MX2800 STS-1
System Manual

Manual Part Number - 61204659L1-1A
CD Part Number - 3253037@

4204659L1	AC Non-Redundant Version with Modem
4204659L2	AC Redundant Version with Modem
4204659L3	DC Non-Redundant Version with Modem
4204659L4	DC Redundant Version with Modem
4204659L5	AC Non-Redundant Version without Modem
4204659L6	AC Redundant Version without Modem
4204659L7	DC Non-Redundant Version without Modem
4204659L8	DC Redundant Version without Modem
1200291L1	Breakout Panel
4175043L2	Battery Backup
1200657L2	Battery Backup Adapter Cable
1200287L1	Amphenol to Punch-Down Cable, 25 foot
1200287L5	Amphenol to Punch-Down Cable, 50 foot
1200287L7	Amphenol to Punch-Down Cable, 100 foot
1200291L5	BNC Patch Panel
1200466L1	Fan Faceplate
4204659L10	STS-1 AC/DC Redundant with Modem
4204659L11	AC Non-Redundant with Modem with Fans
4204659L12	AC Redundant with Modem with Fans
4204659L13	DC Non-Redundant with Modem with Fans
4204659L14	DC Redundant with Modem with Fans
4204659L15	AC Non-Redundant without Modem with Fans
4204659L16	AC Redundant without Modem with Fans
4204659L17	DC Non-Redundant without Modem with Fans
4204659L18	DC Redundant without Modem with Fans

April 2005

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Revision History

Document Revision	Date	Description of Changes
A	April 2005	Initial Release (continuation of discontinued P/N 1200659L1-1G); new Controller Card hardware and software included with this revision.

Conventions

The following typographical conventions are used in this document:

This font indicates a cross-reference link. First-time references to tables and figures are shown in **this font**.

This font indicates screen menus, fields, and parameters.

THIS FONT indicates keyboard keys (ENTER, ESC, ALT). Keys that are to be pressed simultaneously are shown with a plus sign (ALT+X indicates that the ALT key and X key should be pressed at the same time).

This font indicates references to other documentation, sections of documents, and is also used for emphasis.

`This font` indicates on-screen messages and prompts.

`This font` indicates text to be typed exactly as shown.

This font indicates silkscreen labels or other system label items.

This font is used for strong emphasis.

NOTE

Notes inform the user of additional but essential information or features.

CAUTION

Cautions inform the user of potential damage, malfunction, or disruption to equipment, software, or environment.

WARNING

Warnings inform the user of potential bodily pain, injury, or death.

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.

CAUTION

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Training

ADTRAN offers product training. The training courses include overviews on product features and functions while covering applications of ADTRAN's product lines. ADTRAN provides a variety of training options, including customized training courses taught at our facilities or at customer sites. For more information about training, please contact us.

Training Phone:	800-615-1176, ext. 7500
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Training Email:	training@adtran.com

MX2800 STS-1 User Manual
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Section 1
Introduction

1. PRODUCT OVERVIEW

The MX2800 STS-1 is a SONET multiplexer that consolidates T1 and E1 signals into an STS-1 signal. This unit provides a cost-effective, versatile tool for combining independent T1s or E1s over the same STS-1 carrier.

Embedded SNMP (simple network management protocol) and Telnet are available through the modem port using SLIP/PPP or through the 10Base-T ethernet port. Using the Management Information Base II (MIB II), RFC 1595 standards, and an ADTRAN enterprise MIB, the MX2800 STS-1 can be configured, monitored, and diagnosed with standard SNMP network management programs such as HP OpenView™ (from Hewlett Packard) and Spectrum® (from Cabletron). In addition, the SysLog Host Daemon allows remote monitoring, collecting, and logging of MX2800 STS-1 events in real time. This information can be useful during installation setups and/or troubleshooting.

Complete configuration, loopbacks, and performance monitoring are available through SNMP, Telnet, or a VT100 terminal interface. This connection can be made via ethernet, a local EIA-232 link, or through the built-in V.34 modem. The modem can dial-out a “cry for help” for units located in unmanned facilities. The MX2800 STS-1 is designed for either desktop use or for installation in a 19-inch or 23-inch rack.

The major features of the MX2800 STS-1 are as follows:

- Built-in 1:1 redundancy
- Hot-swappable controller cards
- Independent, dual-load sharing, redundant power supplies
- Embedded SNMP and Telnet management through 10Base-T ethernet or SLIP/PPP dialup
- Detailed performance monitoring for local and remote units
- Simplified configuration through the VT100 terminal menu structure
- Integrated V.34 modem for dial-up and dial-out access
- Capable of backhauling multiple service types (T1/E1)
- AC or DC power
- VT Hairpinning
- VT cross-connect to any DS1
- NEBS Level 3 compliant

Controller Card 1:1 Redundancy

The MX2800 STS-1 supports two hot-swappable controller cards which provide 1:1 redundancy for the T1 and STS-1 signals as well as the STS-1 connections. With two cards installed, the MX2800 STS-1 can recover from circuit or network failure, depending on the configuration. Refer to *Section 7, Circuit Redundancy* for more information.

2. STS-1 OVERVIEW

The MX2800 STS-1 multiplexer delivers up to 28 T1s or 21 E1s via the SONET Synchronous Transport Signal Level One (STS-1) at a speed of 51.84 Mbps. This is a cost-effective method for providing T1/E1 signals without the need for costly and complex multi-level multiplexing/demultiplexing as in an M13 multiplexer. The T1/E1 signals can be directly multiplexed into the SONET STS-1 signal, allowing simplified add and drop functionality.

The MX2800 STS-1 multiplexer also implements VT hairpinning and VT cross-connect mapping. Any VT can be hairpinned back to the STS-1 signal for dropping further down the SONET ring. Cross-connect mapping permits a VT to be mapped to any of the 28 available physical ports. The relationship of MX2800 STS-1 components and SONET terminology is illustrated in **Figure 1-1**.

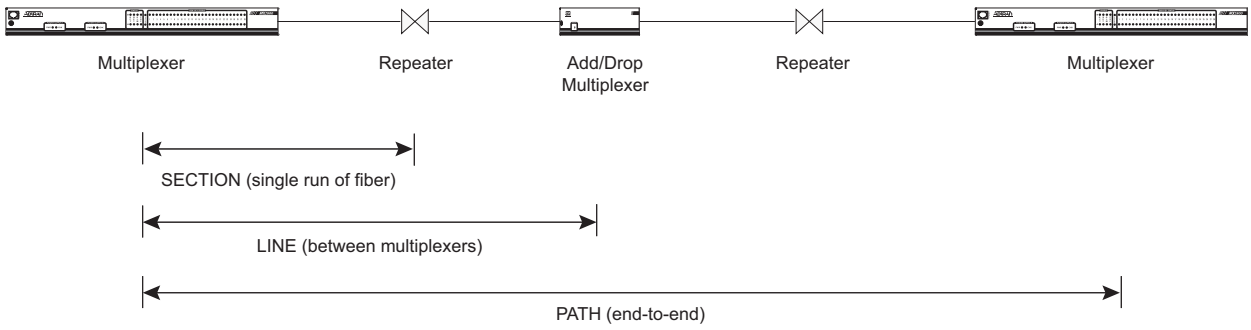

Figure 1-1. MX2800 STS-1 Components

STS-1 Framing Structure

The STS-1 frame is organized as 9 rows by 90 columns of bytes. See **Table 1-1**. This frame is transmitted row by row, from left to right, and with the most significant bit (MSB) of each byte transmitted first. It is defined to operate at the basic rate of 8 kHz or 125 microseconds per frame, or 8,000 frames per second at a bit rate of 51.84 Mbps.

The frame is divided into two parts to physically segregate the layers:

- Transport Overhead
- Synchronous Payload Envelope

The first 3 columns make up the transport overhead (TOH); the remainder is the synchronous payload envelope (SPE). The TOH has 3 rows for the section overhead (SOH) and 6 rows for the line overhead (LOH). The SPE has one column for the path overhead (POH). The remaining 86 columns are for payload data (49.536 Mbps).

Table 1-1. STS-1 Framing Structure

	TOH	SPE	
Rows	**Column 1 through 3**	**Column 4 (POH)**	**Columns 5 through 90**
1	H1 H2 H3	J1	STS-1 Payload Region
2		B3	
3		C2	
4		G1	
5		F2	
6		H4	
7		Z3	
8		Z4	
9		Z5	
1	H1 H2 H3	J1	STS-1 Payload Region
2		B3	
3		C2	
4		G1	
5		F2	
6		H4	
7		Z3	
8		Z4	
9		Z5	
1	H1 H2 H3	J1	STS-1 Payload Region
2		B3	
3		C2	
4		G1	
5		F2	
6		H4	
7		Z3	
8		Z4	
9		Z5	
1	H1 H2 H3	J1	STS-1 Payload Region
2		B3	
3		C2	
4		G1	
5		F2	
6		H4	
7		Z3	
8		Z4	
9		Z5	

Transport Overhead (TOH)

The first three columns are the TOH, which contains the overhead bytes for the Section and Line layers. Section overhead is comprised of 9 bytes and Line overhead is comprised of 18 bytes.

STS-1 Synchronous Payload Envelope (SPE)

The SPE has 87 columns and 9 rows of bytes for a total of 783 bytes. Column 1 contains the STS Path Overhead and has 9 bytes. The remaining 774 bytes are available for payload.

Virtual Tributaries (VT)

The SPE is divided into seven virtual tributary groups, made up of 12 columns each. Smaller tributaries are multiplexed together to form these groups. For example, there can be four VT1.5 tributaries in a VT group or three VT2 tributaries. A VT1.5 tributary consists of three columns per STS-1 frame and has a bit rate of 1.728 Mbps, allowing transport of a T1 at 1.544 Mbps plus required overhead. A VT2 uses four columns per STS-1 frame and has a bit rate of 2.304 Mbps, allowing transport of an E1 at 2.048 Mbps plus required overhead.

STS-1 Pointers

There are several mechanisms that allow for timing compensation between the STS-1 and its low-speed tributaries. The MX2800 STS-1 multiplexer uses pointer adjustments to achieve timing compensation. Pointer adjustments allow the synchronous payload envelope (SPE) to float with respect to the SONET frame. The pointer is contained in the H1 and H2 bytes of the path overhead (POH), and is a count of the number of bytes that the J1 byte is away from the H3 byte, not including the transport overhead. When timing differences exist, dummy bytes are inserted into the SPE without affecting data. The receiving end can recover the payload since the pointer is adjusted to indicate where the payload overhead (POH) starts.

Unit Timing

The MX2800 STS-1 multiplexer allows four timing methods:

- Loop Mode
- Free-Running Mode
- External Nonrevertive Mode
- External Revertive Mode

Loop Mode

The multiplexer derives timing from the incoming STS-1 signal.

A failure in this signal, such as a loss-of-signal (LOS) or a loss-of-framing (LOF) will cause the unit to enter Holdover (HO) mode for the duration of the receive signal defect. During HO, the unit will continue transmitting at the same rate as the receive signal prior to entering its defect condition. Stability of the transmit during HO is guaranteed to ± 4.9 ppm over 24 hours. The defect condition must be cleared before **LOOP** time mode can be resumed.

Free-Running (FR) Mode

In this mode, an internal oscillator is used to generate transmit timing. **FREE-RUNNING** mode provides a SONET minimum clock specification of ± 20 ppm.

External Nonrevertive and Revertive Modes

EXTERNAL timing mode allows the MX2800 STS-1 to derive its transmit timing from the BITS clocks through wire-wrap pins located on the back of the chassis. Two sources can be specified to provide external timing: a primary and a secondary source. Failure of the primary source (due to LOS or AIS) will cause

the unit to switch to the secondary source, if available. When in External Nonrevertive timing mode, the timing source will not switch back to the Primary External Clock in the event that it becomes available. If in External Revertive timing mode, the timing source will switch back to the Primary External Clock if it becomes available. In the event that both the primary and secondary sources are lost, the unit will enter Holdover mode as described previously. Holdover mode will be exited upon recovery of at least one clock source.

3. SNMP

The embedded SNMP feature of the MX2800 STS-1 allows the unit to be accessed and controlled by a network manager through the 10Base-T local area network (LAN) port. The MX2800 STS-1 supports the MIB-II standard, RFC 1213, RFC 1595, and the ADTRAN Enterprise Specific MIB.

NOTE

MIB files are available from ADTRAN in the support section of the ADTRAN Website at www.adtran.com.

The term SNMP broadly refers to the message protocols used to exchange information between the network management system (NMS) and the managed devices, as well as to the structure of device management databases. SNMP has three basic components:

- Network manager
- Agent
- MIB

Network Manager

The network manager is a set of control programs that collect, control, and present data pertinent to the operation of the network devices. These programs reside on a network management station.

Agent

The agent is a control program that resides in every network device. This program responds to queries and commands from the network manager, returns requested information or invokes configuration changes initiated by the manager, and sends unsolicited traps to the manager.

MIB

A MIB is an industry standard presentation of all status and configuration parameters supported by a network device.

