
1	0	0	0	900	64636	19894	900
2	0	0	0	900	64636	19894	900
3	0	0	0	900	64636	19894	900
4	0	0	0	900	64636	19894	900
5	0	0	0	900	64636	19894	900
6	0	0	0	900	64636	19894	900
7	0	0	0	900	64636	19894	900
8	0	0	0	900	64636	19894	900
9	0	0	0	900	64636	19894	900
10	0	0	0	900	64636	19894	900
11	0	0	0	900	64636	19894	900
12	0	0	0	900	64636	19894	900
13	0	0	0	900	64636	19894	900
14	0	0	0	900	64636	19894	900
15	0	0	0	900	64636	19894	900
16	0	0	0	900	64636	19894	900

If more than 16 sample periods are stored, the following prompt will be displayed:

More? [<SPACE> for next page, <RETURN> for next line, Quit]

You can then step through the remaining samples either a line at a time pressing **<return>** or a page at a time by pressing **<space>**.

To view the errors for the same port, enter

ds3dlis 2/3/errors

A screen similar to the following is displayed:

```
Local 15-minute Interval Errors for DS-3 on Slot 2/ds3port 3
Circuit Id: Alcatel DS3 Circuit
Valid Intervals   : 96 of 96, elapsed time (sec): 47 of 900
 #    LCV     PCV     CCV     REI
==  ======  ======  ======  ======
 1      0       0       0     900
 2      0       0       0     900
 3      0       0       0     900
 4      0       0       0     900
 5      0       0       0     900
 6      0       0       0     900
 7      0       0       0     900
 8      0       0       0     900
 9      0       0       0     900
10      0       0       0     900
11      0       0       0     900
12      0       0       0     900
13      0       0       0     900
14      0       0       0     900
15      0       0       0     900
16      0       0       0     900
```

If more than 16 sample periods are stored, the following prompt will be displayed:

```
More? [<SPACE> for next page, <RETURN> for next line, Quit]
```

You can then step through the remaining samples either a line at a time pressing **<return>** or a page at a time by pressing **<space>**.

Using the option **all** with the **ds3dlis** command shows a combined display of both the statistics and the errors.

As a variation to this command, you can enter **ds3dlis <slot>/<option>**. This displays the statistics, errors, or both for all DS3 ports in a slot (up to four total).

Definitions of the fields and columns in this display are the same as those used for the **ds3dlts** command. See *Viewing Cumulative Statistics and Errors of a Local DS3 Port* on page 56-19 for an explanation of these statistics.

Clearing Interval Statistics and Errors of a Local DS3 Port

The **ds3clis** command allows you to clear interval statistics on a port-by-port basis. (The **Elapsed Time** variable and all statistics in the displays are reset after you use the command.) To clear statistics on a given DS3 port:

1. Enter the **ds3clis** command as follows:

   ds3clis <slot>/<ds3port>

   where **<slot>** is the slot number of the board on which the port is located, and **<ds3port>** is the port number on the board for which you want to clear statistics. For example, to clear interval statistics on port 1 in switch slot 3, enter:

   ds3clis 3/1

2. When you have done this and hit return, the following prompt is displayed:

   Confirm to clear interval statistics of local DS3 port

   Enter (option=yes/no)

3. Once you have confirmed your choice, a message similar to the following confirms the operation:

   Port 3/1 interval statistics cleared

Viewing Configuration and Statistical Parameters for a DS3 Port

The **ds3dcs** command allows you to view configuration and statistical parameters for a DS3 port. To view these parameters, enter the **ds3dcs** command, as follows:

ds3dcs <slot>/<ds3port>

where **<slot>** is the slot number of the board on which the port is located and **<ds3port>** is the port number on the board for which you want to view configuration and statistical parameters. For example, to view configuration and statistical parameters for port 1 on the board in switch slot 3, enter:

ds3dcs 3/1

A screen similar to the following is displayed:

```
Configuration for DS-3 on Slot 3/ds3port 1:
---------------------------------------------------------------
Circuit Id: test
Framing Type:                       C-bit
Channelization:                     Channelized
Loopback Configuration:             NoLoop
Transmit Clock Source:              Local
Line Length:                        > 255 feet
Line Status Trap Generation:        Enabled
Send FEAC Far End Alarm Signals:    Enabled
Line Coding:
Port State:                         Enabled
Send FEAC Code:
Remote Error Indications (FEBE):
Valid intervals:                    96 of 96
Elapsed time(sec):                  600 of 900
Invalid intervals:                  20
Line Status:                        RcvRAIFailure
Line Status Changed:                0 days, 00:33:40.05
Remote Status:                      NoAlarms
Remote Status Changed:              0 days, 00:33:40.05
FEAC Alarms Received:               None
Loopback status:                    NearEndPayloadLoopback

Local Current 15-minute Statistics and Errors:
-------------------------------------------------------------------------
  PES  PSES  SEFS   UAS   LEC   CES  CSES   LCV   PCV   CCV    REI
===== ===== ===== ===== ===== ===== ===== ===== ===== ===== =====
    0     0     0     0     0     0     0     0     0     0     0

Local Cumulative Total Statistics and Errors:
-------------------------------------------------------------------------
  PES  PSES  SEFS   UAS   LEC   CES  CSES   LCV   PCV   CCV    REI
===== ===== ===== ===== ===== ===== ===== ===== ===== ===== =====
    0     0     0     0     0     0     0     0     0     0     0
```

There are two variations to this command. You can view configuration and statistical parameters for all DS3 ports in a slot by entering **ds3dcs <slot>** followed by **<return>**, or you can view configuration parameters for an entire switch by entering the **ds3dcs** command by itself.

♦ Note ♦

If the DS3 port is not using C-bit parity as its **Framing Type**, the fields labeled **Send FEAC Code** and **Remote Error Indications (FEBE)** are not displayed in the above screen. These fields only apply to a DS3 port using C-bit parity.

Field Descriptions

The following section explains the fields and their corresponding values.

Most of the definitions of the fields in this display are the same as those used for the **ds3mod** and **ds3dlts** commands. See *Configuring a DS3 Port* on page 56-13 and *Viewing Cumulative Statistics and Errors of a Local DS3 Port* on page 56-19 for an explanation of these fields and statistics.

Fields not described in those two sections are described below.

Port State. Specifies the enable/disable status of the port. The possible values are **enabled** and **disabled**. See *Configuring a DS3 Port* on page 56-13 for information on changing the port state status.

Invalid Intervals. Indicates the number of statistics intervals that were invalid due to errors or interruption.

Line Status. Indicates the current active alarms for the DS3 port. Possible alarms for a port are:

- **No Alarms**. No alarm is present.
- **RAI**. Remote alarm indication (RAI).
- **AIS**. Alarm indication signal (AIS) failure state.
- **OOF**. Out of frame (LOF) failure state.
- **LOS**. Loss of signal (LOS) failure state.

Viewing Received MDL Messages

If the DS3 port is set to use C-bit parity, you can use the **ds3dms** command to view received Maintenance Data Link (MDL) messages. MDL messages are sent from the termination of the DS3 line to the switch for error testing and link maintenance. To view received MDL messages enter the **ds3dms** command as follows

ds3dms <slot>/<ds3port>

where **<slot>** is the slot number of the board on which the port is located and **<ds3port>** is the port number on the board for which you want to view configuration and statistical parameters. For example, to view configuration and statistical parameters for port 1 on the board in switch slot 3, enter:

ds3dms 3/1

A screen similar to the following is displayed:

```
DS-3 MDL Messages Received on Slot 3/ds3port 1 (for C-bit framing)
Circuit Id:                          Test
Framing Type:                        C-bit
MDL Rx Equipment Id Code (EIC):      1234567890
MDL Rx Location Id Code (LIC):       12345678901
MDL Rx Frame Id Code (FIC):          1234567890
MDL Rx Unit Id Code (UIC):           123456
MDL Rx Path Facility Id Code (PFI):  12345678901234567890123456789012345678
MDL Rx Port Idle Signal Code:        12345678901234567890123456789012345678
MDL Rx Generator:                    12345678901234567890123456789012345678
```

For a description of the fields displayed in this screen, see the previous section *Configuring a DS3 Port using C-Bit Parity* on page 56-16

Configuring a DS1 Channel

The **ds1mod** command configures a DS1 channel as part of a DS3 line at the physical level. (It is generic to all such ports, regardless of the logical level service that controls them.) To configure a DS1 port, enter the **ds1mod** command as follows:

ds1mod <slot>/<ds3port>/<ds1>

where **<slot>** is the slot number of the board on which the port is located, **<ds3port>** is the port number on the board you want to modify, and **<ds1>** is the DS1 channel number for the selected DS3 port. Since a channelized DS3 is comprised of 28 DS1 channels, the value for the DS1 channel must be 1-28. For example, to modify DS1 channel 14 for port number 2 on switch slot 5, enter

ds1mod 5/2/14

A screen similar to the following is displayed:

```
1)  Circuit Id (30 chars max):
2)  Framing {ESF(1),D4(2)}
3)  Loopback Config {No Loopback(1), Payload Loopback(2),
    Line Loopback(3), Remote Loopback(ESF framing only)(4) }:
4)  Send Code (ESF framing only) { No Code(1),
    Line Code(2), Payload Code(3), Reset Code(4)}:
5)  Transmit Clock Source
    {Loop(1),Local(2), External Timing(3) }:
6)  Facility Datalink (FDL) {None(1),  Ansi(2),  AT&T 54016(4)}:
7)  Line Status Trap Generation {enabled (1), disabled (2)} :
8)  T1 BERT Pattern {No Pattern(1), 2power15-1(0.151)(2),
    2power20-1(0.153)(3), QRSS(4), 2power23-1(0.153)(5),
    All Zeros(6), All Ones(7), Alternating 1's and 0's(8)}
9)  T1 BERT Interval {in minutes 1-14400}:
10)T1 BERT Framing {Use Configured Framing (1), Unframed(2)}:
11}T1 BERT Start/Stop {enabled(1), diabled(2)}:

Enter (option=value/save/cancel) :
```

You make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

For example, to set the **Loopback Config** to **PayloadLoop** you would enter **3** (the line number for **Loopback Config**), an equals sign, and then **2** (the value that represents **PayloadLoop**).

After you have entered the required values, be sure to save your configuration.

As a variation of this command, you can enter **ds1mod <slot>/<ds3port>** at the system prompt without a specific DS1 channel number. Using the **ds1mod** command in this manner changes the settings for all 28 DS1 channels in a DS3 port.

Field Descriptions

The following section explains the fields and their corresponding values.

1) Circuit Identifier

Enter a textual description of this DS1 port, up to 30 characters. This text will be used in other screen displays to identify this DS1 port.

2) Line Type

Specify the frame format to be used on this port. The choices are Extended SuperFrame (**ESF**), or SuperFrame (**D4**). A T1 frame consists of 24 8-bit time slots and a 1-bit synchronization and control. Twelve (12) T1 frames can be grouped into a SuperFrame, and 24 T1 frames can be grouped into an Extended SuperFrame.

The possible line types for a DS1 port are **ESF (1)** (Extended Superframe) and **D4 (2)** (Superframe).

3) Loopback Config

This field is used for diagnostic purposes to set various receive-to-transmit data loops. Possible types are:

No Loopback(1)

The port is not in a loopback state. This is the typical live network state for a DS1 port.

Payload Loopback(2)

Loopback all 24 receive DS0s on the DS1 to the outgoing transmit DS0 on the DS1 interface. The received signal (bit level) at this DS1 port is looped through the port after passing through the port's framing functionality.

Line Loopback(3)

Loopback the entire receive DS1 to the outgoing transmit DS1s. The received signal at this DS1 port does not go through the port's framing functionality, and is instead looped straight back out the transmit function of the port. This state should only be used for debugging purposes.

Remote Loopback(4)

Allow the interface to react to all loopback commands on the Extended Superframe (ESF) channel. This option is only valid if ESF is employed.

4) Send Code

Send codes are loopback commands sent in the Extended Superframe data link. If the remote device is configured to accept these commands, it will begin a loopback mode upon receiving them. The options specify what type of code is being sent across the DS1 interface by the device. Possible types are:

No Code(1)

Sending looped or normal data. No ESF datalink code is sent.

Line Code(2)

Sending a request for a DS1 line loopback. The received signal at this DS1 port does not go through the port's framing functionality, and is instead looped straight back out the transmit function of the port. This state should only be used for debugging purposes

Payload Code(3)

Sending a request for a payload loopback (i.e., all DS1s in a DS3 frame). Loopback all 24 receive DS0s on the DS1 to the outgoing transmit DS0 on the DS1 interface. The received signal (bit level) at this DS1 port is looped through the port after passing through the port's framing functionality.

Reset Code(4)

Sending a request for loopback deactivation. It cancels a previous command for any of the three options above.

5) Transmit Clock Source

This field specifies the transmit clock timing source of the DS1 channel. The possible values are:

Loop Timing(1)

In loop timing, the transmit timing is recovered from the receive data stream and then the timing "looped" back onto the transmit data stream. This is different from loop diagnostics modes (see below), in which the actual receive data stream is looped back to the transmit data stream).

Local Timing(2)

In local timing, the timing for the transmit data stream is generated internally, rather than using the clock recovered from the receive data stream of the DS3 port.

External Timing(3)

In external timing, the transmit timing is recovered from the receive data stream of another interface and then used as the transmit clock.

8) Facility Datalink

Facility Datalink (FDL) gathers performance statistics every second and stores them in the 24-hour local statistical database. It also sends local performance statistics to the remote T1 port depending on the type of FDL chosen. In order to obtain far-end, or remote, performance statistics you must enable an FDL protocol.

♦ Note ♦

Facility Datalink requires a T1 port and the frame type must be Extended SuperFrame.

You have the following choices:

None (1)

The port does not use Facility Datalink.

ANSI (2)

The FDL exchange recommended by ANSI. The FDL method sends Performance Report Messages (PRMs) to the far-end port every second, processes received PRMs, and stores them in a 24-hour far-end statistical database.

AT&T 54016 (3)

The FDL exchange recommended by AT&T. The FDL protocol will either be active (**network**) or passive (**user**) in its sending of PRMs.

7) Line Status Trap Generation

Specifies whether the SNMP-related line status traps for this port are enabled. The possible values are **enabled(1)** and **disabled(2)**.

8) T1 BERT Pattern

This field allows you to set what type of Bit Error Rate Testing (BERT) pattern is to be generated if you are using C-bit parity for your framing type. The BERT test patterns are framed test patterns, meaning they are inserted into the payload of the framed DS1 signal.

No Pattern (1)

No BERT pattern is set.

2power15-1(0.151) (2)

32767-bit long pseudo-random pattern as defined by ITU-T 0.151.

2power20-1(0.153) (3)

1048575-bit long pseudo-random pattern as defined by ITU-T 0.151.

QRSS (4)

1048575-bit long pseudo-random pattern with 1's substituted as defined by ITU-T 0.151.

2power23-1(0.153) (5)

8388607-bit long pseudo-random pattern as defined by ITU-T 0.151.

All Zeros (6)

BERT pattern is all zeros (0).

All Ones (7)

BERT pattern is all ones (1).

Alternating (8)

BERT pattern alternates between ones and zeros (10101).

9) T1 BERT Interval

When a BERT test is sent, this field determines the length of the test in minutes.

10)T1 BERT Framing

For the BERT test interval, you can select to use the DS1 framing type specified for the DS1 channel (either ESF or D4), or send an unframed interval. To send the test with the specified framing type, set this field to **Use Configured Framing**. send a test without the specified framing type, set this field to **Unframed**.

11}T1 BERT Start/Stop

This option enables the BERT test on the selected DS1 channel. To start the test, set this field to **enable**. To stop the test, set this field to **disable**.

Setting DS1 Collection Statistics for a DS3 Port

In the interests of saving memory and enhancing performance, it is possible to determine which DS1 channels in a DS3 port are to be polled for statistics. To choose what specific DS1 channels are to be polled for statistics, enter the **ds3scs** command as follows:

ds3scs <slot>/<ds3port>

where **<slot>** is the slot number of the board on which the port is located and **<ds3port>** is the port number on the board for which you want to set DS1 channel collection statistics. For example, to set DS1 channel collection statistics for DS3 port 2 on slot 3, you would enter:

ds3scs 3/2

The following screen is displayed:

```
DS1 statistics collection for DS3 port 2/1
As the result of configuration change DS1 statistics may be reset

1) DS1 ports collecting statistics:
  {1,2,3,4,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28}
  DS1 ports not collecting statistics:
  {5,6,7,8}
  (Usage: "+/-<port|all>" add/remove ds1 port. For example,
  "1=+10+12-9" to add ds1 port 10 & 12 and remove ds1 port 9.
  "1=+all" add all ds1 ports.  "1=-all" remove all ds1 ports)

Enter (option=value/save/cancel) :
```

Viewing Cumulative Statistics and Errors of a Local DS1 Channel

The **ds1dlts** command allows you to view statistics for events occurring during the past 24 hours on a single port. To view these statistics, enter the **ds1dlts** command as follows:

ds1dlts <slot>/<ds3port>/<ds1>/<option>

where **<slot>** is the slot number of the board on which the port is located, **<ds3port>** is the port number on the board, **<ds1>** is the DS1 channel for which you want to view statistics or errors, and **<option>** is the type of statistics you would like to display. Available options for this command are:

all. Both statistics and errors are shown in the command display.

stat. Only statistics are shown in the command display.

errors. Only errors are shown in the command display.

For example, to get statistics for DS1 channel 2 on port number 1 on switch slot 3, enter

```
ds1dlts 3/1/2/stat
```

A screen similar to the following is displayed:

```
Local Cumulative Total Statistics for DS-1 #2 on Slot 3/ds3port 1
Circuit Id: test
Valid Intervals : 96 of 96, elapsed time (sec): 421 of 900
     ES     BES     SES    SEFS      DM     UAS
 ====== ====== ====== ====== ====== ======
   1111   1112   1113   1114   1115   1116
```

To view the errors for the same port, enter

```
ds3dlts 3/1/2/errors
```

A screen similar to the following is displayed:

```
Local Cumulative Total Errors for DS-1 #2 on Slot 3/ds3port 1
Circuit Id: test
Valid Intervals : 96 of 96, elapsed time (sec): 421 of 900
    PCV
 ======
   1111
```

Using the option **all** with the **ds1dlts** command shows a combined display of both the statistics and the errors.

As a variation to this command, you can enter **ds1dlts <slot>/<ds3port>/<option>** to display all of the DS1 channels configured for a single DS3 port.

Field Descriptions

The following section explains the fields and their corresponding values.

Configuration information

Circuit Identifier. The textual description of this DS1 port as configured through the **ds1mod** command.

Valid Intervals. Indicates the number of 15-minute intervals for which valid statistics were gathered during the previous 24 hours. Statistics may be gathered for up to 96 15-minute intervals during a 24-hour period.

Elapsed Time. The number of seconds that have elapsed during this 15-minute interval of gathering statistics. This time will be reset to zero when a 15-minute session of statistics gathering is complete (and stored) and the next 15-minute interval begins.

Statistics information

ES - Errored Seconds. For T1-ESF and E1-CRC conditions, this is a second with one or more Path Code Violations, one or more out-of-frame defects, one or more controlled slip errors, or an AIS error.

BES - Bursty Errored Seconds. The number of seconds with fewer than 320 but more than one (1) Path Code Violation error (see below for definition), no Severely Errored Frame errors, and no AIS errors.

SES - Severely Errored Seconds. For T1-ESF frames, this is a second with 320 or more Path Code Violation errors, one or more out-of-frame defects, or an AIS error. For E1-CRC conditions, this is a second with 832 or more Path Code Violation errors, or one or more out-of-frame defects. For E1-noCRC signals, this is a second with 2048 or more Line Code Violation errors. For D4/(SF) frames, this is a second with framing errors, an out-of-frame error, or a second with 1544 or more line code violation errors.

SEFS - Severe Errored Framing Second. A second with one or more out-of-frame errors or an AIS error.

DM - Degraded Minutes. The number of minutes in which the estimated error rate exceeds 1E-6 but does not exceed IE-3.

UAS - Unavailable Seconds. The number of seconds this port was unavailable for transmitting or receiving data. In general, a port is unavailable after 10 consecutive Severely Errored Seconds or after a failure on the interface occurs.

PCV - Path Code Violations. A frame synchronization bit error in EF/D4 and E1-noCRC frames, or a CRC or frame synchronization error in the T1-ESF (Extended Super Frame) and E1-CRC frames.

Viewing Current 15-Minute Statistics of a Local DS1 Channel

The **ds1dlcs** command allows you to view the statistics totals for events occurring during the current 15-minute sample period on a single DS1 port. To view these statistics, enter the **ds1dlcs** command as follows:

ds1dlcs <slot>/<ds3port>/<ds1>/<option>

where <**slot**> is the slot number of the board the port is located on, **<ds3port>** is the port number on the board, **<ds1>** is the DS1 channel for which you want to view statistics, and **<option>** is the type of statistics you would like to display. Available options for this command are:

all. Both statistics and errors are shown in the command display.

stat. Only statistics are shown in the command display.

errors. Only errors are shown in the command display.

For example, to get statistics for DS1 channel 2 on port number 1 of switch slot 3, enter

ds1dlcs 3/1/2/stat

A screen similar to the following is displayed:

```
Local Current 15-minute Statistics for DS-1 #2 on Slot 3/ds3port 1
Circuit Id: test
Valid Intervals : 96 of 96, elapsed time (sec): 421 of 900
     ES     BES     SES   SEFS      DM     UAS
 ====== ======= ======= ======= ======= =======
   1111    1112    1113    1114    1115    1116
```

To view the errors for the same channel, enter

ds3dlcs 3/1/2/errors

A screen similar to the following is displayed:

```
Local Cumulative Total Errors for DS-1 #1 on Slot 2/ds3port 1
Circuit Id: test
Valid Intervals : 96 of 96, elapsed time (sec): 421 of 900
     PCV
 ======
   1111
```

Using the option **all** with the **ds1dlcs** command shows a combined display of both the statistics and the errors.

As a variation to this command, you can enter **ds1dlcs <slot>/<ds3port>/<option>** to display all of the DS1 channels configured for a single DS3 port.

Definitions of the fields and statistics columns in this display are the same as those used for the **ds1dlts** command. See *Viewing Cumulative Statistics and Errors of a Local DS1 Channel* on page 56-31 for an explanation of these statistics.