4. TELNET

Telnet provides a password-protected, remote login facility to the MX2800 STS-1 that allows a remote user to control the MX2800 STS-1 through the terminal menus. Only one Telnet menu session may be active at a time.

5. TL1

Transaction Language 1 (TL1) is an ASCII based language that supports both command-response and autonomous (NE) message generation. Commonly, TL1 is used over a X.25 packet network but is completely independent of any physical layer protocols. For the MX2800 STS-1, TL1 is implemented as a Telnet session running over either Ethernet or PPP. Up to eight TL1 Telnet connections may be active at a time.

6. AVAILABLE OPTIONS

The following optional equipment is available for use with the MX2800 STS-1. Contact a local distributor or the ADTRAN sales department for more information.

Breakout Panel (P/N 1200291L1)

The optional breakout panel connects to the MX2800 STS-1 and provides 28 RJ connectors for the individual T1s/E1s. Shipment includes two six-foot, 64-pin to 64-pin amphenol cables which allow direct cabling to the MX2800 STS-1 (refer to Connecting the Breakout Panel on page 2-5 for more information).

BNC Patch Panel (P/N 1200291L5)

The optional BNC Patch Panel connects to an MX2800 Chassis or equivalent and is mountable to a 19-inch rack. The panel converts the T1/E1 transmit-and-receive signal interfaces from 120-ohm amphenol interfaces to 75-ohm coaxial (BNC). This allows easy 75-ohm impedance-matched access to both the transmit and receive lines of each T1/E1 channel. Each of the twenty eight BNC interfaces is configurable as either balanced or unbalanced. The frame ground of the patch panel is connected to a ground lug accessible on the rear of the patch panel. See **Figure 1-2**.

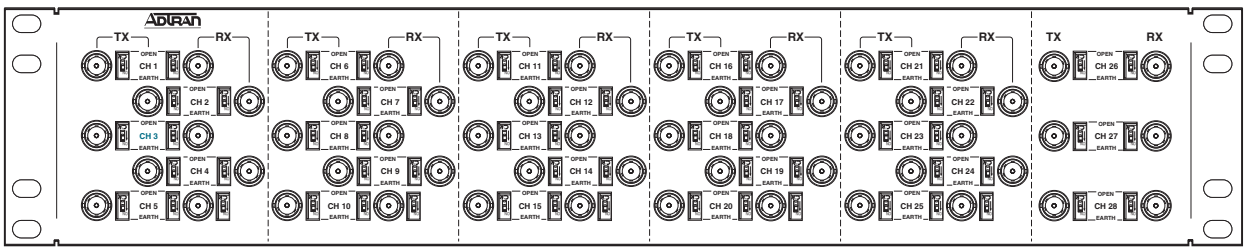

Figure 1-2. Optional BNC Patch Panel

Battery Backup (P/N 4175043L2)

The battery backup system provides power backup in the event of power loss. This system includes the battery, an AC battery charger, and an alarm cable.

Fan Faceplate (P/N 1200466L1)

The MX2800 Fan Faceplate provides the means for additional heat dissipation. This allows multiple units to be stacked directly on top of each other. The fan faceplate replaces the original faceplate, and it is for use with the 1202289L1, 1202289L2, and 1202289L3 power supplies. **Figure 1-3** shows how the fan faceplate is installed on the chassis.

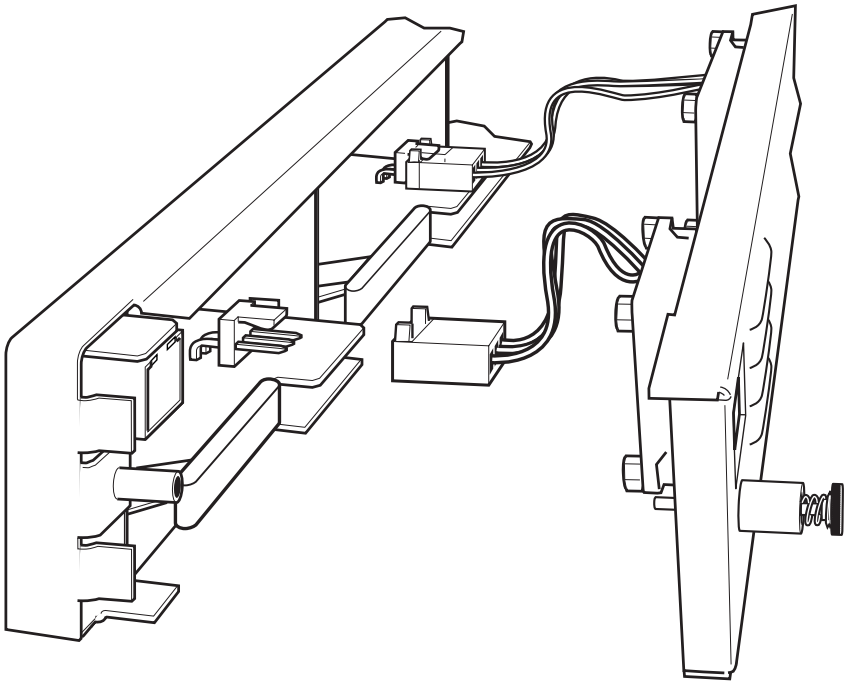

Figure 1-3. Fan Faceplate

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Section 2
Installation and Operation

1. INTRODUCTION

The first three tasks for installing and operating the MX2800 are to unpack, inspect, and power up. The next three subsections detail the tasks. Additional subsections provide information for mounting the MX2800 into an equipment rack, making the proper connection to the back panel, identifying the front panel indicators and modular jack, and the adding or removing of a card.

2. RECEIVING INSPECTION

Carefully inspect the MX2800 for any damage that might have occurred in shipment. If damage is suspected, file a claim immediately with the carrier, keep the original packaging for damage verification and/or returning the unit, and contact ADTRAN Customer Service. For warranty information, refer to *Appendix F, Warranty*.

3. ADTRAN SHIPPING CONTENTS

After unpacking the MX2800 unit but before an initial power up, be sure that the following items are present:

- MX2800 unit
- DC or AC power supply (two power supplies come with the redundant versions)
- Controller card (two cards come with the redundant versions)
- 8-pin to 6-pin modular cable (modem version only)
- 8-pin to 8-pin modular cable
- 8-pin modular to DB-9 female connector
- Two 4-position terminal lug connectors
- 3-position terminal lug connector
- Six-foot AC power cable (AC version only)
- Mounting brackets and screws for 19-inch or 23-inch rack installation
- *MX2800 STS-1 System Manual* on Compact Disk
- *MX2800 STS-1 Job Aid*

NOTE

MIB files are available from ADTRAN in the support section of the ADTRAN website at www.adtran.com.

4. POWER UP

The AC version of the MX2800 is provided with a 6-foot power cable terminated in a three-prong plug which is connected to a grounded 120 VAC power receptacle.

NOTE

Power to the AC version of the MX2800 must be provided from a grounded 120 VAC power receptacle.

The DC version of the MX2800 is provided with two 4-position modular terminal lug connectors. These connectors simplify the initial wiring and connection or disconnection of the DC power when replacing rackmount units.

NOTE

A 3-amp fuse is recommended for use in the fuse and alarm panel that feeds the MX2800.

For more detailed information on power connections, refer to Section 8, Power Loss Recovery on page 8-1.

Once the modular connector is wired, push it firmly into one of the rear panel power connectors. **Figure 2-1** and **Table 2-1** illustrate the DC power connector and give definitions for the four connector symbols.

NOTE

The chassis should be connected to an earth ground using the ground stud located between the AC and DC power sources on the rear panel.

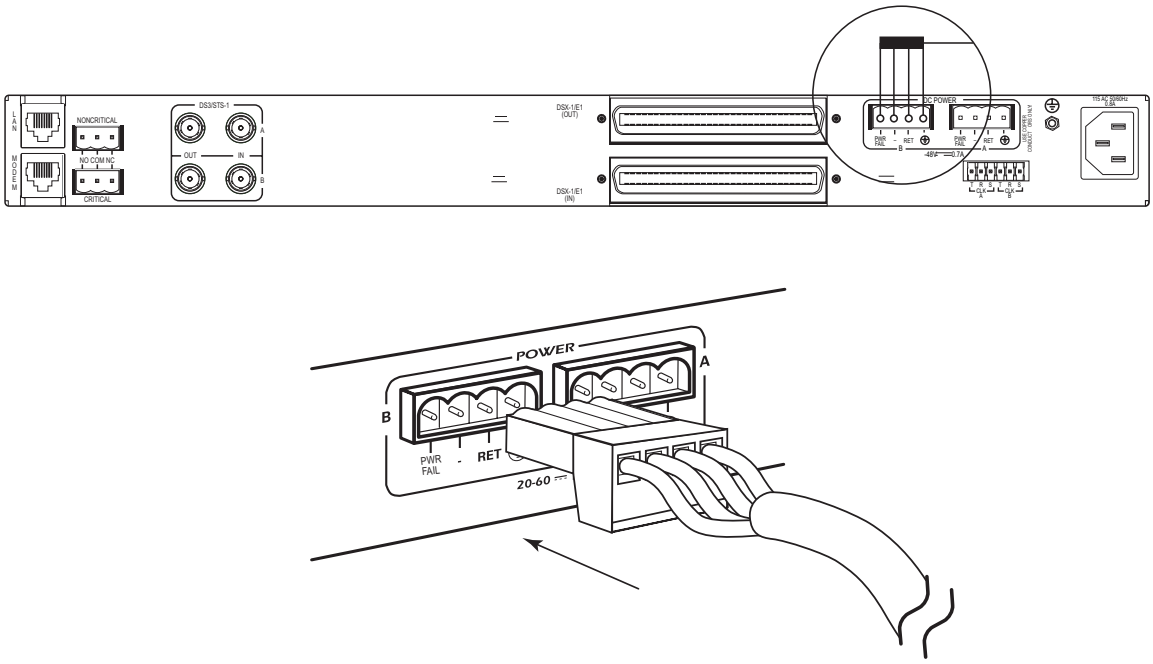

Figure 2-1. DC Power Connector

Table 2-1. DC Connector Symbol Definitions

Symbol	Definition
PWR FAIL	Battery backup connector. If the AC fails, a trap is sent to as notification when connected to the 4175043L2 battery backup or equivalent system.
–	Negative side of DC power source (usually –48 VDC)
RET	Positive side of DC power source (usually ground)
⏚	Frame Ground

The following UL requirements must be met during installation of the MX2800 DC version:

1. Disconnect all power sources prior to servicing. Unit may use multiple power sources.
2. Voltage input requirement for DC version is Minimum –48 VDC, 0.8 amps
3. Voltage input requirement for AC version is Minimum 120 VAC, 0.32 amps
4. Connect to a reliably grounded –48 VDC source which is electrically isolated from the AC source. Use 24 VDC source for 1202289L3.
5. The branch circuit overcurrent protection must be a fuse or circuit breaker rated minimum 48 VDC, maximum 20 amps.

6. A readily accessible disconnect device that is suitably approved and rated must be incorporated in the field wiring.
7. The chassis should be connected to an earth ground using the ground stud located between the AC and DC power sources on the rear panel.
8. The unit must be installed in accordance with the requirements of NEC NFPA 70.
9. The unit must be installed in accordance with Articles 400 and 364.8 of the National Electrical Code NFPA 70 when installed outside of a restricted access location (that is, in a Central Office, behind a locked door, or in an area accessed by service personnel only).
10. Care should be taken not to upset the stability of the equipment rack after installation is complete.

CAUTION

Use copper conductors only for DC power and ground connection.

5. RACKMOUNT INSTALLATION

The MX2800 STS-1 can be mounted into a standard 19-inch or 23-inch equipment rack. Follow these steps to mount the unit into a rack:

1. Install the mounting flanges on each side of the MX2800 STS-1 at one of the three available positions.

CAUTION

Install the flanges only with the screws provided.

2. After the flanges have been installed, position the MX2800 STS-1 at the correct location within the rack and secure the mounting flanges to the mounting rails of the rack.
3. Make all network, DTE, and power connections to the rear of the unit. Refer to Power Up on page 2-2 for more information on making the DC power connection.
4. Using the 8-position modular to DB-9 female connector and the 8-position modular to 8-position modular cable, connect a VT 100 terminal device to the **CRAFT** port on the front panel of the unit.

NOTE

Two MX2800 STS-1s may be stacked with no spacing between units. ADTRAN recommends 1U (1.75") of separation above and below the two stacked units. This spacing allows the unit to dissipate heat. The design of the MX2800 STS-1 uses the chassis to distribute heat generated by the internal cards. This arrangement allows the unit to operate without a cooling fan.

Connecting the Breakout Panel

The optional breakout panel (P/N 1200291L1) connects to the MX2800 STS-1 via the **IN** and **OUT** amphenol connectors located on the back of the unit, and provides 28 RJ connectors for the individual T1s/E1s. Shipment includes two six-foot, 64-pin to 64-pin amphenol cables which allow direct cabling to the MX2800 STS-1. Connect the **IN** amphenol connector of the breakout panel to the **IN** amphenol connector of the MX2800 STS-1. Connect the **OUT** amphenol connector of the breakout panel to the **OUT** amphenol connector of the MX2800 STS-1 (see **Figure 2-2**).

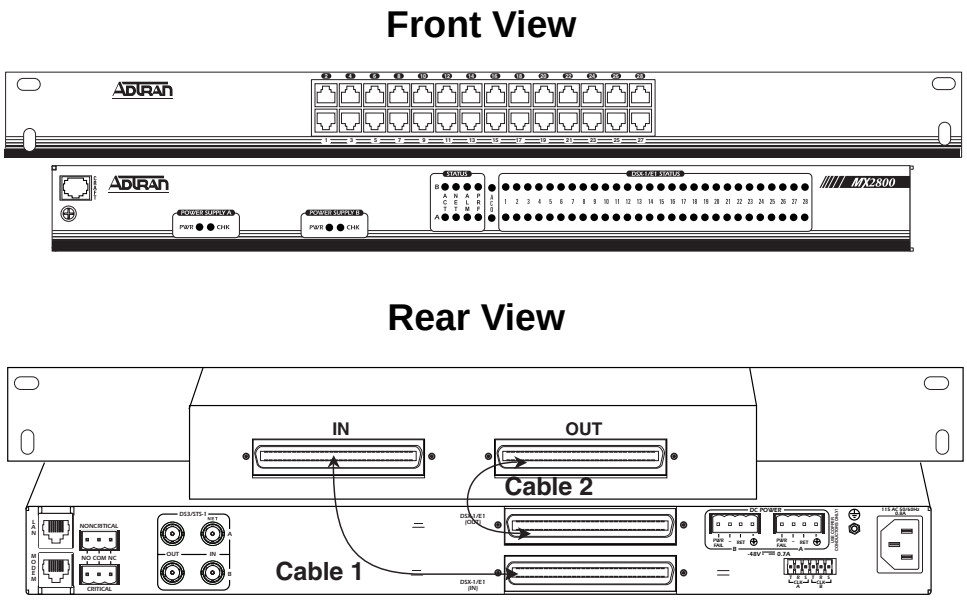

Figure 2-2. The Breakout Panel

Connecting the BNC Patch Panel

The optional BNC patch panel (P/N 1200291L5) connects to the MX2800 via the **TX** and **RX** amphenol connectors located on the back of the unit and provides 28 pairs of BNC connectors for the individual T1/E1s. Shipment includes two 6-foot, 64-pin to 64-pin amphenol cables for direct cabling to the MX2800. Connect the BNC patch panel **RX** amphenol connector to the MX2800 **IN** amphenol connector and the BNC patch panel **TX** amphenol connector to the MX2800 **OUT** amphenol connector.

6. REAR PANEL

The MX2800 STS-1 rear panel is equipped as follows:

- LAN port
- Modem port
- Two alarm output terminal blocks

- Two sets of NET in/out jacks
- Two amphenol connectors
- DC/AC power connections
- Wire-wrap pins for external connection of BITS clock

Descriptions for the items shown in **Figure 2-3** are explained in **Table 2-2**. Pin assignments are given in the tables in *Appendix B, Pinouts*.

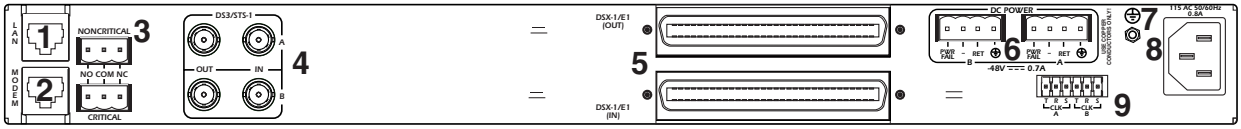

Figure 2-3. MX2800 STS-1 Rear View

Table 2-2. MX2800 Review View Identifiers

#	Item	Function
1	Ethernet LAN	10Base-T Ethernet connection
2	Modem	Telephone line connection for internal V.34
3	Noncritical/Critical	Connections for external audible/visual alarms
4	DS3/STS-1	EC-1/STS-1 service connection for controller cards A and B
5	DSX-1/E1	64-pin female amphenol connectors for T1/E1s
6	Power	DC power connection
7	⏚	Ground stud
8	115 VAC 50/60 Hz	AC power connection
9	BITS Clock	Wire-wrap pins for external connection of BITS clocks

LAN Port

The **LAN** port is an 8-pin modular connector that provides a 10Base-T ethernet LAN interface. This **LAN** interface is used for SNMP and Telnet control.

NOTE

Connect the LAN port to intra-building wiring only.

Modem Port

The **MODEM** port is an 8-pin modular jack that provides a telephone line (POTS) connection for the internal V.34 modem.

The MX2800 STS-1 can be configured as a dial-in host and also as a dial-out-on-Trap device (meaning the unit dials out to a specified host to report error conditions).

NOTE

Information regarding the built-in modem applies to the following ADTRAN products:

4204659L1	AC Non-Redundant Version with Modem
4204659L2	AC Redundant Version with Modem
4204659L3	DC Non-Redundant Version with Modem
4204659L4	DC Redundant Version with Modem
4204659L10	STS-1 AC/DC Redundant with Modem
4204659L11	AC Non-Redundant with Modem with Fans
4204659L12	AC Redundant with Modem with Fans
4204659L13	DC Non-Redundant with Modem with Fans
4204659L14	DC Redundant with Modem with Fans

Noncritical and Critical Alarm Connectors

The alarm connectors connect to the three contacts of a Form C type relay on the main board of the MX2800 STS-1. This relay is activated any time the MX2800 STS-1 detects an alarm condition on the STS-1 network interface. Both **NC** (normally closed) and **NO** (normally open) contacts are provided.

Connect alarms to one of the three-position modular terminal lug connectors (provided). These connectors make it easier to perform initial wiring and to connect and disconnect alarms when replacing rackmount units. Once a modular connector is wired, push it firmly into the rear panel **NONCRITICAL** or **CRITICAL** connector.

The alarm functions can be enabled or disabled through the Alarm Relays section of the Configuration menu (refer to Alarm Relay Configuration on page 3-31).

Network Interfaces

The network interfaces are full-duplex circuits provided by four BNC coaxial cable connections. The receive data from the network is connected to the RX (**IN**) connectors, while the transmit data from the MX2800 STS-1 is connected to the TX (**OUT**) connectors.

NOTE

Network interfaces must be connected using coaxial cables that have the shields grounded at both ends.

DSX-1/E1 Interfaces

The DSX-1/E1 interfaces are 64-pin amphenol connectors. These interfaces provide Tx and Rx connections between the unit and equipment such as wire-wrap patch panels, punch-down panels, or breakout panels.

NOTE

Connect the DSX-1/E1 interfaces to intra-building wiring only.

Power Connection

The DC and AC power connections are described in Power Up on page 2-2.

External BITS Clock

The external BITS clock connections are made through wire-wrap pins. It is possible to connect two external BITS clocks in this manner. This allows either one or two external BITS clocks to be used for unit timing. Each BITS clock terminates on three wire-wrap posts. The posts are tip, ring, and shield and are labeled **T**, **R**, and **S** for clock A and clock B.

7. FRONT PANEL

The MX2800 STS-1 faceplate is shown below in **Figure 2-4**. Descriptions of each part of the front panel follow.

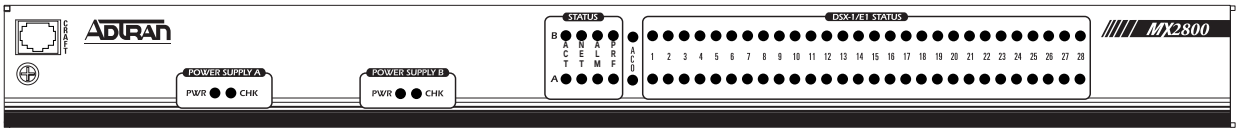

Figure 2-4. MX2800 STS-1 Front Panel

Craft Port

The **CRAFT** port, an 8-pin modular jack, provides connection to a VT100 EIA-232 compatible interface using the supplied 8-pin modular to DB-9 female connector and the 8-pin to 8-pin modular cable.

Establishing Terminal Connection

NOTE

A Telnet menu session has priority over a terminal menu session through the craft port. If a terminal menu session is active when a Telnet menu session is initiated, the terminal menu session will be disabled while the Telnet menu session is active.

To connect the MX2800 STS-1 to a VT100 terminal, follow the steps below:

1. Configure the VT100 terminal as follows:
   - 9600, 19200, 38400, or 57600 baud
   - 8-bit characters
   - no parity
   - one stop bit
2. Using the terminal interface cable adapter provided by ADTRAN, connect the DTE port of a terminal to the 8-pin modular jack labeled **CRAFT** on the MX2800 STS-1 front panel.
3. Initialize the terminal session.
4. Press ENTER repeatedly until the username: prompt appears.
5. Enter the user name. The factory default user name is **adtran** (all lower-case). The password: prompt appears.
6. Enter the password. The factory default password is **adtran** (all lower-case). The Main Menu displays (see **Figure 2-5**).
7. Make selections by entering the number corresponding to the chosen parameter. Press ESC on the keyboard to return to the previous screen. End a terminal session by selecting Logout from the Main Menu or by pressing CTRL+C at any time.

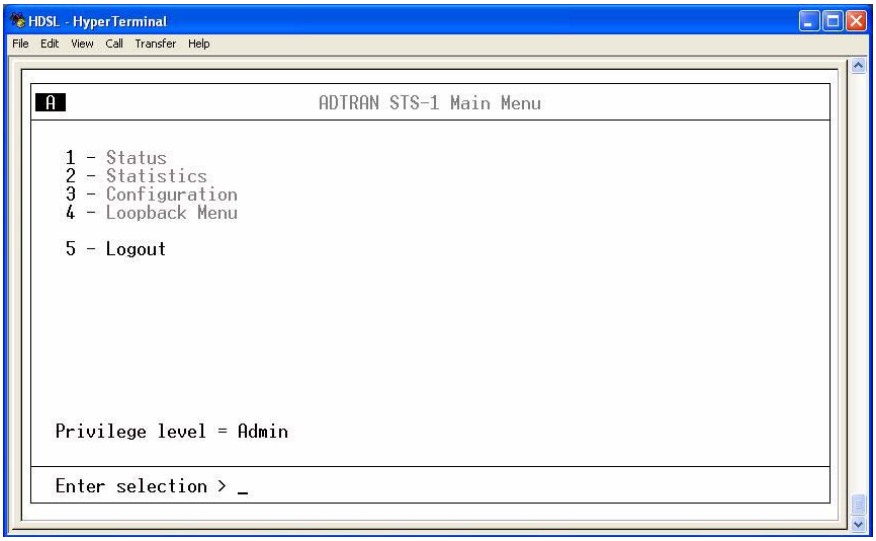

Figure 2-5. ADTRAN STS-1 Main Menu

NOTE

The letter displayed in the upper left-hand corner of the terminal menu indicates which controller card is active (A or B).

Navigating Within the Menus

Navigate within the MX2800 STS-1 terminal menus using the following procedures:

To...	Then...
Select an item	Press the number corresponding to a choice, and then press the ENTER key
Scroll left and right within the same screen	Press the left and right arrow keys. Additional screens are available when < or > is displayed in the top portion of the menu
Return to the previous menu	Press the ESC key
End the terminal session	Press CTRL+C
Refresh the display	Press CTRL+R
Scroll up or down within the same screen	Press the up or down arrow keys. Additional screens are available when ∧ or ∨ is displayed in the top portion of the menu

The MX2800 STS-1 Main Menu consists of the following options:

Status

This screen provides information on the current state of the STS-1, power supplies, system, and VT/Port lines. For more detailed information, refer to *Section 4, Status*.

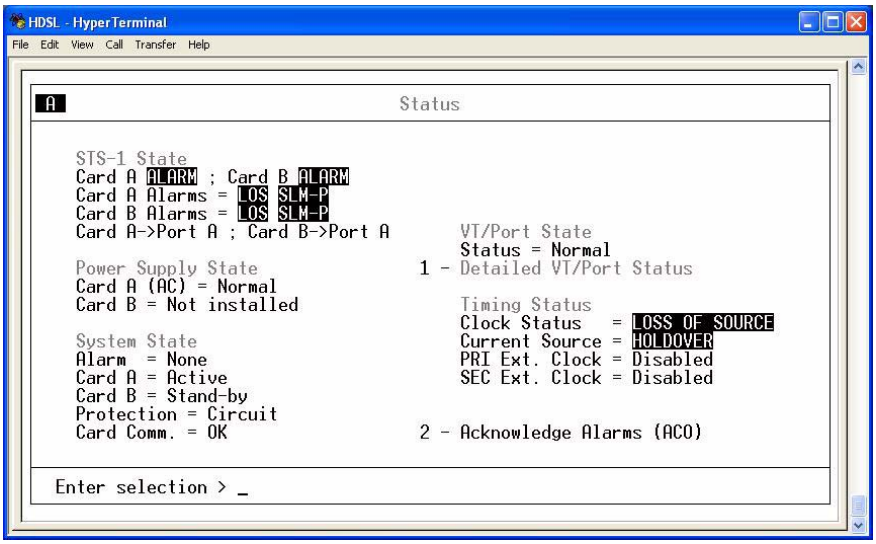

Figure 2-6. Status Screen

Statistics

This screen provides detailed statistical information (both current and historical) for the STS-1, VT, and Port lines. For more detailed information, refer to *Section 5, Statistics*.