Viewing 15-Minute Interval Statistics and Errors of a Local DS1 Channel

The **ds1dlis** command allows you to view the statistics and errors totals for events occurring during all currently stored 15-minute sample periods on a single DS1. To view these statistics, enter the **ds1dlis** command as follows:

ds1dlis <slot>/<port>/<ds1>/<option>

where **<slot>** is the slot number of the board on which the port is located, **<port>** is the port number on the board, **<ds1>** is the channel for which you want to view statistics, and **<option>** is the type of statistics you would like to display. Available options for this command are:

all. Both statistics and errors are shown in the command display.

stat. Only statistics are shown in the command display.

errors. Only errors are shown in the command display.

For example, to get statistics for channel 3 on port 1 on the board in switch slot 2, enter:

ds1dlis 2/1/3/stat

A screen similar to the following is displayed:

```
Local 15-minute Interval Statistics for DS-1 #3, on Slot 2/ds3port 1
Circuit Id: test
Valid Intervals: 96 of 96, elapsed time (sec): 600 of 900
 #      ES      BES      SES     SEFS       DM      UAS
== ====== ======= ======= ======= ======= =======
 1       0        0        0      900   64636   19894
 2       0        0        0      900   64636   19894
 3       0        0        0      900   64636   19894
 4       0        0        0      900   64636   19894
 5       0        0        0      900   64636   19894
 6       0        0        0      900   64636   19894
 7       0        0        0      900   64636   19894
 8       0        0        0      900   64636   19894
 9       0        0        0      900   64636   19894
10       0        0        0      900   64636   19894
11       0        0        0      900   64636   19894
12       0        0        0      900   64636   19894
13       0        0        0      900   64636   19894
14       0        0        0      900   64636   19894
15       0        0        0      900   64636   19894
16       0        0        0      900   64636   19894
```

If more than 16 sample periods are stored, the following prompt will be displayed:

```
More? [<SPACE> for next page, <RETURN> for next line, Quit]
```

You can then step through the remaining samples either a line at a time pressing **<return>** or a page at a time by pressing **<space>**.

To view the errors for the same channel, enter

```
ds1dlis <slot>/<ds3port>/<ds1>/errors
```

This displays a screen similar to the following:

```
Local 15-minute Interval Errors for DS-1 #3, on Slot 2/ds3port 1
Circuit Id: test
Valid Intervals: 96 of 96, elapsed time (sec): 600 of 900
 #     PCV
== ======
 1       0
 2       0
 3       0
 4       0
 5       0
 6       0
 7       0
 8       0
 9       0
10       0
11       0
12       0
13       0
14       0
15       0
16       0
```

If more than 16 sample periods are stored, the following prompt will be displayed:

```
More? [<SPACE> for next page, <RETURN> for next line, Quit]
```

You can then step through the remaining samples either a line at a time pressing **<return>** or a page at a time by pressing **<space>**.

Definitions of these fields and statistics columns in this display are the same as those used for the **ds1dlts** command. See *Viewing Cumulative Statistics and Errors of a Local DS1 Channel* on page 56-31 for an explanation of these statistics.

Clearing Interval Statistics of a Local DS1 Channel

The **ds1clis** command allows you to clear interval statistics on a port-by-port, DS1 channel-by-channel basis. (The **Elapsed Time** variable and all statistics in displays are reset after you use the command.) To clear statistics on a given DS1 port:

1. enter the **ds1clis** command as follows:

   ds1clis <slot>/<ds3port>/<ds1>

   where **<slot>** is the slot number of the board on which the port is located, **<ds3port>** is the port number on the board, and **<ds1>** is the DS1 channel for which you want to clear statistics. For example, to clear interval statistics for channel 1 on port 1 in switch slot 3, enter:

   ds1clis 3/1/1

2. When you have done this and hit return, the following prompt is displayed:

   Confirm to clear interval statistics of local DS1 port

   Enter (option=yes/no)

3. When you have confirmed your choice to clear the statistics, a message similar to the following confirms the operation:

   Port 3/1/1 interval statistics cleared

Viewing Configuration and Statistical Parameters for a DS1 Channel

The **ds1dcs** command allows you to view configuration and statistical parameters for a DS1 port. To view these parameters, enter the **ds1dcs** command as follows:

ds1dcs <slot>/<ds3port>/<ds1>

where **<slot>** is the slot number of the board on which the port is located, **<ds3port>** is the port number on the board, and **<ds1>** is the DS1 channel for which you want to view configuration and statistical parameters. For example, to view configuration and statistical parameters for DS1 channel 1 for DS3 port1 on the board in switch slot 3, enter:

ds1dcs 3/1/1

A screen similar to the following is displayed:

```
 Configuration for DS-1 #2 on Slot 3/ds3port 1:
 ----------------------------------------------------------------
Circuit Id: test
Transmit Clock Source:  Local            Loopback Config: NoLoop
Framing:                ESF              Send Code: SendNoCode
FDL Configuration:      ANSI             Trap Generation: enabled
Valid intervals:        96 of 96
Elapsed Time (sec):     600 of 900
Invalid intervals:      20
Line status:            RcvRAIFailure,
Line Status Changed:    0 days, 00:33:40.05
Remote Status:
Remote Status Changed:  0 days, 00:33:40.05
Loopback status:        NearEndPayloadLoopback

Local Current 15-minute Statistics and Errors:
--------------------------------------------------------------------------
     ES     BES     SES    SEFS      DM     UAS     PCV
 ====== ====== ====== ====== ====== ====== ======
   1111   1112   1113   1114   1115   1116   1117

Local Cumulative Total Statistics and Errors:
----------------------------------------------------------------
     ES     BES     SES    SEFS      DM     UAS     PCV
 ====== ====== ====== ====== ====== ====== ======
   1111   1112   1113   1114   1115   1116   1117
```

There are two variations of this command. You can enter **ds1dcs <slot>/<ds3port>** to view configuration and statistical parameters for all DS1 channels on a DS3 port, or you can enter **ds1dcs <slot>** and view configuration and statistical parameters for all DS1 channels on an entire channelized DS3 module.

All of the definitions for fields in this display are the same as those used for the **ds1mod** and **ds1dlts** commands. See *Configuring a DS1 Channel* on page 56-27 and *Viewing Cumulative Statistics and Errors of a Local DS1 Channel* on page 56-31 for an explanation of these fields and statistics.

Adding a Logical Port Configuration

The **lpadd** command allows you to create a logical port. A logical port is an HDLC channel used to transmit data, and can be assigned up to 24 time slots from a DS1. To add a logical port, perform the following steps:

1. Enter the **lpadd** command as follows:

   lpadd <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the HDLC channel or logical port number that identifies the new logical port. If you want to assign the next available logical port number, you can type an asterisk (*) instead of a specific logical port number. For example, to add a logical port number 1 to physical port 2 in switch slot 3, enter:

   lpadd 3/2/1

   A screen similar to the following is displayed:

```
Adding logical port: slot 3, ds3port 1, logical port 1
1) ds1 channel {1-28}                                  : 0
2) Protocol {PPP(0), FR(1)}                            : PPP
3) Change channel mask (0x000000 - 0xFFFFFF)           : 0x000000
   31) Add starting ds0 channel of the group (1-24)    : 0
   32) Add number of ds0 channels in the group (1-24): 0
   33) Group add to mask (1) or clear in the mask (2)
   34) ds0 channels (time slots) used {}
                    channels available: {9,10,11,12,13,14}
   (Usage: "+/-<ts/all)" add/remove time slot. For example,
   "5=+10+12-9" to add time slot 10 and 12 and remove time slot 9.
   "5=+all" to add all time slots.  "5=-all" remove all time slots)

Enter (option=value/save/cancel) :
```

2. Make changes to the options in this screen at the colon prompt (:) by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

   For example, to change the logical port protocol to Frame Relay, you would enter 2 (the line number for protocol), and equals sign, and then a 1 (the value for Frame Relay) as follows:

   2=1

3. After you have entered the required values, be sure to save your configuration.

♦ Note ♦

When creating a logical port, either by assigning it a specific number or selecting the next available number, it is important to keep a record of this as it uniquely identifies the logical port and is required when using other logical port commands.

Field Descriptions

The following section explains the fields and their corresponding values.

1) ds1channel {1-28}

The logical port must be assigned to one of the 28 DS1 channels of a DS3 line. Since a channelized DS3 consists of 28 DS1 channels, this number must be between 1 and 28.

♦ Note ♦

More than one logical port can be assigned to a DS1 as long as the two logical ports are not assigned to use the same set of DS0 time slots.

2) Protocol {PPP(0), FR(1)}

The protocol this logical port will use to transmit data, either Point-to-Point Protocol (**PPP (0)**) or Frame Relay (**FR (1)**).

3) Change channel mask (0x000000 - 0xFFFFFF)

A hexadecimal number assigned to this logical port indicating which DS0s have been assigned to the logical port.

31) Add starting ds0 channel of the group (1-24)

Select the first DS0 time slot number the logical port will use for data traffic. Since there are 24 time slots in a DS1 channel, this number must be between 1 and 24. For example, if you wished to have this logical port begin with time slot 5, you would enter that number for this parameter.

32) Add number of ds0 channels in the group (1-24)

Select the number of DS0 time slots to add to the starting DS0 time slot. Using the above example, if you wanted to have this logical port use 4 time slots total, you would enter 3 for this parameter. This logical port would now use DSO time slots 5, 6, 7, and 8 of this DS1 channel.

33) Group add to mask (1) or clear in the mask (2)

Decide whether the DS0 group is added to the logical port mask or if they will be clear in the mask.

♦ Note ♦

Once a DS0 time slot is assigned to a logical port, it cannot be used in another logical port unless it is first removed from the initial assignment.

34) ds0 channels (time slots) used

Displays a list of the specific DS0 time slots being used by this logical port.

Adding a Logical Port Configuration to a Clear Channel DS3 Port

If a DS3 port is configured to be a clear channel port, it is still possible to add a logical port that encompasses the entire clear channel. To add a logical port to a clear channel DS3:

1. Using the **ds3mod** command, configure the DS3 port as described in *Configuring a DS3 Port* on page 56-13 or *Configuring a DS3 Port using C-Bit Parity* on page 56-16. Change the **Channelization** option to **Unchannelized** by entering a **3** (the line number for **Channelization**), an equal sign (**=**), and a **2** (the value for **Unchannelized**) at the system prompt, as shown

   ```
   3=2
   ```

   This setting allows the DS3 to run as a single line using its full bandwidth. Remember to save your configuration.