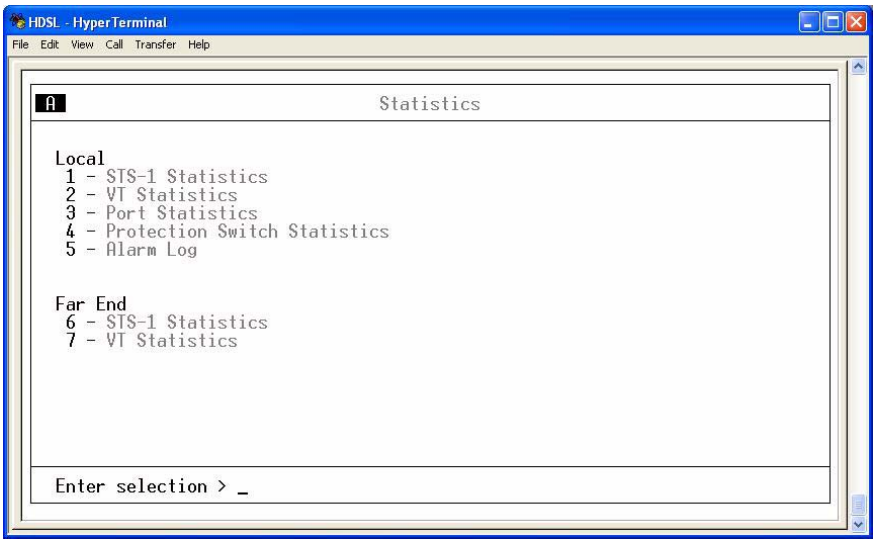

Figure 2-7. Statistics Menu

Configuration

Sets STS-1 network, VT/Port, and system management parameters. For more detailed information, refer to *Section 3, Configuration*.

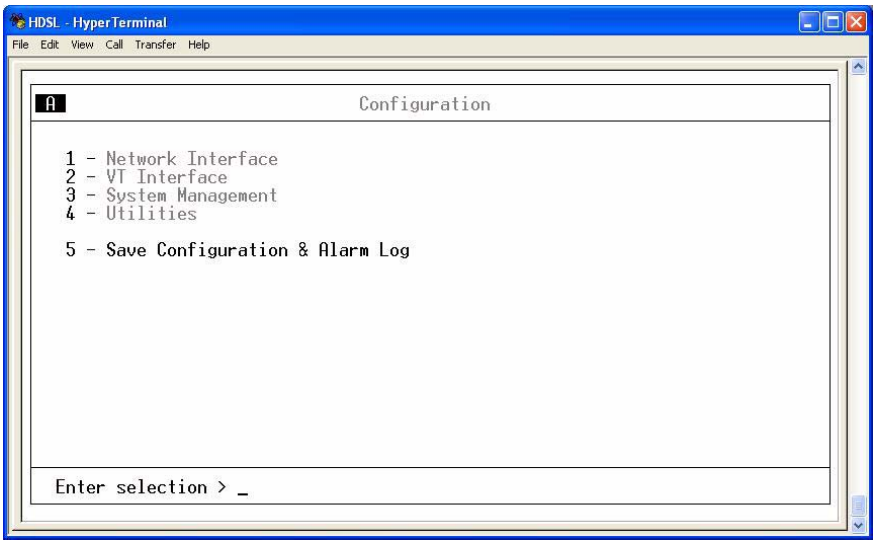

Figure 2-8. Configuration Menu

Loopbacks

This option accesses loopback tests for the STS-1 and VT/Port circuits. For more detailed information, refer to *Section 6, Loopbacks*.

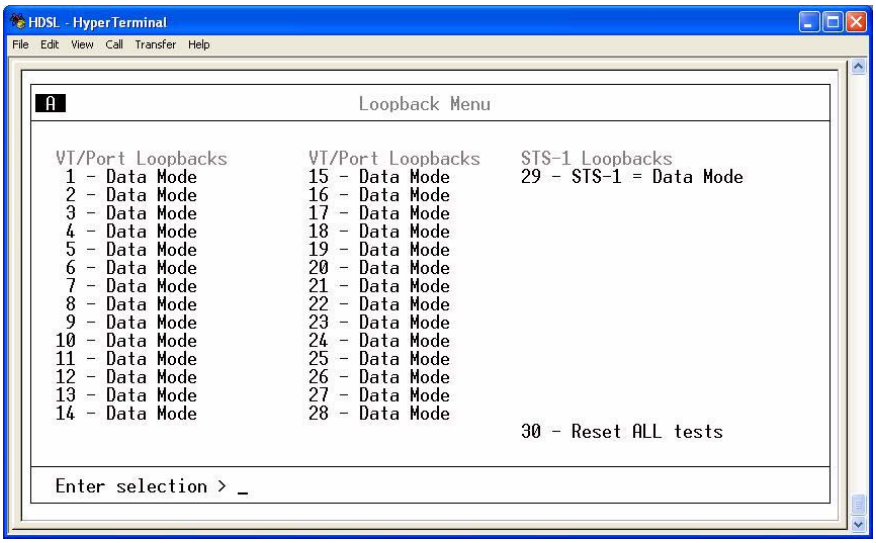

Figure 2-9. Loopback Menu

Logout

The Logout selection ends the terminal session and logs out of the system. The unit will also logout of a terminal session automatically if the session remains inactive for a certain period of time. A valid username and password entry are required to initiate a new terminal session. For more information, refer to Terminal Timeout on page 3-30.

ACO Buttons

The **ACO** (alarm cut off) buttons turn off an active audible alarm. The buttons are recessed, requiring a pointed instrument to press them. Once an **ACO** button has deactivated an audible alarm, the alarm remains disabled for the duration of that alarm condition.

Alarms can also be turned off remotely by using a selection found in the Status menu. Refer to *Acknowledge Alarms (ACO) on page 4-8* for more information.

LED Descriptions

The MX2800 STS-1 has LED status indicators for the power supplies, the STS-1 state, the controller cards, and the individual T1s/E1s. These LEDs are identified in the following subsections.

Power Supply A/B Status LEDs

The **PWR** LED is active when the unit is on and receiving full power. The **CHK** LED is active when the power supply is failing or is providing low power and needs to be checked.

Controller Card Status LEDs

The status LEDs on the two controller cards are **ACT** (active), **NET** (network), **ALM** (alarm), and **PRF** (performance). Different conditions are indicated by the state of the LED (it remains solid, flashes, or alternates colors). The condition descriptions vary depending on whether the LED represents the active controller card or the controller card on standby.

LED definitions are for the active cards are provided in **Table 2-3**.

LED definitions for standby cards are provided in **Table 2-4**.

Table 2-3. LED Conditions for Active Cards

Label	LED State	Card Condition
ACT	Green solid	Normal (All OK)
	Green/Amber alternating	Normal + Console Open
	Red solid	Self Test Failed
	Amber solid	Software Update in Progress
	Red/Amber alternating	Self Test Failed + Console Open
	Red flashing	Card Failure
NET	Green solid	Normal (All OK)
	Red flashing	LOS
	Red solid	LOMF, AIS-P, AIS-L, RFI-L, RFI-P, LOP, SLM, UEQ
	Amber solid	In Test (Local)
	Amber flashing	In Test (Remote)
	Red/amber alternating	In Test + Alarms
ALM	Green solid	Normal (No Alarm)
	Red flashing	Critical Alarm
	Red solid	Non-Critical Alarm
	Amber flashing	Critical Alarm Suppressed (**ACO** button was pushed)
	Amber solid	Non-Critical Alarm Suppressed (**ACO** button was pushed)
PRF	Green solid	Normal (All OK)
	Red flash (once per event)	Single/Burst CV
	Red flashing	Continuous Code Violations
	Red solid	XCV Threshold Exceeded

Table 2-4. LED Conditions for Standby Cards

Label	LED State	Card Condition
ACT	Green flashing	Normal (All OK)
	Amber solid	Software Update in Progress
	Red flashing	Self Test Failed
NET	Off	Normal (All OK)
	Red flashing	STS-1 Failure
ALM	Off	Normal (No Alarm)
PRF	Off	Normal (All OK)

T1/E1 Status LEDs

These LEDs apply to each individual T1 or E1. Different conditions are indicated by the state of the LED (its color and whether it flashes, alternates color, or remains solid). The condition descriptions vary depending on whether the LEDs represent T1s or E1s of the active controller card or the controller card on standby. **Table 2-5** provides T1/E1 LED definitions for the active and standby card.

Table 2-5. T1/E1 Status LEDs

	LED State	T1/E1 Condition
Active Card	Green solid	Normal (All OK)
	Off	Disabled
	Red flashing	LOS
	Red flash (once per event)	Single/Burst CV
	Red/green alternating	XCV Threshold Exceeded
	Amber solid	In Test (Local)
	Amber flashing	In Test (Remote)
	Red/amber alternating	In Test + Alarm
Standby Card	Off	Normal (All OK) *or* N/A (in the case of E1 configuration)
	Red flashing	T1/E1 Failure

8. REPLACING OR INSTALLING CARDS

The MX2800 STS-1 is designed with hot-swappable controller cards and power supplies. To replace or install a controller card or power supply, the front cover must be removed.

Cover Removal

Remove the front cover of the MX2800 STS-1 with a phillips-head screwdriver. With the cover removed, the power supply and controller card slots will be visible.

Module Replacement

The two power supplies are located at the left of the chassis

The controller cards are stacked on the right side of the chassis.

To remove a card, pull the locking lever for the desired card to separate the backplane connector from the backplane. Once, the backplane connector has disconnected, carefully pull the card straight out of the chassis.

To replace or install a card, simply line up the card with the guide grooves. Carefully insert the card into the chassis until the backplane connector reaches the backplane.

Finally, use the locking levers to seat the card firmly into the backplane connector slot on the chassis.

Once all cards have been replaced or installed, replace the front cover of the MX2800 STS-1.

Figure 2-10 illustrates the removal and replacement of the front cover.

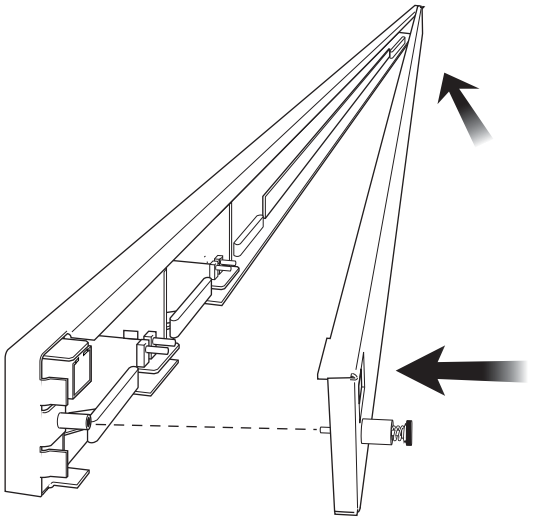

Figure 2-10. Replacing or Installing Cards

Section 3
Configuration

Configuration of the MX2800 STS-1 is accomplished via either the 10Base-T ethernet connection, a SLIP/PPP modem port, or a VT-100 terminal. **Figure 3-1** shows the Configuration menu screen. **Figure 3-2**, **Figure 3-3**, and **Figure 3-4** show the menu tree.

NOTE

A Telnet menu session has priority over a terminal menu session through the craft port. If a terminal menu session is active when a Telnet menu session is initiated, the terminal menu session will be disabled until the Telnet menu session is closed.