2. Use the **lpadd** command as described in *Adding a Logical Port Configuration* on page 56-38. Instead of the regular **lpadd** screen, an abbreviated version appears, as shown:

   ```
   Adding clear channel logical port: slot 2. ds3port 1, logical port 511
   1) Protocol {PPP(0), FR(1)}: PPP

   Enter (option=value/save/cancel) :
   ```

   Choose either Point-to-Point Protocol or Frame Relay as your transmission protocol at the system prompt. For example, to select Frame Relay you would enter **1** (the line number), and equal sign (**=**), and **1** (the value for Frame Relay), as shown:

   ```
   1=1
   ```

3. Remember to save your configuration when you are finished.

Modifying a Logical Port Configuration

The **lpmod** command allows you to modify a logical port to the M013 configuration. To modify the configuration of a logical port, perform the following steps:

1. Enter the **lpmod** command as follows:

   ```
   lpmod <slot>/<ds3port>/<logPort>
   ```

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to modify logical port number or 1 for physical port 2 on slot 3, enter:

   ```
   lpmod 3/2/1
   ```

A screen similar to the following is displayed:

```
Logical port configuration:
   slot 3, ds3port 2, ds1channel 10, logical port 1
   operState Enabled, ds0 channel mask 0x000000
1) Logical port descriptor (30 chars max)          :
2) Protocol {PPP(0), FR(1)}                        : PPP
3) MTU                                             : 100
4) Administrative state {enabled(1), disabled(2)}: Enabled
5) ds0 channels (time slots) used: {}
                    channels available: { 1,2,3,4,5,6,7,8,9,10,11,12,
                                          13,14,15,16}
   (Usage: "+/-<ts/all)" add/remove time slot. For example,
   "5=+10+12-9" to add time slot 10 and 12 and remove time slot 9.
   "5=+all" to add all time slots.  "5=-all" remove all time slots)

Enter (option=value/save/cancel) :
```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

For example, if you wanted to change the **MTU** (Maximum Transfer Unit) to 300, you would enter 3 (the line number for **MTU**), an equals sign, and then 300, as follows

```
3=300
```

3. After you have entered the required values, be sure to save your configuration.

♦ Note ♦

Once you have created a logical port and assigned it to a DS3 port and DS1 channel, it remembers this information. Thus you will not need to enter those parameters when using this and other logical port commands.

Field Descriptions

The following section explains the fields and their corresponding values.

1) Logical port descriptor (30 chars max)

A textual description of the logical port. This is how the logical port will be identified in other UI screens. It can be up to thirty (30) characters long.

2) Protocol {PPP(0), FR(1)}

The protocol this logical port will use to transmit data, either Point-to-Point Protocol (**PPP (0)**) or Frame Relay (**FR (1)**).

3) MTU

The Maximum Transmission Unit for this logical port (in bytes). Any data unit exceeding this limit is discarded.

4) Administrative state {enabled(1), disabled(2)}

This field indicates the Administrative State of the logical port, which can be either Enabled or Disabled. If **enabled**, the logical port has been enabled and can transmit data as long as its Operational State is also **enabled**. If the Admin Status is **disabled**, the port will not pass data.

5) ds0 channels (time slots) used

Displays a list of the specific DS0 time slots being used by this logical port.

Deleting a Logical Port

The **lpdel** command allows you to delete a logical port from the M013 configuration. To delete a logical port, perform the following steps:

1. Enter the **lpdel** command as follows:

   lpdel <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to delete a logical port number 1 for physical port 2 on slot 3, enter:

   lpdel 3/2/1

   A screen similar to the following is displayed:

   Confirm to delete logical port 1, ds3port 2 on slot 3

   Enter (option=yes/no) :

2. Confirm deletion by entering **yes** at the colon prompt (:) followed by **<return>**. The following message should be displayed:

```
Changing configuration ...

Logical port 1 for ds3port 2 on slot 3 deleted
```

Viewing Logical Port Configuration and Statistics

The **lpview** command allows you to view logical port configuration and statistics. To view logical port configuration and statistics, enter the **lpview** as follows:

```
lpview <slot>/<ds3port>/<logPort>
```

where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to view the statistics for logical port 27 for port 3 on slot 2, enter:

```
lpview 2/3/27
```

A screen similar to the following is displayed:

```
Configuration of logical port 27 2/3/27
DS1 channel:3                    Descriptor:
DS0 channels (time slots) used:  {}
DS0 channel mask: 0x000000       Protocol: Frame Relay
Daughter card: 1                 Speed: 0
Administrative state: Enabled    MTU: 0
Operational state: Enabled       Status change time: 0 days, 00:00:00.00
Statistics of logical port 27 on slot 2
TxOctetCount:              1     RxOctetCount:              7
TxUniCount:               22     RxUniCount:               88
TxMcCount:               333     RxMcCount:               999
TxBcCount:              4444     RxBcCount:              1111
TxBufDiscard:          55555     RxBufDiscard:          22222
TxErrorDiscard:       666666     RxErrorDiscard:       333333
DelayExceedDiscard:        4     VseDiscardTxFull:         55
MtuExceedDiscard:        666     FloodLimitDiscard:    999999
VlanFiltered:           7777     PortFiltered:          88888
UnknownProtos:       1111111     OutQLen:                5518
```

There are three variations of this command. You can enter **lpview <slot>/<ds3port>** to show the statistics of all logical ports for the selected port, **lpview <slot>** to show the statistics for all logical ports on the selected slot, and **lpview** alone to show the statistics for all logical ports in the switch. To see the next set of logical port statistics, press the space bar.

Field Descriptions

The following section explains the fields and their corresponding values.

Configuration information

DS 1 channel. The DS1 channel number for this logical port.

DS 0 channels (time slots) used. A list of the DS0 timeslots used in this logical port.

Descriptor. This field is a textual description of the configured logical port (up to a maximum of thirty characters) as created in with the **lpmod** command.

DSO Channel Mask. This field is a hexadecimal number used to mask the channel number for security purposes.

Protocol. This field indicates the Protocol Type, which can be either Frame Relay or Point-to-Point Protocol (PPP).

Daughter Card. This field indicates which daughtercard of the channelized DS3 module the logical port uses.

Speed. This column indicates the speed of the logical port, expressed in bits per second (bps).

Administrative State. This field indicates the Administrative State of the logical port, which can be either Enabled or Disabled. If **Enabled**, the logical port has been enabled and can transmit data as long as its Operational State is also **enabled**. If the Admin Status is **Disabled**, the port will not pass data.

MTU. The Maximum Transmission Unit for this logical port (in bytes). Any data unit exceeding this limit is discarded.

Operational State. This field indicates the Operational State of the logical port, which can either be enabled or disabled. If **enabled**, the port is capable of passing data as long as it has been logically enabled at the Administrative level. If **disabled**, the port cannot pass data because the port is administratively down. If the Operational State displays **LB**, the port is currently in Loopback (test) mode.

Status Change Time. This field refers to the system time when the last change in line status occurred to this logical port.

Statistics information

TxOctetCount. The total number of octets, or bytes, transmitted from this logical port since the last time the switch was initialized.

RxOctetCount. The total number of octets, or bytes, received on this logical port since the last time the switch was initialized. This statistic includes the data and Frame Relay header fields, but does not include CRC or flag characters.

TxUniCount. The number of unicast frames transmitted on this logical port to a higher layer protocol since the last time the switch was initialized.

RxUniCount. The number of unicast frames received by this logical port from a higher level protocol since the last time the switch was initialized.

TxMcCount. The number of mulitcast frames transmitted on this logical port to a higher layer protocol since the last time the switch was initialized.

RxMcCount. The number of multicast frames received by this logical port from a higher level protocol since the last time the switch was initialized.

TxBcCount. The number of broadcast frames transmitted on this logical port to a higher layer protocol since the last time the switch was initialized.

RxBcCount. The number of broadcast frames received by this logical port from a higher level protocol since the last time the switch was initialized.

TxBufDiscard. For transmissions from this logical port, the number of frames discarded due to a lack of buffer space.

RxBufDiscard. For data received by this logical port, the number of frames discarded due to a lack of buffer space.

TxErrorDiscard. For transmissions from this logical port, the number of frames discarded due to errors.

RxErrorDiscard. For data received by this logical port, the number of frames discarded due to errors.

DelayExceedDiscard. Number of frames that were delayed, usually due to collisions, but were ultimately transmitted.

VseDiscardTxFull. The number of frames that were discarded due to a lack of VSE transmit buffer space.

MtuExceedDiscard. The number of frames that have been discarded because they exceeded the maximum transmission unit (MTU) size. See *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40 for information on setting the MTU size.

FloodLimitDiscard. The number of frames discarded due to exceeding the flood limit of this logical port. Flooding occurs when the frame's destination is not know, so it is sent out to all devices in a VLAN or segment ring.

VlanFiltered. The number of frames discarded due to not being able to find a matching VLAN.

PortFiltered. The number of frames discarded due to not being able to find a matching virtual port.

UnknownProtos. The number of unknown protocols encountered by this logical port.

OutQLen. The number of packets in the output packet queue.

Clear Statistics for a Logical Port

The **lpcls** command allows you to clear statistics associated with a logical port. To clear statistics:

1. Enter the **lpcls** command as follows:

   lpcls <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to clear the statistics for logical port 27 on port 3 of slot 2, enter:

   lpcls 2/3/27

   The following message will be displayed:

   Confirm to clear statistics of logical port

   Enter (option=yes/no):

2. Enter **yes** and hit **<return>** to clear the statistics. A message similar to below will appear to verify the operation:

   Statistics of logical port 27 on port 3 for slot 2 cleared

3. There are three variations of this command. Enter **lpcls <slot>/<ds3port>** to clear the statistics for all logical ports on the selected port, **lpcls <slot>** to clear the statistics of all logical ports for the selected slot, or **lpcls** to clear the statistics for all logical ports in the switch.

Modify the Protocol Configuration of a Logical Port using PPP

The **lppmod** command allows you to modify the configuration of a logical port protocol (either PPP or Frame Relay). There is a separate display for PPP and Frame Relay protocol configurations. (You can set what type of protocol a logical port uses with the **lpmod** command. See *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40 for details.)

To modify a port protocol configuration for a logical port using PPP, perform the following steps:

1. Enter the **lppmod** command as follows:

   lppmod <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created.

   For example, to modify the protocol of logical port 27 on port 3 of slot 2, enter:

   lppmod 2/3/27

   If the logical port is using PPP, then a screen similar to the following is displayed:

```
Protocol configuration of PPP
  logical port 27, descriptor:
  slot 2, ds3port 3, ds1channel 10
  ds0 channel mask 0x000000
1) Administrative state {enabled(1), disabled(2)}          : Enabled
2) Bridging admin state {enabled(1), disabled(2)}          : Enabled
  21) Bridging group {1-65535}                             : 3
  22) PPP bridging mode {BridgeAll(1), BridgeEthernet(2)}  : BridgeEthernet
3) IP routing admin state {enabled(1), disabled(2)}        : Enabled
  31) Remote IP Address                                    : 255.255.255.255
  32) Local IP Address                                     : 255.255.255.255
4) Authentication type {None(1), PAP(2), CHAP(3)}          : None
  41) Remote user Id (8 chars max)                         : TESTReId
  42) Remote password (8 chars max)                        : TESTRePw
  43) Local user Id (8 chars max)                          : TESTLoId
  44) Local password (8 chars max)                         : TESTLoPw
5) Max failure count {1-65535}                             : 4
6) Max configure count {1-65535}                           : 5
7) Max terminate count {1-65535}                           : 6
8) Max timeout count {1-65535}                             : 7

Enter (option=value/save/cancel) :
```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

   For example, to change the **Max configure count** to 10, you would enter 7 (the line number for **Max configure count**), then an equals sign, then 10, as follows:

   7=10

3. After you have entered the required values, be sure to save your configuration.

Field Descriptions for Logical Port using PPP

1) Administrative state {enabled(1), disabled(2)}

This field indicates the Administrative State of the logical port, which can be either Enabled or Disabled. If **Enabled**, the logical port has been enabled and can transmit data as long as its Operational State is also **enabled**. If the Admin Status is **Disabled**, the port will not pass data.