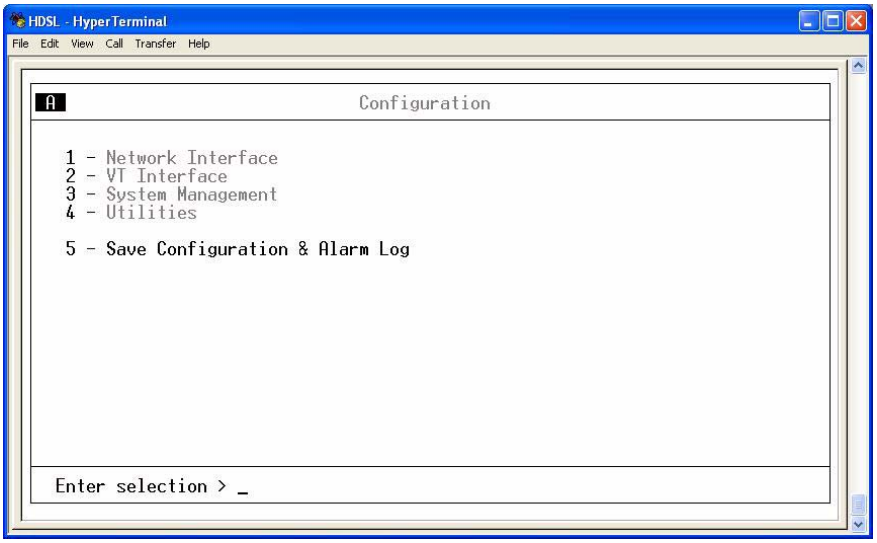

Figure 3-1. Configuration Menu

Detailed descriptions of the menu options shown in Figure 3-1 are given in the following:

- Network Interface on page 3-5
- VT Interface on page 3-9
- System Management on page 3-16
- Utilities on page 3-37
- Save Configuration and Alarm Log on page 3-43

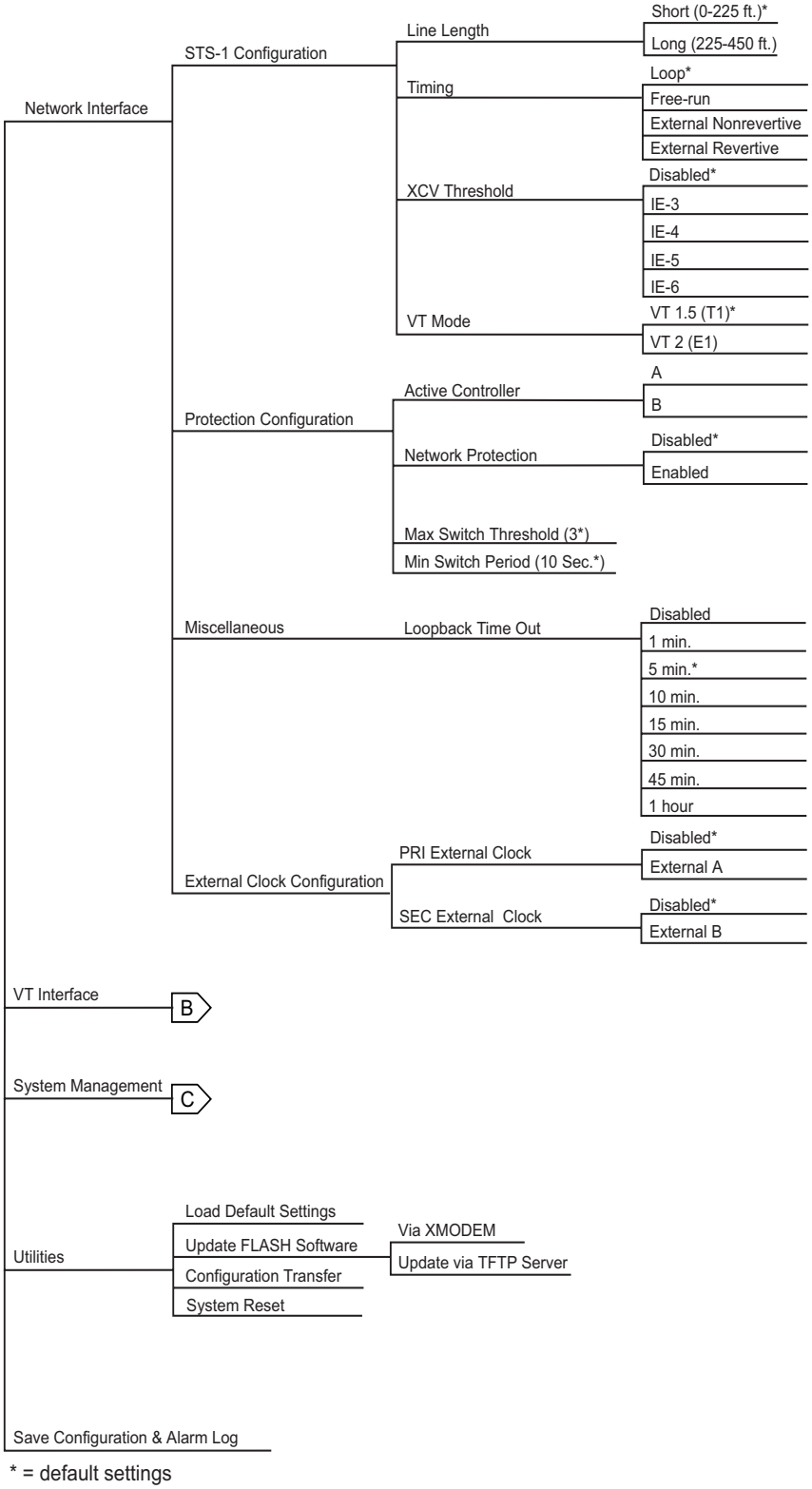

Figure 3-2. Configuration Menu Tree, Page 1

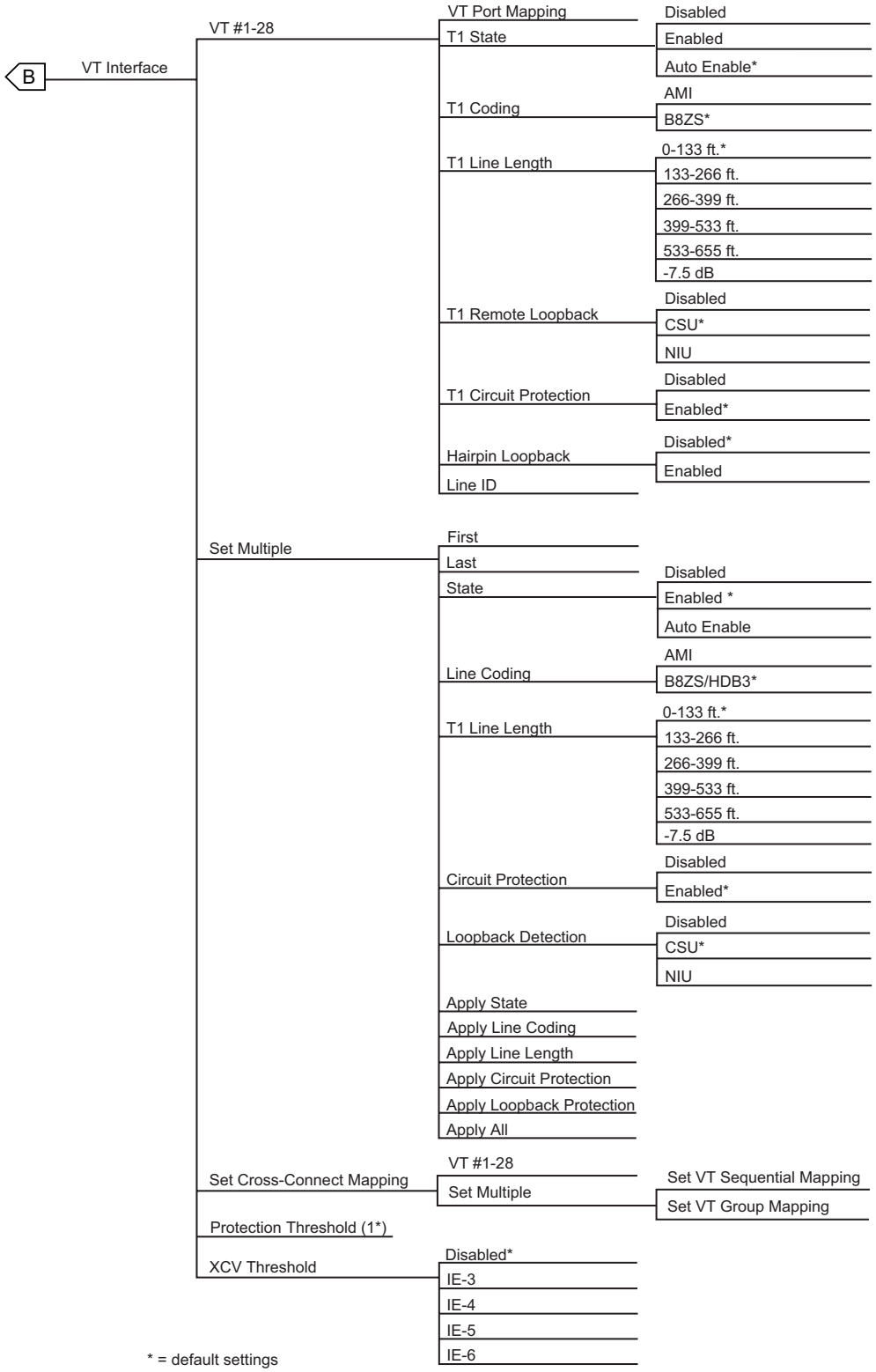

Figure 3-3. Configuration Menu Tree, Page 2

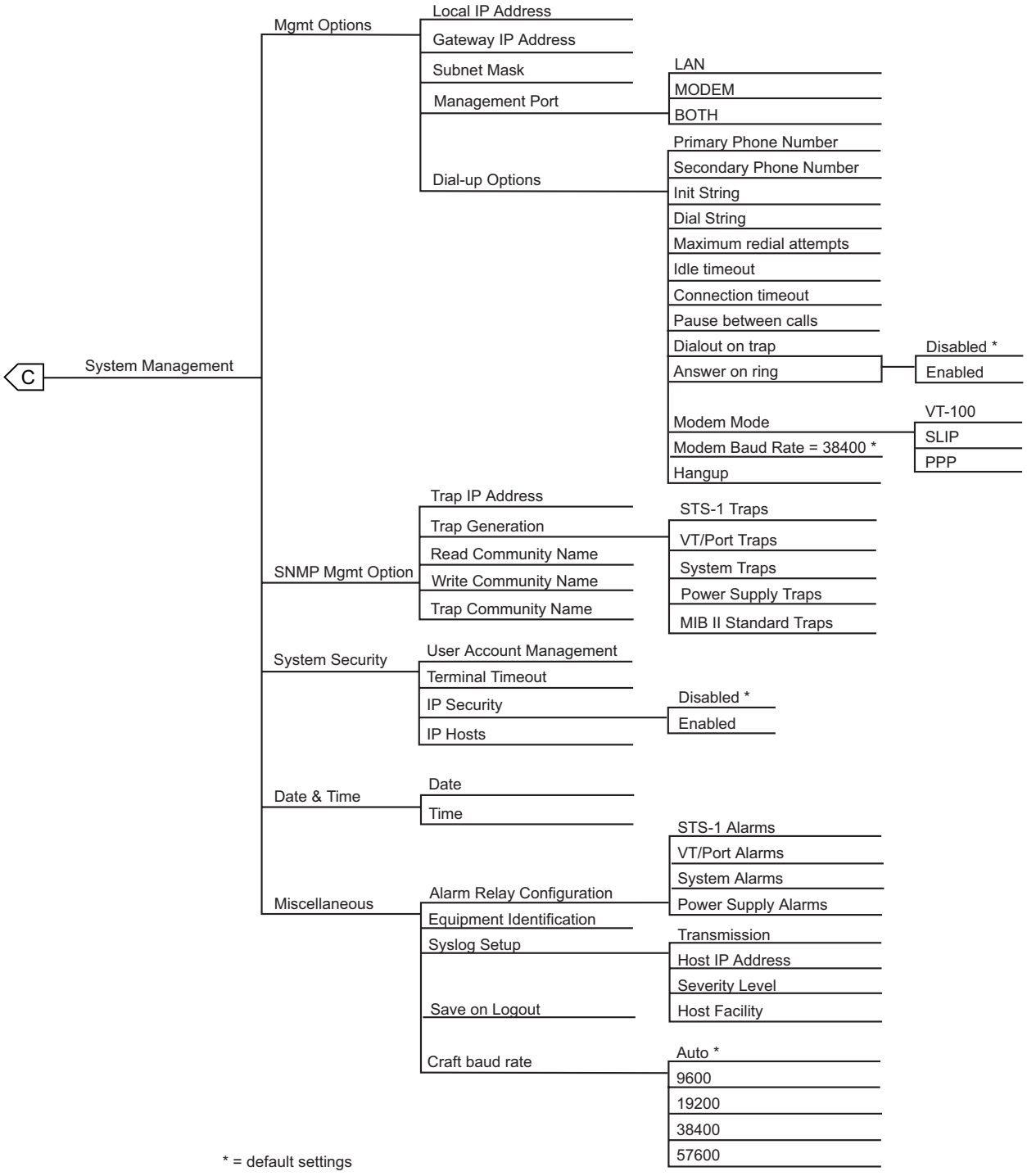

Figure 3-4. Configuration Menu Tree, Page 3

1. NETWORK INTERFACE

Select Network Interface to access the network configuration parameters (**Figure 3-5**). Configure the MX2800 STS-1 network settings appropriately for the application.