2) Bridging admin state {enabled(1), disabled(2)}

This field allows you to enable or disable the Bridging function for this PPP logical port.

21) Bridging group {1-65535}

Indicates the VLAN Group to be used for PPP Bridging. A value of zero (0) indicates that this PPP Entity will not perform a bridging service and will discard all bridged format packets received or transmitted.

22) PPP bridging mode {BridgeAll(1), BridgeEthernet(2)}

This field allows you to select the operational mode for bridging. The options are **BridgeEthernet**, which enables bridging on Ethernet interfaces only, or **BridgeAll**, which enables it for all interfaces.

3) IP routing admin state {enabled(1), disabled(2)}

This field is used to enable or disable the routing of IP packets over PPP. The options are **Enabled** or **Disabled**.

31) Remote IP Address

This field is allows you to specify the Remote IP address of the PPP connection when IP routing is enabled. Valid IP address notation must be used. If this parameter is set to 0.0.0.0 and IP routing is enabled, the Remote IP address will be learned during Internet Protocol Control Protocol (IPCP) negotiation.

32) Local IP Address

This field allows you to specify the local IP address for this logical port, if IP routing is enabled. Valid IP notation must be used.

4) Authentication type {None(1), PAP(2), CHAP(3)}

Specifies the type of authentication that is to be expected on incoming calls. The options are **None**, **PAP** (Password Authentication Protocol), and **CHAP** (Challenge Handshake Authentication Protocol). Set this parameter to the type of authentication that you expect your callers to be using. If you enable either PAP or CHAP authentication, the next two parameters must also be set (remote user ID and password) or the caller's connection requests will be refused. If you set this parameter to **None**, you must also set the Default Bridge and IP Configuration Administration Status parameters or the caller's connection requests will be refused. See the chapter titled "Point-to-Point Protocol" for more details on PAP and CHAP.

41) Remote user Id (8 chars max)

Specifies the User ID expected from the remote end during PAP or CHAP authentication.

42) Remote password (8 chars max)

Specifies the password expected from the remote end during PAP or CHAP authentication.

43) Local user Id (8 chars max)

Specifies the User ID to be sent to the remote end during PAP or CHAP authentication. This parameter is used only for outgoing calls.

44) Local password (8 chars max)

Specifies the password sent to the remote end during PAP or CHAP authentication. This parameter is used only for outgoing calls.

5) Max failure count {1-65535}

The maximum number of times a CONFIGURATION_REQUEST packet will be sent when the previous attempts received responses, but did not receive a CONFIGURATION_ACK. This counter applies to all Link Control Protocol (LCP) and Network Control Protocol (NCP) negotiations.

6) Max configure count {1-65535}

The maximum number of times a CONFIGURATION_REQUEST packet will be sent when the previous attempts did not receive any responses. This counter applies to all LCP and NCP negotiations.

7) Max terminate count {1-65535}

The maximum number of TERMINATE_REQUEST packets that will be sent without receiving a TERMINATE_ACK packet. This counter applies to all LCP and NCP negotiations.

8) Max timeout count {1-65535}

Indicates the number of seconds to wait between CONFIGURATION_REQUEST retries that do not receive a response. This timeout value applies to all LCP and NCP negotiations.

Modify the Protocol Configuration of a Logical Port using Frame Relay

The **lppmod** command displays a different screen than the one described above if you want to modify the configuration of a logical port protocol using Frame Relay. (You can set what type of protocol a logical port uses with the **lpmod** command. See *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40 for details.)

To modify a port protocol configuration for a logical port using Frame Relay, perform the following steps:

1. Enter the **lppmod** command as follows:

   lppmod <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created.

   For example, to modify the protocol of logical port 27 on port 3 of slot 2, enter:

   lppmod 2/3/27

   If the logical port is using Frame Relay, then the following screen appears:

```
Protocol configuration of FR
  logical port 27, descriptor:
  slot 2, ds3port 3, ds1channel 10
  ds0 channel mask 0x000000
1) Administrative state {enabled(1), disabled(2)}              : Enabled
2) DLCMI type
  {No LMI Configured(1), LMI Rev.1.0(2),
  T1.617 AnnexD(3), T1.617 AnnexB(4),
  Q.933 AnnexA(5), T1.617 AnnexD-1994(6)}      : No LMI Configured
3) Polling interval T391/nT1 {1-255 sec}       : 1
4) Full status interval N391/nN1 {1-10}        : 1
5) Error threshold N392/nN2 {1-10}             : 1
6) Monitored events counter N393/nN3 {1-10}    : 1
7) Dynamic VC creation {enabled(1), disabled(2)} : Enabled
  71) Default IP routing admin state {enabled(1), disabled(2)}: Enabled
  72) Default bridging admin state {enabled(1), disabled(2)}  : Enabled
  73) Default bridging mode
     {BridgeAll(1), BridgeEthernet(2)}                       : BridgeEthernet
  74) Default bridging VLAN {1-65535}                        : 1

Enter (option=value/save/cancel) :
```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter.

   For example, to change the **DCLMI type** to No LMI Configured, you would enter 2 (the line number for **DCLMI type**), then an equals sign, then 1 (the value for No LMI Configured), as follows:

   2=1

3. After you have entered the required values, be sure to save your configuration.

As a variation of this command you can enter the following:

lppmod <slot>/<ds3port>/<logPort>/<DLCI>

where **<slot>, <ds3port>,** and **<logPort>** are as described above, and **<DLCI>** is the unique Data Link Control Identifier assigned to a virtual circuit. This only applies if a logical port is using Frame Relay and it has been assigned a virtual circuit, For information on creating virtual circuits for logical ports, see *Add Frame Relay DLCI on a Logical Port* on page 56-64.

Field Descriptions for Logical Port using Frame Relay

1) Administrative state {enabled(1), disabled(2)}

This field indicates the Administrative State of the logical port, which can be either Enabled or Disabled. If **Enabled**, the logical port has been enabled and can transmit data as long as its Operational State is also **enabled**. If the Admin Status is **Disabled**, the port will not pass data.

2) DLCMI type

This field specifies the Data Link Control Management Interface (DLCMI) that you want to use for Frame Relay and virtual circuit management. You have four choices for this protocol, each of each corresponds to an existing widely used protocol. The numbers used in the **lppmod** screen correspond to the following DLCMIs:

1 No LMI Configured

2 LMI Rev. 1.0 (LMI)

3 ANSI T1.617 Annex D

4 CCITT-ITU-T Q.933 Annex A

Enter your choice by specifying the number corresponding to your choice.

♦ Important Note ♦

The DLCMI protocol that you enter must match that used by your service provider. Entering an incorrect DLCMI protocol may cause the port to not operate. The WSX needs to know the protocol you are using to establish communication with the Frame Relay network.

3) Polling interval {1-255 sec}

This interval is the time in seconds between WSX logical port polls of the Frame Relay network. The WSX port polls the network by sending STATUS ENQUIRY messages, which check the link integrity of the Frame Relay connection. By default this interval is set to 10 seconds, but you can increase or decrease it. The default is the standard Frame Relay value. Increasing the polling interval lightens the data load on the logical port, as it does not have to poll as often. The interval may range from 1 second to 4 minutes and 15 seconds (255 seconds).

♦ Important Note ♦

The **Polling Interval** that you enter must match that used by your service provider. This option should only be modified by experienced Frame Relay network administrators.

4) Full status interval {1-10}

This interval is the time in seconds between FULL STATUS ENQUIRIES initiated by the WSX to the Frame Relay network. The Frame Relay network returns a list of all virtual circuits and whether they are active or inactive. You can set this interval from 1 to 10 seconds. By default, this interval is set to 6 seconds, which is the standard Frame Relay default value.

♦ Important Note ♦

The **Full Status Interval** that you enter must match that used by your service provider. This option should only be modified by experienced Frame Relay network administrators.

5) Error threshold {1-10}

The number of DLCMI protocol errors that will be tolerated before determining the logical port Frame Relay line is down and all associated virtual circuits are inactive. These errors may include timeouts from STATUS ENQUIRY polls and invalid STATUS messages returned from the Frame Relay network. By default, this threshold is set to 3, which is the standard Frame Relay default value.

♦ Important Note ♦

The **Error Threshold** that you enter must match that used by your service provider. This option should only be modified by experienced Frame Relay network administrators.

6) Monitored events counter {1-10}

The number of status polling intervals over which the **Error Threshold** is counted. This value should be greater than or equal to the **Error Threshold**. If the station received the number of errors specified in **Error Threshold** within the number of polling intervals specified for the **Monitored Events Counter**, then the Frame Relay line is considered down and all associated virtual circuits are considered inactive. By default, this counter is set to 4, which is the standard Frame Relay default value.

♦ Important Note ♦

The **Monitored Events Counter** that you enter must match that used by your service provider. This option should only be modified by experienced Frame Relay network administrators.

7) Dynamic VC creation {enabled(1), disabled(2)}

This option allows you to set whether virtual circuits are dynamically created (learned) when the Frame Relay network determines it is necessary.

71) Default IP routing admin state {enabled(1), disabled(2)}

This field determines the default status of Internet Protocol (IP) routing of learned virtual circuits. The options are **enabled** or **disabled**.

72) Default bridging admin state {enabled(1), disabled(2)}

This field determines the default bridging administration state of learned virtual circuits. The options are **enabled** or **disabled.**

73) Default bridging mode {BridgeAll(1), BridgeEthernet(2)}

If bridging is enabled, this field indicates what bridging mode is being employed for learned virtual circuits. The options are **BridgeEthernet** or **BridgeAll**.

74) Default bridging VLAN {1-65535}

If bridging is enabled, this field indicates the default VLAN group used for bridging on this logical port.

Display Protocol Configuration and Statistics of a Logical Port using PPP

The **lppview** command allows you to view logical port protocol configuration and statistics (either PPP or Frame Relay). There is a separate display for PPP and Frame Relay protocol configuration and statistics. (You can set what type of protocol a logical port uses with the **lpmod** command. See *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40 for details.)

To view logical port protocol configuration and statistics for PPP, enter the **lppview** command as follows:

```
lppview <slot>/<ds3port>/<logPort>
```

where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to view the protocol statistics of logical port 27 on port 3 or slot 2, enter:

```
lppview 2/3/27
```

If the logical port is configured to use PPP, a screen similar to the following is displayed:

```
Protocol  (PPP) configuration of logical port 2/3/27
AdminState:Enabled                                  PPPMode:Normal
RoutingEnable:              Enabled   BridgingEnable:              Enabled
BridgingMode:         BridgeEthernet  BridgingGroup:                    3
LQMEnable:                  Enabled   AuthenticationType:           None
MTU:                              2   MaxFailCount:                    4
MaxConfigCount:                   5   MaxTerminateCount:               6
LocalUserId:                TESTLoId  RemoteUserId:               TESTReId
LocalPassword:              TESTLoPw  RemotePassword:             TESTRePw
LocalIpAddress:     255.255.255.255   RemoteIPAddress:     255.255.255.255
RetryTimeout:                     7

PPP protocol specific statistics
LcpFramesRcvd:                    0   IpcpFramesRcvd:                  0
BcpFramesRcvd:                    0   LcpFramesSent:                   0
IpcpFramesSent:                   0   BcpFramesSent:                   0

Common FR/PPP statistics
CircuitSent8023Frames:           10   CircuitSent8023Octets:           20
CircuitReceived8023Frames:       30   CircuitReceived8023Octets:       40
CircuitSentBPDUFrames:           50   CircuitSentBPDUOctets:           60
CircuitReceivedBPDUFrames:       70   CircuitReceivedBPDUOctets:       80
CircuitSentIPFrames:             90   CircuitSentIPOctets:             10
CircuitReceivedIPFrames:         20   CircuitReceivedIPOctets:         30
CircuitSent8025Frames:           80   CircuitSent8025Octets:           90
CircuitReceived8025Frames:       10   CircuitReceived8025Octets:       20
CircuitSentFDDIFrames:           30   CircuitSentFDDIOctets:           40
CircuitReceivedFDDIFrames:       50   CircuitReceivedFDDIOctets:       60
```

As a variation of this command, you can enter **lppview <slot>/<ds3port>** to see the protocol configuration for every logical port on the selected port, or **lppview <slot>** to see the protocol configuration for every logical port in the selected module.