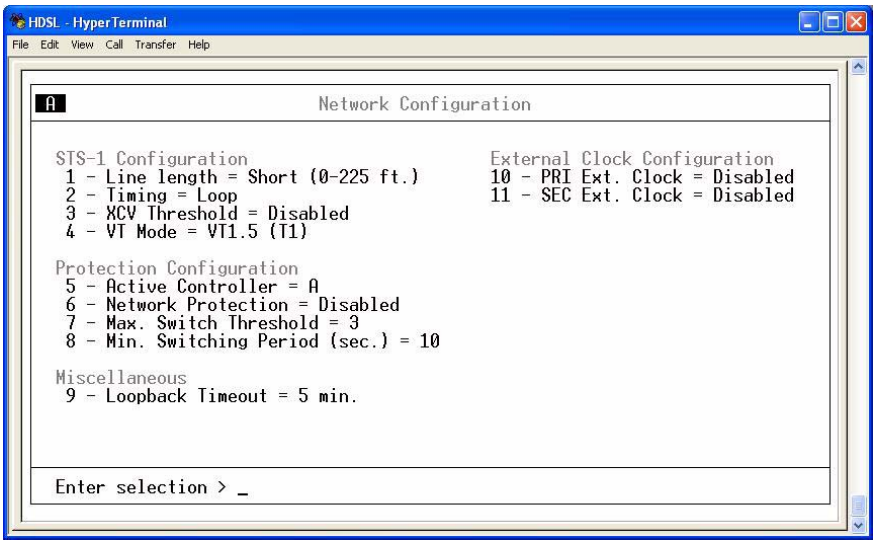

Figure 3-5. Network Configuration Menu

Menu-option descriptions are described in the following sections:

- STS-1 Configuration on page 3-5
- Protection Configuration on page 3-7
- Miscellaneous on page 3-8
- External Clock Configuration on page 3-8

STS-1 Configuration

Use the STS-1 Configuration selections described below to configure the STS-1 network settings to match an application.

Line Length

Set the line length to reflect the physical length of the STS-1 network line, as follows:

- Set the line length to Long if the cabling distance is between 225-450 feet
- set it to Short if the distance is less than 225 feet

Timing

This option determines the source of timing used to derive the transmit signal. The MX2800 STS-1 has four modes of timing operation:

- Loop
- Free-Run
- External Nonrevertive
- External Revertive

Loop

Loop timing configures the unit to recover timing from the STS-1 receive signal. Loss of the STS-1 receive signal or reception of AIS causes the unit to enter hold-over mode (refer to Loop Mode on page 1-4 for information on hold-over mode). The STS-1 receive signal must be valid for at least 10 seconds for the unit to exit hold-over mode and restore loop timing.

Free-Run

When the unit is configured for Free-Run timing mode, timing is derived from a +/–20 ppm internal reference providing a SONET Minimum Clock (SMC).

External Nonrevertive

Setting the unit to External Nonrevertive or External Revertive timing mode configures the unit to derive timing from one of the two external sources selected in the Primary External Clock (PRI Ext) and Secondary External Clock (Sec Ext) options. These are external BITS clocks that may be terminated on the two sets of wire-wrap pins on the back of the MX2800 chassis. The external clock source may be disabled (if only one source exists, or no external clock sources are desired). When both sources are configured, failure of one source causes the unit to switch to the other source (if it is a valid source).

When in External Nonrevertive timing mode, the timing source does not switch back to the Primary external clock in the event that it becomes available.

External Revertive

When in External Revertive timing mode, the timing source switches back to Primary External clock if it becomes available.

Failure of both sources causes the unit to enter hold-over mode. At least one external clock source must be valid for at least 10 seconds for the unit to exit hold-over mode and restore external clock timing.

XCV Threshold

The XCV Threshold (excessive code violations threshold) sets a limit on code violations accepted by the unit before it switches controller cards. If set to Disabled, code violations do not cause the unit to switch controller cards. The threshold limits are described in the following chart:

Setting	The unit switches controller cards if...
$1E^{-3}$	more than one out of every 1,000 bits received on the STS-1 contains a code violation
$1E^{-4}$	more than one out of every 10,000 bits received on the STS-1 contains a code violation
$1E^{-5}$	more than one out of every 100,000 bits received on the STS-1 contains a code violation
$1E^{-6}$	more than one out of every 1,000,000 bits received on the STS-1 contains a code violation

VT Mode

The seven VT groups may be configured to carry either VT1.5 or VT2 tributaries.

- When set for VT1.5 (T1), all VT groups are set for VT1.5[TU=11] at 1.728 Mbps and the ports are set for T1 at 1.544 Mbps.
- When set for VT2 (E1), all the VT groups are set for VT2[TU=12] at 2.304 Mbps and the ports are set for E1 at 2.048 Mbps. When set for VT2, the last 7 VTs (VT 22-28), and the last 7 ports (ports 22-28) become unavailable.

Protection Configuration

The MX2800 STS-1 houses two controller cards for 1:1 protection against hardware failure. The two cards can also provide network protection, supporting two STS-1 circuits simultaneously. The menu selections allow customization of setup parameters.

Active Controller

This field displays **A** or **B**, indicating the active controller card. This setting can be used to force the controller cards to switch. For example, if controller card **A** is active and **B** is selected, a switch-over occurs immediately.

Network Protection

This option allows enabling or disabling of the ability to automatically route the STS-1 to the backup facility in the event of a facility failure.

- Network Protection = Enabled: All information is automatically routed to the backup facility in the event of a primary facility failure.
- Network Protection = Disabled: The primary STS-1 facility (A) is utilized at all times.

NOTE

When choosing a setting for Network Protection, cabling and network provisioning issues must be considered. For configuration examples of the different modes of protection, refer to *Section 7, Circuit Redundancy*.

Max. (Maximum) Switch Threshold

The value entered in this field determines the number of times per hour the unit is allowed to switch between controller cards. If protection switching occurs more than the Max. Switch Threshold within one hour, the unit issues a trap and inhibits automatic protection switching for the next 24 hours. The default setting is 3 times an hour. This count may be cleared by clearing protection switch alarm counts (refer to Protection Switch Statistics on page 5-13).

Min. (Minimum) Switching Period

After a protection switch occurs, the number of seconds entered in this field must pass before another automatic protection switch is allowed. The default setting is 10 seconds.

Miscellaneous

Loopback Timeout

This option applies for all types of loopbacks and pattern generation tests. Any diagnostic test will expire independently for each facility according to this option. The default setting is 5 minutes.

Sets the loopback timeout to one of the following values: Disabled, 1 minute, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 45 minutes, 1 Hour

External Clock Configuration

PRI Ext. Clock and SEC Ext. Clock - These options allow selection of the primary and secondary external clock sources among the external BITS clocks that terminate on the two sets of wire-wrap pins on the back of the MX2800 STS-1 chassis. If a clock source detects AIS or LOS, the clock becomes invalid. The clock will be revalidated when the AIS or LOS condition is removed.

2. VT INTERFACE

The VT Interface menu (shown in **Figure 3-6**) provides the following functions:

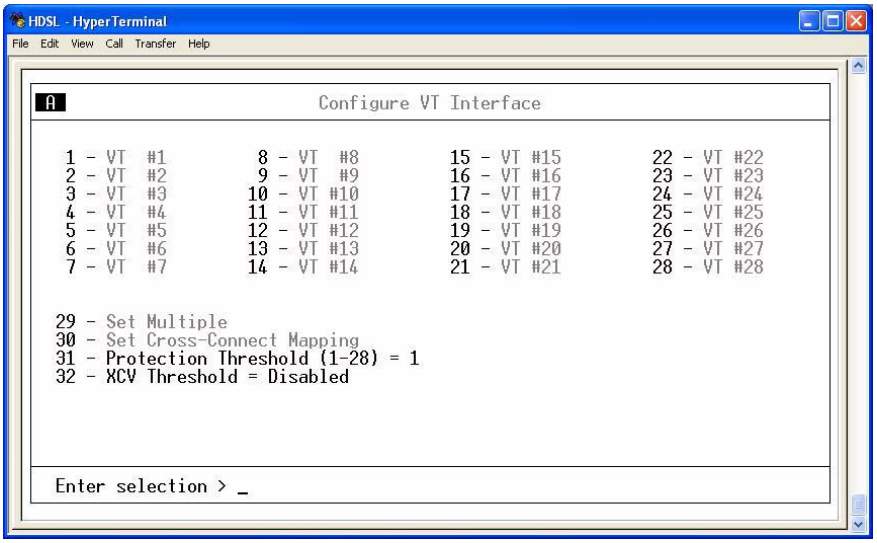

Figure 3-6. VT Interface Menu

VT Interface #1-28

The VT Interface #1-28 menu (**Figure 3-7**) allows the management of the following functions:

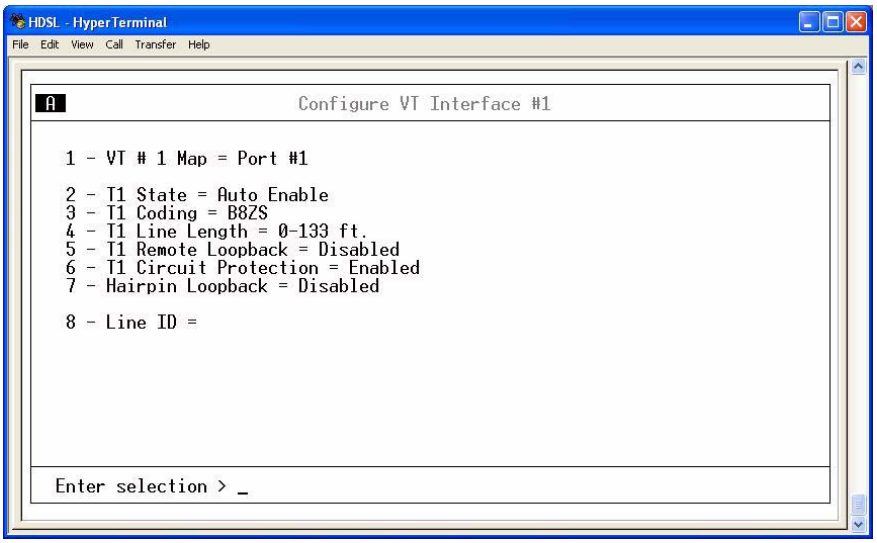

Figure 3-7. Configure VT Interface #1 Menu

VT # Map

Map a T1/E1 port of the VT selected in the *VT Interface Menu* to a VT. Any available T1/E1 port can be mapped to an available VT. An error is returned if the port is already mapped to another VT. Select Unequipped to unmap a VT.

T1/E1 State

Set T1/E1 as Disabled, Enabled, or Auto Enable. In Auto Enable, the unit automatically detects when a T1/E1 signal is connected and begins to allow alarm reporting for that channel.

T1/E1 Coding

Set the line code for each individual T1/E1 interface to match the connected device.

- T1 line code choices are AMI and B8ZS
- E1 line code choices are AMI and HDB3

T1/E1 Line Length

Set the line length for each T1 interface according to the distance from the MX2800 to a DTE device.

- Options are available for T1 channels for up to 655 feet
- The only available option for an E1 channel is 0-6 dB loss

T1 Remote Loopback

Allows a selected T1 to respond to CSU or NIU loopbacks arriving from the STS-1 side. This option is not supported for E1.

T1/E1 Circuit Protection

T1/E1 Circuit Protection determines which circuit initiates a protection switch if a failure in the circuitry for that channel is detected.

- If set to Disabled, the failure of the circuitry of that one channel does not cause a protection switch.
- If set to Enabled, the failure of a channel causes a protection switch to occur (depending on the Protection Threshold setting).

Hairpin Loopback

This option allows a Hairpin loopback of the VT to the STS-1 signal for dropping further down the SONET ring.

Line ID

Text strings may be entered to name the individual T1 lines. This field accepts up to 18 alpha-numeric characters, including spaces and special characters (such as an underbar).

Set Multiple

The Set Multiple option displays the menu shown in **Figure 3-8**, which is used to make multiple changes to the state, line coding, length, circuit protection, and loopback detection.

These may be set as a contiguous group, or to all VTs at one time.

All VTs

Make changes to all VTs with the following steps:

1. Set First to 1 and Last to 28
2. Make the necessary changes
3. Select Apply All (or select the Apply option that corresponds to the change made)
4. Exit the menu if work is complete

Contiguous Group

Make changes to some of the VTs within a contiguous group by following these steps:

1. Set the First and Last fields to correspond to the lines to change
2. Select Apply All (or select the Apply option that corresponds to the change made).
3. Exit the menu, or continue to enter new First and Last numbers for other lines. *Apply the settings following each change.*

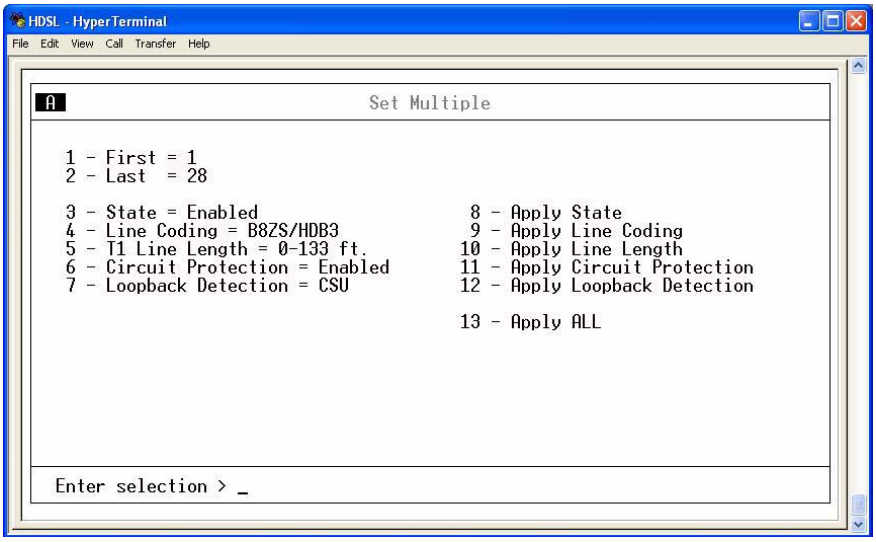

Figure 3-8. Set Multiple Menu

Set Cross-Connect Mapping

Any VT can be cross-connect mapped to any available T1/E1 port.

NOTE

Select Unequipped to unmap the port and disable the VT.

The Set Multiple option allows the provisioning of all available VTs as either mapped by VT group or mapped one-to-one with the T1/E1 ports. The default mapping scheme is by VT Group.

The Set Cross-Connect Mapping menu is illustrated in **Figure 3-9**.

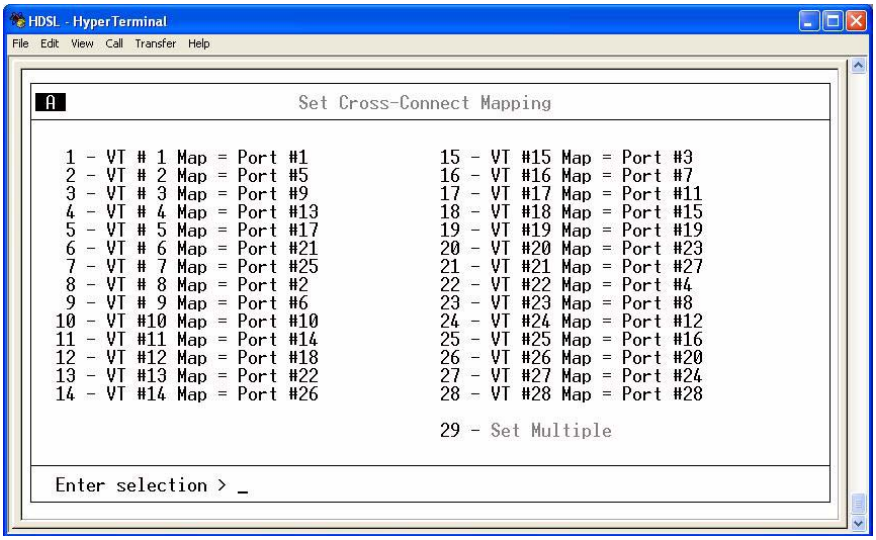

Figure 3-9. Set Cross-Connect Mapping Menu

As shown in Figure 3-9, VT #1 is mapped to Port #1, while VT #2 is mapped to Port #5. This indicates a group mapped mode, as described in the next subsection.

The following tables illustrate the association of the VT ports and physical DS1 ports both sequentially-mapped and group-mapped.

VT1.5 Mode

When the MX2800 STS-1 system is provisioned for VT1.5 (T1) mode, each of the seven VT groups is configured to carry four VT1.5s (1.728 Mbps each), for a total of 28 VT1.5s. Any VT1.5 may be mapped to any of the 28 physical DS1 ports not already mapped. The diagram below illustrates how the VT1.5s are associated with the physical DS1 ports for VT1.5 mapping both by VT group and sequentially.

Table 3-1 illustrates VT1.5 (T1) Mode.

Table 3-1. VT1.5 Mode Cross-Connect Mapping

Physical Port Sequential-mapping (TR-253)	Physical Port Group-mapping (M13)	VT 1.5 #	VTG-VT	
1	1	1	1-1	**VTG #1**
8	2	8	1-2	
15	3	15	1-3	
22	4	22	1-4	
2	5	2	2-1	**VTG #2**
9	6	9	2-2	
16	7	16	2-3	
23	8	23	2-4	
3	9	3	3-1	**VTG #3**
10	10	10	3-2	
17	11	17	3-3	
24	12	24	3-4	
4	13	4	4-1	**VTG #4**
11	14	11	4-2	
18	15	18	4-3	
25	16	25	4-4	
5	17	5	5-1	**VTG #5**
12	18	12	5-2	
19	19	19	5-3	
26	20	26	5-4	
6	21	6	6-1	**VTG #6**
13	22	13	6-2	
20	23	20	6-3	
27	24	27	6-4	
7	25	7	7-1	**VTG #7**
14	26	14	7-2	
21	27	21	7-3	
28	28	28	7-4	

VT2 Mode

When the system is provisioned for VT2 (E1) mode, each of the seven VT groups is configured to carry three VT2s (2.304 Mbps each), for a total of 21 VT2s. Any VT2 may be mapped to any physical E1 port designated 1-21 that is not already mapped. Physical E1 ports 22-28 are unequipped (not used) when the product is configured for VT2 mode. The diagram below illustrates how the VT2s are associated with the physical E1 ports for VT2 mapping both by VT group and sequentially.

Table 3-2 illustrates VT2 (E1) Mode.

Table 3-2. VT2 Mode Cross-Connect Mapping

Physical Port Sequential-mapping (TR-253)	Physical Port Group-mapping (M13)	VT 1.5 #	VTG-VT	
1	1	1	1-1	**VTG #1**
8	2	8	1-2	
15	3	15	1-3	
2	4	2	2-1	**VTG #2**
9	5	9	2-2	
16	6	16	2-3	
3	7	3	3-1	**VTG #3**
10	8	10	3-2	
17	9	17	3-3	
4	10	4	4-1	**VTG #4**
11	11	11	4-2	
18	12	18	4-3	
5	13	5	5-1	**VTG #5**
12	14	12	5-2	
19	15	19	5-3	
6	16	6	6-1	**VTG #6**
13	17	13	6-2	
20	18	20	6-3	
7	19	7	7-1	**VTG #7**
14	20	14	7-2	
21	21	21	7-3	

Protection Threshold (1-28)

The Protection Threshold setting determines how many of the Enabled lines must fail before a card switch occurs. To cause the failure of a single protected (enabled) line to switch to protection, set the Protection Threshold to 1. Choices are 1 to 28.

XCV Threshold

Set a limit on code violations (CVs) accepted by the unit over an individual T1/E1 line before it switches controller cards. If set to Disabled, code violations do not cause the unit to switch controller cards. The threshold limits are described in the following chart:

Setting	The unit switches controller cards if...
$1E^{-3}$	more than one out of every 1,000 bits received on a T1/E1 line contains a code violation
$1E^{-4}$	more than one out of every 10,000 bits received on a T1/E1 line contains a code violation
$1E^{-5}$	more than one out of every 100,000 bits received on a T1/E1 line contains a code violation
$1E^{-6}$	more than one out of every 1,000,000 bits received on a T1/E1 line contains a code violation

3. SYSTEM MANAGEMENT

System management is possible through either SNMP, TL1, or VT-100 menus. Access is possible via craft port, SLIP/PPP modem port, or 10Base-T ethernet interface. The menu (**Figure 3-10**) includes options to customize alarm and trap generation, security setup, and equipment identification. The availability of some options in this menu vary depending upon the configuration of other options.

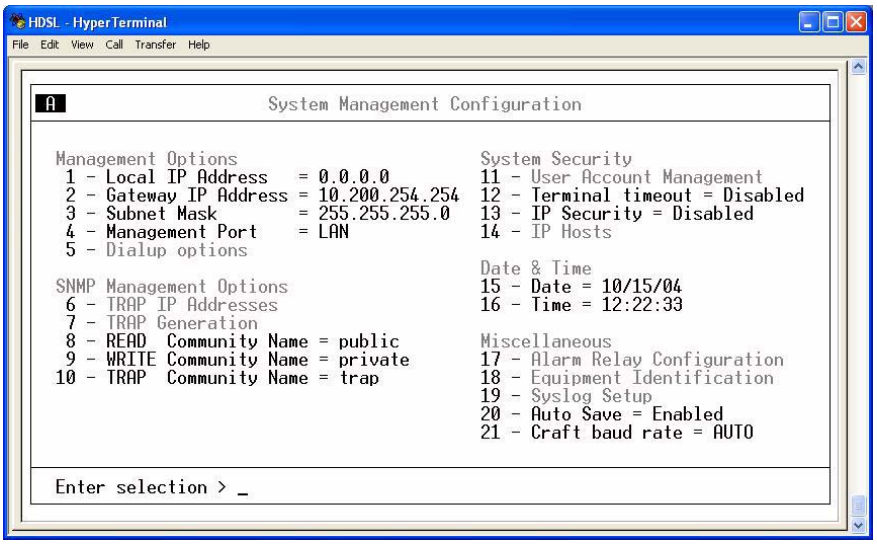

Figure 3-10. System Management Configuration Menu

CAUTION

Configuration changes to Local IP Address, Gateway IP Address, Subnet Mask, Management Port, Modem Mode, Modem Baud Rate, and IP Hosts will not be implemented unless all Telnet sessions are closed. Changes made while a Telnet menu session is active will invoke a warning message on the console.

NOTE

If the unit is not equipped with an internal modem, the Management Port option and Dialup Options will not be available.

Management Options

Local IP Address

This option is utilized to enter the MX2800 STS-1 IP address. This IP address applies to the LAN or modem port (when configured for PPP or SLIP). This address is available from the network administrator.

Gateway IP Address

If the MX2800 STS-1 and the network manager are connected through a gateway node, a gateway IP address for the MX2800 STS-1 is required in this field. If an IP packet is to be sent to a different network, the unit sends it to the gateway.

Subnet Mask

This option is utilized to enter the subnet mask of the MX2800 STS-1. This address is available from the network administrator.

Management Port

This option is utilized to assign the management port as either LAN or Modem. The Modem setting applies only to units equipped with an internal modem.

Dialup Options

This option is utilized to configure the dialup capabilities of the MX2800 (see **Figure 3-11**). These options apply only to units equipped with an internal modem.

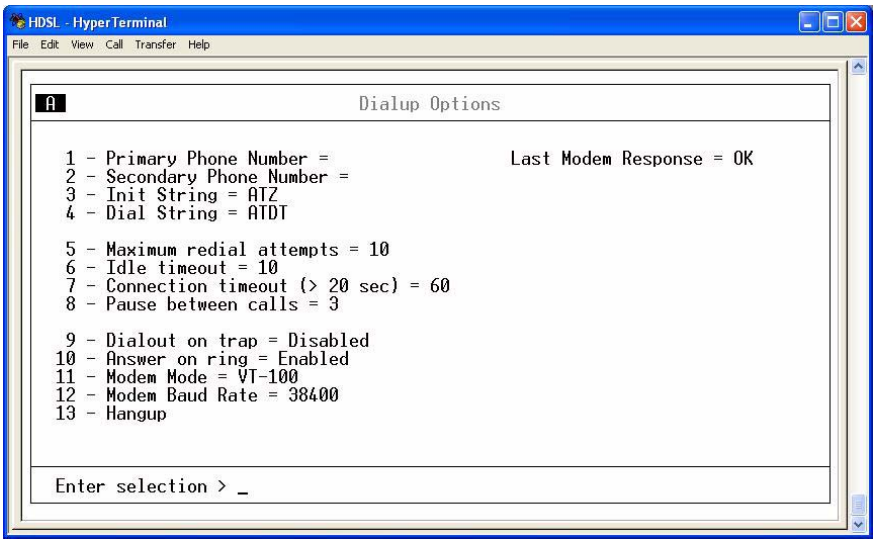

Figure 3-11. Dialup Options Menu

Primary and Secondary Phone Numbers

When the MX2800 dials out to send a trap, it first dials the Primary Phone Number. If the call is unsuccessful, it tries the Secondary Phone Number. Attempts between the two numbers continue until a call is established and the trap is reported (or until each number's maximum redial attempts is reached; refer to *Maximum Redial Attempts* below).

Initializing String

This AT command in this field is used to initialize the modem, and is normally left at the default setting of ATZ.

Dial String

This AT command causes the modem to dial out, and is normally left at the default setting (ATDT).

Maximum Redial Attempts

This setting controls the number of times a call is attempted. If a successful call is not established after the final attempt, the MX2800 discards the trap messages.

Idle Timeout

After establishing a call and sending trap messages, the MX2800 remains online for the number of seconds set in this field. If the field is set to 0, the unit disconnects as soon as the trap is sent.

Connection Timeout

This setting determines the number of seconds the MX2800 waits for a connection. Timing begins as soon as the dial command is issued. This field must be set for greater than 20 seconds.

Pause Between Calls

This is the delay, in seconds, that the MX2800 waits between redial attempts.

Dialout On Trap

Enable or disable the MX2800's ability to dial out to report traps.

Answer on Ring

Enable or disable the ability to accept incoming calls. If enabled, incoming calls are automatically answered by the MX2800. This enables performance of remote management functions via modem dialup.

Modem Mode

Select the Modem port function for the application (VT-100, PPP, or SLIP). The Modem port, located on the rear panel of the MX2800, provides a telephone line (POTS) for connection to the internal V.34 modem. This setting applies only if the Management Port option is set to Modem.