Field Descriptions for Logical Port Protocol using PPP

The following section explains the fields and their corresponding values.

Configuration information

AdminState. This field indicates the Administrative State of the logical port, which can be either Enabled or Disabled. If **Enabled**, the logical port has been enabled and can transmit data as long as its Operational State is also **enabled**. If the Admin Status is **Disabled**, the port will not pass data.

PPPMode. This field indicates which PPP mode the logical port is using.

RoutingEnable. This field indicates whether IP routing is enabled or disabled for this logical port.

BridgingEnable. This field indicates whether bridging is enabled or disabled for this logical port.

BridgingMode. If bridging is enabled, this field indicates what bridging mode is being employed. The options are **BridgeEthernet** or **BridgeAll**.

BridgingGroup. If bridging is enabled, this field indicates the bridging group number, as specified with the **lppmod** command.

LQMEnable. This field indicates whether Line Quality Monitoring (LQM) is enabled. LQM counts the number of packets sent across a link and periodically asks the remote end how many packets it received. Discrepancies are evidence of packet loss and indicate link quality problems.

AuthenticationType. This field indicates what type of authentication is being used by this logical port. The options are **none**, **PAPS**, or **CHAPS**.

MTU. This field indicates the maximum transmission unit (MTU) size, in bytes. Any packet exceeding this number is discarded.

MaxFailCount. This field indicates the maximum number of times a CONFIGURATION_REQUEST packet will be sent when the previous attempts received responses, but did not receive a CONFIGURATION_ACK. This counter applies to all LCP and NCP negotiations.

MaxConfigCount. This fields indicates the maximum number of times a CONFIGURATION_REQUEST packet will be sent when the previous attempts did not receive any responses. This counter applies to all LCP and NCP negotiations.

MaxTerminateCount. This field indicates the maximum number of TERMINATE_REQUEST packets that will be sent without receiving a TERMINATE_ACK packet. This counter applies to all LCP and NCP negotiations.

LocalUserId. This field displays the User ID to be sent to the remote end during PAP or CHAP authentication. This parameter is used only for outgoing calls.

RemoteUserId. This field displays the User ID expected from the remote end during PAP or CHAP authentication.

LocalPassword. This field displays the password sent to the remote end during PAP or CHAP authentication. This parameter is used only for outgoing calls.

RemotePassword. This field displays the password expected from the remote end during PAP or CHAP authentication.

LocalIpAddress. This field allows you to specify the local IP address for this logical port, if IP routing is enabled. Valid IP notation must be used.

RemoteIPAddress. This field displays the Remote IP address of the PPP connection when IP routing is enabled. Valid IP address notation must be used. If this parameter is set to 0.0.0.0 and IP routing is enabled, the Remote IP address will be learned during Internet Protocol Control Protocol (IPCP) negotiation.

RetryTimeout. This field indicates the number of seconds to wait between CONFIGURATION_REQUEST retries that do not receive a response. This timeout value applies to all LCP and NCP negotiations.

PPP Protocol Specific Statistics information

The following statistics are specific to a logical port configured to use PPP.

LcpFramesRcvd. This field displays the number of Link Control Protocol (LCP) frames received on this logical port.

IpcpFramesRcd. This field displays the number of Internet Protocol Control Protocol (IPCP) frames received on this logical port.

BcpFramesRcvd. This field displays the number of Bridge Control Protocol (BCP) frames received on this logical port.

LcpFramesSent. This field displays the number of Link Control Protocol (LCP) frames sent by this logical port.

IpcpFramesSent. This field displays the number of Internet Protocol Control Protocol (IPCP) frames sent by this logical port.

BcpFramesSent. This field displays the number of Bridge Control Protocol (BCP) frames sent by this logical port.

Common FR/PPP Statistics information

These are statistics for the different protocols possible for traffic on both Frame Relay and PPP.

♦ Note ♦

The descriptions below combine frames and octets, though they are represented as separate statistics in the UI.

CircuitSent8023Frames/Octets. This counter indicates transmitted traffic for Ethernet (bridged 802.3 or trunked format) frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitReceived8023Frames/Octets. This counter indicates received traffic for Ethernet (bridged 802.3 or trunked format) frames and octets on this virtual circuit. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitSentBPDUFrames/Octets. This counter indicates transmitted traffic for BPDU frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitReceivedBPDUFrames/Octets. This counter indicates received traffic for BPDU frames and octets on this virtual circuit. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitSentIPFrames/Octets. This counter indicates transmitted traffic for routed IP, ARP, and Inverse ARP format frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitReceivedIPFrames/Octets. This counter indicates received traffic for routed IP, ARP, and Inverse ARP format frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitSent8025Frames/Octets. This counter indicates traffic for Token Ring (802.5 format) frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitReceived8025Frames/Octets. This counter indicates received traffic for Token Ring (802.5 format) frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitSentFDDIFrames/Octets. This counter indicates transmitted traffic for FDDI frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

CircuitReceivedFDDIFrames/Octets. This counter indicates traffic for FDDI frames and octets on this logical port. Statistics for octets, or bytes, include the data and Frame Relay header fields, but they do not include CRC or flag characters.

Display Protocol Configuration and Statistics of a Logical Port using Frame Relay

The **lppview** command displays a different screen if you want to see logical port configuration and statistics information for a logical port using Frame Relay. (You can set what type of protocol a logical port uses with the **lpmod** command. See *Adding a Logical Port Configuration to a Clear Channel DS3 Port* on page 56-40 for details.)

To view logical port protocol configuration and statistics for Frame Relay, enter the **lppview** command as follows:

```
lppview <slot>/<ds3port>/<logPort>
```

where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to view the protocol statistics of logical port 27 on port 3 of slot 2, enter:

```
lppview 2/3/27
```

If the logical port is configured to use frame relay, a screen similar to the following is displayed:

```
Protocol (FR) configuration of logical port 2/3/27
AdminState:                 Enabled    DlcmiType:              No LMI Configured
IPRoutingAdminStatus:       Enabled    BridgingAdminStatus:              Enabled
DefaultBridgeMode:    BridgeEthernet   DefaultBridgingVlan:                    1
PollingInterval:                 1     FullStatusInterval:                     1
ErrorThreshold:                  1     MonitoredEventsCounter:                 1
MaxVcs:                          1     DynamicVcCreation:                Enabled
DlcmiAddress:                Q.921     DlcmiAddressLen:               ThreeOctets
DlcmiMulticast:       NonBroadcast

Frame Relay VC configuration
DLCI:                            1     AdminState:                       Enabled
CommittedInfoRate:            1000     CommittedBurstRate(BPS):             2000
ExcessBurstRate:              3000     Multicast:                  NonBroadcast
RoutingEnable:             Enabled     TrapEnable:                       Enabled
BridgingEnable:            Enabled     BridgingMode:               BridgeEthernet
BridgingVlan:                   10

FR protocol specific statistics
CircuitReceivedFECNs:            1     CircuitReceivedBECNs:                   2
CircuitSentFrames:               3     CircuitSentOctets:                      4
CircuitReceivedFrames:           3     CircuitReceivedOctets:                  6
CircuitDiscards:                 7     CircuitReceivedDEs:                     8
CircuitDiscards:                 8

Common FR/PPP statistics
CircuitSent8023Frames:          10     CircuitSent8023Octets:                 20
CircuitReceived8023Frames:      30     CircuitReceived8023Octets:             40
CircuitSentBPDUFrames:          50     CircuitSentBPDUOctets:                 60
CircuitReceivedBPDUFrames:      70     CircuitReceivedBPDUOctets:             80
CircuitSentIPFrames:            90     CircuitSentIPOctets:                   10
CircuitReceivedIPFrames:        20     CircuitReceivedIPOctets:               30
CircuitSent8025Frames:          80     CircuitSent8025Octets:                 90
CircuitReceived8025Frames:      10     CircuitReceived8025Octets:             20
CircuitSentFDDIFrames:          30     CircuitSentFDDIOctets:                 40
CircuitReceivedFDDIFrames:      50     CircuitReceivedFDDIOctets:             60
```

As a variation of this command you can enter the following:

```
lppview <slot>/<logPort>/<DLCI>
```

where **<slot>** and **<logPort>** are as described above, and **<DLCI>** is the unique Data Link Control Identifier assigned to a virtual circuit. This only applies if a logical port is using Frame Relay and it has been assigned a virtual circuit, For information on creating virtual circuits for logical ports, see *Add Frame Relay DLCI on a Logical Port* on page 56-64.

As another two variations of this command, you can enter **lppview <slot>/<ds3port>** to see the protocol configuration for every logical port on the selected port, or **lppview <slot>** to see the protocol configuration for every logical port in the selected module.

Field Descriptions for Logical Port Protocol using Frame Relay

The following section explains the fields and their corresponding values.

Configuration

AdminState. This field indicates the Administrative State of the logical port, which can be either Enabled or Disabled. If **Enabled**, the logical port has been enabled and can transmit data. If the Admin Status is **Disabled**, the port will not pass data.

DlcmiType. This field indicates the Data Link Control Management Interface (DLCMI) type used by the logical port for frame relay and virtual circuit management. The four options for this field are **none**, **LMI Rev. 1.0**, **ANSI T1.617 Annex D**, and **CCITT-ITU-T-Q.933 Annex A**.

♦ Important Note ♦

The DLCMI protocol used by the logical port must match that of the Frame Relay service.

IPRoutingAdminStatus. This field indicates the status of IP routing for this logical port. The options are **Enabled** or **Disabled**.

BridgingAdminStatus. This field displays the Bridging status of this logical port. The options are **enable** or **disable**.

DefaultBridgeMode. This field indicates the default bridging mode of this logical port. The options are **BridgeAll** or **BridgeEthernet**.

DefaultBridgingVlan. Indicates the VLAN Group to be used for Frame Relay Bridging. A value of zero (0) indicates that this logical port will not perform a bridging service and will discard all bridged format packets received or transmitted.

PollingInterval. This field indicates the interval in seconds between WSX logical port polls of the Frame Relay network. The WSX port polls the network by sending STATUS ENQUIRY messages, which check the link integrity of the Frame Relay connection. By default this interval is set to 10 seconds, but you can increase or decrease it. The default is the standard Frame Relay value. Increasing the polling interval lightens the data load on the logical port, as it does not have to poll as often. The interval may range from 1 second to 4 minutes and 15 seconds (255 seconds).

♦ Important Note ♦

The **Polling Interval** that you enter must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

FullStatusInterval. This field indicates the interval in seconds between FULL STATUS ENQUIRIES initiated by the WSX to the Frame Relay network. The Frame Relay network returns a list of all virtual circuits and whether they are active or inactive. You can set this interval from 1 to 10 seconds. By default, this interval is set to 6 seconds, which is the standard Frame Relay default value.

♦ Important Note ♦

The **Full Status Interval** that you enter must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

ErrorThreshold. This field indicates the number of DLCMI protocol errors that will be tolerated before determining the logical port Frame Relay line is down and all associated virtual circuits are inactive. These errors may include timeouts from STATUS ENQUIRY polls and invalid STATUS messages returned from the Frame Relay network. By default, this threshold is set to 3, which is the standard Frame Relay default value.

♦ Important Note ♦

The **Error Threshold** that you enter must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

MonitoredEventsCounter. This field indicates the number of status polling intervals over which the **Error Threshold** is counted. This value should be greater than or equal to the **Error Threshold**. If the station received the number of errors specified in **Error Threshold** within the number of polling intervals specified for the **Monitored Events Counter**, then the Frame Relay line is considered down and all associated virtual circuits are considered inactive. By default, this counter is set to 4, which is the standard Frame Relay default value.

♦ Important Note ♦

The **Monitored Events Counter** that you enter must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

MaxVcs. This field indicates the maximum number of virtual circuits supported by this logical port.

DynamicVcCreation. This field indicates whether virtual circuits can be dynamically created (learned) by the logical port. The options for this are **enabled** and **disabled**.

DlcmiAddress. This field displays what address format is in use by this logical port. The format determines the length of the address, i n bits. The options are **Q921** (13 bits), **Q922March90** (11bits), **Q922November90** (10 bits), and **Q922** (final standard).

DlcmiAddressLen. This field indicates the length of the DLMCI address in octets. The options are 2, 3, or 4 octets.

♦ Note ♦

In the case of a Q922 format, the length indicates the entire length of the address including the control portion.

DlcmiMulticast. This field indicates whether the logical port is using a multicast service. The options are **Broadcast** (yes) or **NonBroadcast** (no).

Frame Relay VC Configuration information

The following fields show the defaults for the virtual circuit associated with this logical port. For more information on virtual circuits, see the chapter "Managing Frame Relay."

DLCI. The Data Link Control Identifier (DLCI) for this virtual circuit.

AdminState. This field indicates the Administrative State of the virtual circuit, which can be either Enabled or Disabled. If **Enabled**, the logical port has been enabled and can transmit data. If the Admin Status is **Disabled**, the port will not pass data.

CommittedInfoRate. This field sets the Committed Information Rate (CIR) for this virtual circuit.

♦ Important Note ♦

The **CIR** that you set must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

CommitedBurstRate. The Committed Burst Rate (Bc) is the amount of data that the network will guarantee to transfer under normal conditions.

♦ Important Note ♦

The **Bc** that you enter must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

ExcessBurstRate. The Excess Burst Rate (Be) is the amount of data over-and-above the Committed Burst Rate (Bc) that the network will transmit as long as excess bandwidth is available.

♦ Important Note ♦

The **Be** that you enter must match that of the Frame Relay service. This option should only be modified by experience Frame Relay network administrators.

Multicast. This field indicates whether the virtual circuit is using a multicast service. The options are **Broadcast** (yes) or **NonBroadcast** (no).

RoutingEnable. This field indicates whether Routing is enabled or disabled for this virtual circuit.

TrapEnable. This field indicates whether this virtual circuit is enabled to send SNMP traps.

BridgingEnable. This field indicates whether Bridging is enabled or disabled for this virtual circuit.

BridgingMode. If Bridging is enabled, this field indicates what bridging mode is being employed for this virtual circuit. The options are **BridgeEthernet** or **BridgeAll**.

BridgingVlan. If Bridging is enabled, indicates the VLAN Group to be used for Bridging. A value of zero (0) indicates that this PPP Entity will not perform a bridging service and will discard all bridged format packets received or transmitted.

FR Protocol Specific Statistics

The following statistics are specific to logical ports employing Frame Relay.

CircuitReceivedFECNs. This field indicates the number of frames received by this logical port indicating forward congestion since its creation.

CircuitReceivedBECNs. This field indicates the number of frames received by this logical port indicating backward congestion since its creation.

CircuitSentFrames. The number of frames sent by this logical port since its creation.

CircuitSentOctets. The number of octets sent by this logical port since its creation

CircuitReceivedFrames. The number of frames received by this logical port since its creation.

CircuitReceivedOctets. The number of octets received by this logical port since its creation.

CircuitDiscards. The number of frames on this logical port discarded due to errors.

CircuitReceivedDEs. The number or Discard Eligibility (DE) frames or octets received by this logical port. DE's is a single bit attached to a frame that signifies it is the first thing to be discarded if bandwidth is reaching maximum usage.

CircuitDiscards. The number of octets on this logical port discarded due to errors.

Common FR/PPP Statistics information

The statistics information displayed for these counters is the same as the counters for a logical port using PPP. See *Common FR/PPP Statistics information* on page 56-56 for their descriptions.

Clear Protocol Statistics of a Logical Port

The **lppcls** command allows you to clear statistics associated with a logical port. To clear statistics

1. enter the **lppcls** command as follows:

   lppcls <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created.

   For example, to clear the protocol statistics of logical port 27 on port 3 of slot 2, enter:

   lppcls 2/3/27

   A confirmation message similar to the following will appear:

   Confirm to clear protocol statistics of logical port 2/3/27

   Enter (option=yes,no)

2. To confirm, enter **yes** and hit **<return>**. The below confirmation is displayed:

   Statistics on logical port 2/3/27 are cleared

As a variation to this command, you can enter a DLCI number as follows:

lppcls <slot>/<ds3port>/<logPort>/<DLCI>

where **<slot>**, **<ds3port>**, and **<logPort>** are as above and **<DLCI>** is the unique Data Link Control Identifier assigned to the virtual circuit for this logical port. This can only be done for logical ports using Frame Relay as virtual circuits are not applicable to Point-to-Point Protocol.

As another two variations of this command, you can enter **lppcls <slot>/<ds3port>** to clear the protocol configuration for every logical port on the selected port, or **lppcls <slot>** to clear the protocol configuration for every logical port in the selected module.

Add Frame Relay DLCI on a Logical Port

The **lpfradd** command allows you to add a Frame Relay DLCI, or a virtual circuit, to a logical port that has been configured to use Frame Relay. To add a virtual circuit, perform the following steps:

1. Enter the **lpfradd** command as follows:

   lpfradd <slot>/<ds3port>/<logPort>/<DLCI>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, **<logPort>** is the number of the specific logical port as designated when the port was created, and **<DLCI>** is the The Data Link Control Identifier for the new virtual circuit. For example, to create a virtual circuit with a DLCI of 16 for logical port 27 on port 3 of slot 2, enter:

   lpfradd 2/3/27/16

   A screen similar to the following is displayed:

```
Add Frame Relay VC with DLCI 16
   logical port 27, descriptor:
   slot 2, ds3port 5, ds1channel 10
   ds0 channel mask 0x000000
1) Administrative state {enabled(1), disabled(2)} : Disabled
2) Committed information rate (Cir)
   {0 through line speed in BPS}                  :0
3) Committed burst rate (Bc)
   {0 through positive number in bits}            :0
4) Excess burst rate (Be)
   {0 through positive number in bits}            :0

Enter (option=value/save/cancel) :
```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter. After you have entered the required values, be sure to save your configuration.

For more information on virtual circuits, see the chapter "Managing Frame Relay."

Field Descriptions

1) Administrative state {enabled(1), disabled(2)}

This option enables or disables a virtual circuit on this logical port. Setting this option to enable allows data to be sent and received on it, while setting this option to disable means no data can be sent on the circuit.

2) Committed information rate (Cir) {0 through line speed in BPS}

This field sets the Committed Information Rate (CIR) for this virtual circuit.

♦ Important Note ♦

The **CIR** that you set must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

3) Committed burst rate (Bc) {0 through positive number in bits}

The Committed Burst Rate (Bc) is the amount of data that the network will guarantee to transfer under normal conditions.

♦ Important Note ♦

The **Bc** that you enter must match that of the Frame Relay service. This option should only be modified by experienced Frame Relay network administrators.

4) Excess burst rate (Be) {0 through positive number in bits}

The Excess Burst Rate (Be) is the amount of data over-and-above the Committed Burst Rate (Bc) that the network will transmit as long as excess bandwidth is available.

♦ Important Note ♦

The Be that you enter must match that of the Frame Relay service. This option should only be modified by experience Frame Relay network administrators.

Delete Frame Relay DLCI on a Logical Port

The **lpfrdel** command allows you to delete a Frame Relay DLCI, or virtual circuit, from a logical port. To delete a virtual circuit, perform the following steps:

1. Enter the **lpfrdel** command as follows:

   lpfrdel <slot>/<ds3port>/<logPort>/<DLCI>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, **<logPort>** is the number of the specific logical port as designated when the port was created, and **<DLCI>** is the The Data Link Control Identifier for the new virtual circuit. For example, to create a virtual circuit with a DLCI of 16 for logical port 27 on port 3 of slot 2, enter:

   lpfrdel 2/3/27/16

   A message similar to the following is displayed:

   Confirm to delete FR VC with DLCI 16. logical port 2/3/27

   Enter (option=yes/no) :

2. Confirm deletion by entering **yes** at the colon prompt (:) followed by **<return>**. The following notice appears:

   FR VC with DLCI 16 deleted, logical port 2/3/27

Adding a Router Interface

The **riadd** command allows you to create a router interface for PPP, a frame relay circuit, or a virtual circuit. A router interface connects to a virtual circuit or set of virtual circuits and identifies on the network for IP routing. To create a router interface:

1. Enter the **riadd** at the system prompt in the following manner:

   riadd <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to create a router interface for logical port 27 on port 3 of slot 2, enter:

   riadd 2/3/27

   A screen similar to the following is displayed:

   ```
   1) IP address                          : 0.0.0.0
   2) IP mask                             : 0.0.0.0
   3) MTU (Bytes)                         : 0
   4) Administrative state
      {enabled (1), disabled (0)}         :

   Enter (option=value/save/cancel) :
   ```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter. After you have entered the required values, be sure to save your configuration.

One router interface per logical port is allowed.

Field Descriptions

The following section explains the fields and their corresponding values.

IP address

The Internet Protocol (IP) address assigned to this router interface.

IP mask

The subnet mask that the above IP address is a member of.

MTU

The Maximum Transfer Unit (MTU) this router interface will handle. Any unit larger than this number is discarded.

Administrative state

This option enables or disables the router interface for this logical port. Setting this option to enable allows data to be sent and received on it, while setting this option to disable means no data can be sent on the circuit.

Modifying a Router Interface Configuration

The **rimod** command allows you to configure an existing router interface by modifying the IP address or routing parameters associated with the selected interface. To modify a router interface:

1. Enter the **rimod** command as follows:

   rimod <slot>/<ds3port>/<logPort>/

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to modify a router interface for logical port 27 on port 3 of slot 2, enter:

   rimod 2/3/27

   A screen similar to the following is displayed:

   ```
   1) IP address                          : 0.0.0.0
   2) IP mask                             : 0.0.0.0
   3) MTU (Bytes)                         : 0
   4) Administrative state
      {enabled (1), disabled (0)}         :

   Enter (option=value/save/cancel) :
   ```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter. After you have entered the required values, be sure to save your configuration.

The displayed fields are the same as the ones shown for the **riadd** command. See *Adding a Router Interface* on page 56-66 for more details.

Deleting a Router Interface

The **ridel** command allows you to delete a router interface. To delete a router interface, perform the following steps:

1. Enter the **ridel** command as follows:

   ridel <slot>/<de3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to delete a router interface for logical port 27 on port 3 of slot 2, enter:

   ridel 2/3/27

   A message similar to the following is displayed:

   ```
   Confirm to delete router interface on logical port 2/3/27
   Enter (option=yes/no) :
   ```

2. Confirm the interface deletion by entering **yes** at the prompt followed by a **<return>**. The following message is displayed:

   Router interface deleted

Viewing Router Interfaces

The **riview** command allows you to view a router interface's configuration information. To view an interface configuration enter the **riview** command as follows:

riview <slot>/<ds3port>/<logPort>

where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port the interface was added to when created. For example to view a router interface assigned to logical port 27 on DS3 port 3 of slot 2, enter:

riview 2/3/27

When you have entered the command, the following display is shown:

Router interface on Logical port 2/3/27 Admin state: Disabled
IP address: 5.5.5.5, IP Mask: 6.6.6.6
Control pdu statistics: Total in 4, out 6, Errors in 3, out 4

Definitions for the **Admin state**, **IP address**, and **IP Mask** fields can be found in the section *Adding a Router Interface* on page 56-66. The **Control pdu statistics** show ????

There are three variations to this command. You can enter **riview <slot>/<ds3port>** to display the statistics of all router interfaces for the specified port, **riview <slot>** to display the statistics of all router interfaces for the specified slot, and **riview** to display the statistics of all router interfaces for the switch.

Clearing Statistics for a Router Interface

The **ricls** command allows you to clear the statistics for a selected router interface. To clear the statistics of a router interface enter the **ricls** command as follows:

ricls <slot>/<ds3port>/<logPort>

where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port the interface was added to when created. For example to clear the statistics of a router interface assigned to logical port 27 on DS3 port 3 of slot 2, enter:

ricls 2/3/27

There are three variations to this command. You can enter **ricls <slot>/<ds3port>** to clear the statistics of all router interfaces for the specified port, **ricls <slot>** to clear the statistics of all router interfaces for the specified slot, and **ricls** to clear the statistics of all router interfaces for the switch.

Creating a Bridging or Trunking Service

The **m013cas** command allows you to create a bridging or trunking service for a logical port. (For more information on bridging and trunking services see the chapter "Managing Frame Relay.") Creating a service for a logical port using Frame Relay differs slightly than creating a service for a port using PPP. Both are detailed below.

To create a bridging or trunking service for a logical port using Frame Relay, to the following:

1. Enter the **m013cas** command at the prompt as shown:

   m013cas <slot>/<ds3port>/<logPort>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, and **<logPort>** is the number of the specific logical port as designated when the port was created. For example, to add a service to logical port 27 on port 2 of slot 3, you would enter:

   m013cas 3/2/27

   A screen similar to the following appears:

   ```
   Adding service on logical port 27, slot 3
   1) Service description (30 chars max)                 :
   2) Service type {trunking(4), bridging(6)}            : Bridging
   3) Administrative state {enabled(1), disabled(2)}     :
   4) DLCI                                               :
   51) Bridging group {1-65535}                          : 0
   52) Bridging mode {BridgeAll(0), BridgeEthernet(1)}   : BridgeAll

   Enter (option=value/save/cancel) :
   ```

2. Make changes to the options in this screen at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter. For example, to use **testservice** as the **Service description**, you would enter **1** (the line number for the **Service description**), then the equals sign, then **testservice**.

3. Choose what type of service you wish to create, either **trunking (4)** or **bridging (6),** as above. For example, to create a bridging service you enter **2** (the line number for the **Service type**), an equals sign, and then **6** (the value for bridging).

4. Select the administrative state for this service, either **enabled (1)** or **disabled (2),** as above. Enabling a port means it is active and can receive and transmit data.

5. Enter the virtual circuit that is assigned to the logical port. The virtual circuit has a Data Link Control Identifier (DLCI) that is assigned when it is created. For more information on creating a virtual circuit, see *Add Frame Relay DLCI on a Logical Port* on page 56-64.

6. If you are creating a bridging service, select a bridging group for the service by entering the line number, and equals sign, and the group number. For example, to create a bridging service for group 10, you would enter **51** (the line number for **Bridging group**), an equals sign, and then **10**.

7. If you are creating a bridging service, select what bridging mode the service uses. The mode is either **BridgeAll (0)** or **BridgeEthernet (1)**. **BridgeAll** allows bridging for all interfaces, while **BridgeEthernet** enables bridging on Ethernet interfaces only.

8. Remember to save the configuration before you exit by typing **save** at the command prompt. A message similar to the following is shown:

```
Created bridge service for logical port 3/2/27
Service id 100 should be used in future references.
```

Remember the service ID number as it is needed for other service commands such as **m013das**, **m013vas**, **m013mas**. For more information, see *Deleting Services* on page 56-71, *Viewing Service Configurations* on page 56-71, and *Modifying Service Configurations* on page 56-73.

Creating a service for a logical port using Point-to-Point Protocol (PPP) is nearly identical to the procedure described in the steps above, with the exceptions that there is no field for a DLCI, and that only a bridging service can be created. You cannot create a trunking service for a logical port using PPP.

To create a service for a logical port using PPP, enter the **m013cas** command as described above. The menu for creating a service for a logical port using PPP is almost the same as the one displayed for a logical port using Frame Relay, and is shown below:

```
Adding service on logical port 2, slot 3
1) Service description (30 chars max)                 :
2) Service type {trunking(4), bridging(6)}            : Bridging
   for PPP only bridging is available
3) Administrative state {enabled(1), disabled(2)}     :
41) Bridging group {1-65535}                          : 0
42) Bridging mode {BridgeAll(0), BridgeEthernet(1)} : BridgeAll

Enter (option=value/save/cancel) :
```

Proceed using the steps outlined above.

Deleting Services

The **m013das** command allows you to delete a service from a logical port. To delete a service:

1. Enter the **m013das** command as follows:

   m013das <slot>/<ds3port>/<logPort>/<serviceId>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, **<logPort>** is the number of the specific logical port as designated when the port was created, and **<serviceId>** is the identification number of the service as assigned when it was created. For example, to delete bridging service 100 for logical port 27 on port 2 of slot 3, you would enter:

   m013das 3/2/27/100

   The following message should appear:

   Confirm to delete bridge service 100 for logical port 3/2/27

   Enter (option=yes/no) :

2. Enter yes to confirm and delete the service, or no to abort. A confirmation message similar to the following appears:

   Deleted bridge service 100 for logical port 3/2/27

Viewing Service Configurations

Once you have created a service or a number or services, you can view their configurations and locations using the **m013vas** command. To view the configuration of a service enter the **m013vas** command as follows:

m013vas <slot>/<ds3port>/<logPort>/<serviceId>

where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, **<logPort>** is the number of the specific logical port as designated when the port was created, and **<serviceId>** is the identification number of the service as assigned when it was created. For example, to view service 100 for logical port 27 on port 2 of slot 3, you would enter:

m013vas 3/2/27/100

The following screen is displayed:

Slot Ds3 LogPort	Opr Sts	VC	Group	Service Id	VPort	Service Description	Type
3/2/27	UP	PPP	1	100		Testsevice	Bridge

There are four variations of this command. You can enter **m013vas <slot>/<ds3port>/<logPort>** to view all services for the specified logical port, **m013vas <slot>/<ds3port>** to view all services for the specified DS3 port, **m013vas <slot>** to view all the services for the specified slot, or **m013vas** to view all the services for the switch.

Field descriptions

The following sections describe the fields displayed by the **m013vas** command.

Slot/Ds3/LogPort. The slot, port, and logical port numbers for this service are shown in this field. For example, if the service was assigned to slot 3, port 2, logical port 27, the field would show **3/2/27**.

Opr Sta. This field shows the administration status of the service. It is either enabled or disable.

VC. In the case of service for a logical port using Frame Relay, this field shows the Data Link Control Identifier (DCLI) of the virtual circuit associated with the logical port. A virtual circuit can be attached to more than one and be supported by more than one service type. If a logical port uses Point-to-Point Protocol (PPP) rather than Frame Relay, this field will show **PPP** rather than a number.

Group. The number of the Group or Groups associated with this service. Only one Group is supported by a bridging service. Trunking services can supports multiple groups.

Service Id. Each service for a port is assigned a number. This field shows the number assigned to this service when it was created.

VPort. The virtual port associated with this service. For bridging services there is a one-to-one mapping between a virtual port and a virtual circuit. For trunking services, multiple virtual ports can map to a single virtual circuit.

Service Description. The textual description of this service as entered when the service was created.

Type. The type of service, either trunking or bridging. Bridging and Trunking services cannot coexist on the same virtual circuit.

Modifying Service Configurations

Once you have created a service, you can modify it using the **m013mas** command. To modify a service:

1. Enter the **m013mas** command as follows:

   m013mas <slot>/<ds3port>/<logPort>/<serviceId>

   where **<slot>** is the slot number of the board on which the logical port is located, **<ds3port>** is the DS3 port number on the board, **<logPort>** is the number of the specific logical port as designated when the port was created, and **<serviceId>** is the number of service as designated when the service is created. For example, to view service 100 for logical port 27 on port 2 of slot 3, you would enter:

   m013mas 3/2/27/100

   A screen similar to the following is displayed:

```
Service configuration on logical port 3/2/27
1) Service description (30 chars max)                : testservice
2) Service type {trunking(4), bridging(6)}           : Bridging
3) Administrative state {enabled(1), disabled(2)}    : Enabled
4) DLCI                                              : 16
51) Bridging group {1-65535}                         : 1
52) Bridging mode {BridgeAll(0), BridgeEthernet(1)}  : BridgeAll

Enter (option=value/save/cancel) :
```

   ♦ Note ♦

   The above screen shows a service for a logical port using Frame Relay. The screen for a service for a logical port using PPP looks slightly different. Specifically, the DLCI field is absent, and you can only configure a bridging service for logical port using PPP.

2. Make any changes to the service configuration at the colon prompt (:). You do this by entering the line number of the option you want to change, an equal sign (=), and then the value for the new parameter. For example, to change the **Bridging group** to 18, enter **51** (the line number for the **Bridging group** parameter), then an equals sign, then **18**, as follows:

   51=18

3. After you have entered the required values, be sure to save your configuration.

Deleting the Module Configuration

Using the **m013cfgdel** command, you can complete delete the channelized DS3 module configuration and start again. To delete the entire configuration:

Enter the **m013cfgdel** command at the system prompt, as shown:

```
m013cfgdel
```

The following message appears asking you to confirm your choice:

```
Confirm to delete current M013 configuration


Enter (option=yes/no) :
```

Enter **yes** at the prompt to confirm the deletion of the channelized DS3 module configuration. When it is finished, the following message appears:

```
M013 configuration deleted.
```

♦ Important Note ♦

Using this command *completely* deletes the configuration parameters in the channelized DS3 module module. All information on configuration and statistics will be lost.