When configured for VT-100, the MX2800 reports error conditions in plain ASCII with the following information:

- The Unit ID value programmed in the Equipment Identification portion of the System Management screen (refer to System Management on page 3-16)
- A trap code indicating the error condition
- A text description of the fault
- The date and time when the error was logged

When configured for PPP or SLIP, the MX2800 logs into the PPP/SLIP host and reports the error conditions to the hosts designated under Trap IP Addresses (refer to Trap IP Addresses on page 3-21).

Modem Baud Rate

Set the maximum operating speed of the Modem port (1200, 2400, 4800, 9600, 19200, and 38400 bps). The default setting is 38400 bps.

Hangup

Selecting this option forces the MX2800 to end an established call.

Last Modem Response

This status field displays the last modem response to the MX2800 as one of the following:

- OK
- Connect
- Busy
- Error
- No Dialtone

- No Carrier

SNMP Management Options

Trap IP Addresses

Enter up to five IP addresses of SNMP managers to which the MX2800 STS-1 sends traps.

Trap Generation

Use this menu (**Figure 3-12**) to designate error conditions that generate trap messages.

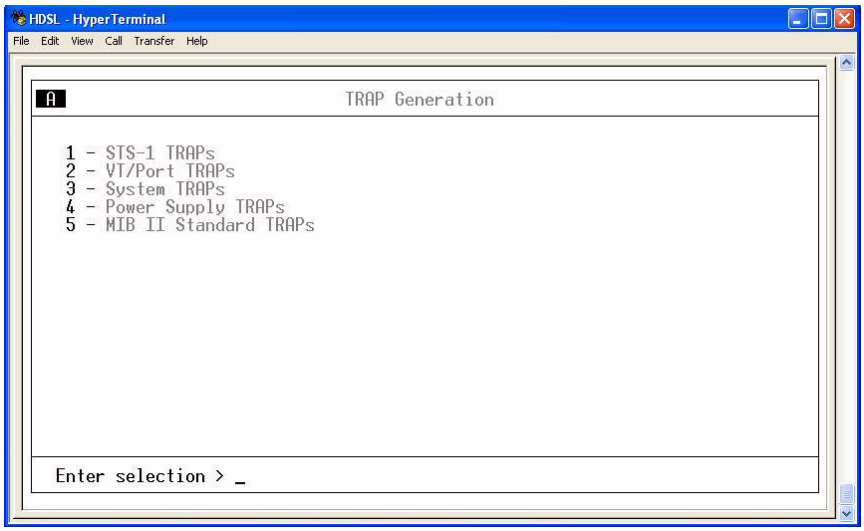

Figure 3-12. Trap Generation Menu

STS-1 Active Alarm Traps

STS-1 Active Alarm trap messages are sent for the reasons provided in **Table 3-3**.

Table 3-3. STS-1 Active Alarm Traps

Trap	Meaning	If enabled, the unit issues a trap when...
LOS	Loss of Signal	The controller card has lost the network receive signal.
LOF	Loss of Framing	The controller card detects a loss of framing from the network.
LOP	Loss of Pointer	The controller card is unable to detect a valid pointer in the received STS-1 signal.
LOMF	Loss of Multiframe	The controller card detects loss of H4 multiframe from the network.
AIS-L	Line Alarm Indication Signal	The controller card is receiving a line alarm indication signal. Line AIS defect is detected as a “111” pattern in bits 6, 7, and 8 of the K2 byte in five consecutive frames.
AIS-P	Path Alarm Indication Signal	The controller card is receiving a path alarm indication signal. AIS-P is defined as all ones in bytes H1, H2, and H3 as well as all ones in the entire STS synchronous payload envelope.
RFI-L	Line Remote Failure Indication	The controller card is receiving a line remote failure indication. RFI-L is declared when the incoming line remote defect indication (RDI-L, “110” pattern in bits 6,7, and 8 of the K2 line overhead byte) last for 2.5 ± 0.5 seconds.
RFI-P	Path Remote Failure Indication	The controller card is receiving a path remote failure indication. RFI-P is declared when the incoming path remote defect indication (RDI-P, “1” in bit 5 of the G1 path overhead byte for 5 contiguous frames) last for 2.5 ± 0.5 seconds.
UEQ-P	Path Unequipped	The controller card detects that the path is unequipped. The path is unequipped if it is not provisioned. Byte C2 of the STS path overhead is set to zero.
SLM-P	Path Signal Label Mismatch	The controller card is detecting a signal label mismatch. A received signal label is mismatched if the received C2 byte does not indicate unequipped (0) or “VT structured payload” (2).
XCV	Excessive Code Violations	The controller is receiving excessive code violations exceeding the threshold set in the system (refer to XCV Threshold on page 3-16).
In Test		The STS-1 is going in test (applies to the Active controller card only).
JTRACE	STS receive path trace	The controller card has detected a change in the receive path trace message. The message is received in the J1 path overhead byte. This byte is used to repetitively transmit a 64 byte string so the receiving terminal in a path can verify its continued connection to the intended transmitter.

VT/Port Traps

VT/Port Alarm trap messages are sent for the reasons provided in **Table 3-4**.

Table 3-4. VT/Port Traps

Trap	Meaning	If enabled, the unit issues a trap when...
LOS	T1/E1 Loss of Signal	The unit has lost the receive signal on a T1/E1.
CAIS	Carrier Side AIS	The T1 is receiving all ones from the STS side of the network.
LAIS	Loop Side AIS	The T1 is receiving all ones from the DSX-1 interface.
XCV	T1/E1 Excessive Code Violations	The controller card is receiving excessive code violations, exceeding the threshold (refer to XCV Threshold on page 3-16).
VT-LOP	VT Path Loss of Pointer	The unit fails to find a valid VT pointer. A VT LOP defect is declared when either a valid pointer is not detected in eight consecutive VT superframes, or when eight consecutive VT superframes are detected with the NDF set to “1001” without a valid concatenation indicator. A VT LOP failure is declared when the VT LOP defect persists for 2.5 ± 0.5 seconds.
VT-AIS	VT Path Alarm Indication Signal	The unit is receiving a VT path alarm indication signal. VT-Path AIS is specified as all ones in bytes V1, V2, V3, and V4, as well as all ones in the entire VT synchronous payload envelope. A VT-Path AIS failure is declared when the VT-Path AIS defect persists for 2.5 ± 0.5 seconds.
VT-RFI	VT Path Remote Failure Indication	The unit is receiving a VT path remote failure indication. VT-RFI is declared when the incoming VT path remote defect indication (VT-RDI, “1” in bit 4 of the VT-Path Overhead byte (V5) in five contiguous frames) lasts for 2.5 ± 0.5 seconds.
VT-SLM	VT Path Signal Label Mismatch	The controller card is detecting a signal label mismatch in the VT path. A received signal label is mismatched if the VT label does not indicate “unequipped” (0) or “asynchronously mapped” (2).
VT-UEQ	VT Path Unequipped	The controller card detects that the VT path is unequipped (VT label is zero).

System Traps

System Alarm trap messages are sent for the reasons provided in **Table 3-5**.

Table 3-5. System Traps

Trap	If enabled, the unit issues a trap when...
Protection Switching	
Protection Switch	All data has been routed from the primary card to the standby card.
Card Removed	A controller card has been removed.
Card Failure	A controller card has failed.
Communication Fail	Communication between controller cards A and B has failed.
Max Switches	Max Switch Threshold is reached (Max. (Maximum) Switch Threshold on page 3-7).
System Timing	
Clock Status	There is a change in clock status. The clock status can have any of the following conditions: **NORMAL** – clock synchronization is operating normally. **RECOVERING** – clock synchronization is in process of recovering from a fault. **LOSS OF SOURCE** – the reference clock source has become invalid. **OUT OF RANGE** – the clock synchronization circuit is unable to track the reference source. **OUT OF LOCK** – the clock synchronization circuit is unable to lock to the reference source.
Clock Source Change	The unit has switched clock sources. The SNMP varbinds for this alarm trap indicate the current clock source: Loop PRI Ext SEC Ext Free-run Holdover
PRI EXT Clock Status	A failure condition is encountered on the PRImary clock source (if configured). The SNMP varbinds for this alarm trap indicate the current condition: Disabled Normal Available LOS/AIS Fail Unavailable
SEC EXT Clock Status	A failure condition is encountered on the SECondary clock source (if configured). The SNMP varbinds for this alarm trap indicate the current condition: Disabled Normal Available LOS/AIS Fail Unavailable
Activity Loss Status	The MX2800 STS-1 has detected a critical hardware failure in which a clock source has become inactive. If any clock source fails, the corresponding clock source is displayed in the status menu and a TRAP/Syslog condition is generated. If all clocks are operating normally, no indication is shown on the menu. Again, this condition is only encountered during a hard card failure and the customer should contact ADTRAN technical support if this occurs.

Power Supply Alarm Traps

Power Supply Alarm trap messages are sent for the reasons provided in **Table 3-6**.

Table 3-6. Power Supply Alarm Traps

Trap	If enabled, the unit issues a trap when...
Card Removed	The power supply card has been removed
Malfunction	The power supply card is no longer working and the unit has switched to the backup power supply or battery backup
Card Failure	The power supply card has failed
Power Low	The power supply's output level is abnormally low
Bat. Backup Active	Battery charger has lost its AC source and is now running off the battery backup
Battery Low	The battery backup has reached a critical energy point at which it may be unable to supply the unit with sufficient power to maintain operation
Temperature High	The power supply card is getting too hot
Temperature Crit	The power supply card temperature is so high that it may suffer damage

MIB II Standard Alarm Traps

MIB II Standard Alarm trap messages are sent for the reasons provided in **Table 3-7**.

Table 3-7. MIB II Standard Alarm Traps

Trap	If enabled, the unit issues a trap when...
Cold Start	The unit is first powered up
Link Up	The STS-1 is up with no alarms
Link Down	The STS-1 is in alarm
Auth. Failure	An unauthorized attempt has been made to access the unit

Read Community Name

Enter the authentication strings used for SNMP management. Match the MX2800 STS-1 to the SNMP manager for read privileges.

Write Community Name

Enter the authentication strings used for SNMP management. Match the MX2800 STS-1 to the SNMP manager for write privileges.

Trap Community Name

Enter the identification string used for trap management. This string accompanies all traps transmitted by the MX2800 STS-1.

System Security

User Account Management

This option is used to enter up to 15 user accounts. Each user account is assigned a username, password, and privilege level. Usernames and passwords are not case sensitive but must be 12 characters or less. Each user account is assigned a privilege level which provides limitation of access to the MX2800 options and controls. The four privilege levels are listed below.

Guest

Read-only privilege level allows the display of most menu items on the console interface. A limited number of TL1 commands can be performed; however, none of these can alter the product configuration.

Interface

Write-access privilege level allows the configuration of items related to the network interface and T1/E1 interface, but does not allow initiation of loopbacks or view and/or alteration of system-level items such as LAN configurables.

Test

Write-access privilege level allows configuration of the network interface and T1/E1 interface, plus initiation of loopbacks. View and/or alteration of system-level items such as LAN configurables, etc. is not permitted.

Admin

With Admin privilege level, all menu items can be viewed and/or altered. This is the only level that allows alteration of the User Account Management information.

User accounts provide access to the MX2800 for console interface sessions and TL1 sessions. **Table 3-8** provides a summary of privileges.

NOTE

The Load Default Settings menu item that is located on the Configuration/Utilities menu resets the User Account Management table back to a single default account **adtran/adtran/admin**.

Table 3-8. Console Menu User Privileges

Console Menu Item	X indicates a Privilege level under which an item may be altered			
	Guest	Interface	Test	Admin
Status Menu				
Detailed VT/Port Status	X	X	X	X
Acknowledge alarms		X	X	X
Statistics Menus				
Clear statistics (for all Statistics menus)		X	X	X
Alarm Log Menus				
Reset alarm log		X	X	X
Configuration – Network Interface Menu				
STS-1 Configuration				
Line length		X	X	X
Timing		X	X	X
XCV threshold		X	X	X
VT Mode		X	X	X
Protection Configuration				
Active controller		X	X	X
Network protection		X	X	X
Max switch threshold		X	X	X
Min switching period		X	X	X
Miscellaneous				
Loopback time out		X	X	X
Shutdown standby controller		X	X	X
Reset standby controller		X	X	X
External Clock Configuration				
PRI Ext. Clock		X	X	X
SEC Ext. Clock		X	X	X

Table 3-8. Console Menu User Privileges (Continued)

Console Menu Item	X indicates a Privilege level under which an item may be altered			
	Guest	Interface	Test	Admin
VT1 Interface Menu				
Single Channels				
VT Mapping		X	X	X
T1 State		X	X	X
T1 Coding		X	X	X
T1 Line Length		X	X	X
T1 Remote Loopback		X	X	X
T1 Circuit Protection		X	X	X
Hairpin Loopback		X	X	X
Line ID		X	X	X
Cross Connect Mapping		X	X	X
XCV Threshold		X	X	X
System Management Menu				
Local IP address				X
Gateway IP address				X
Subnet mask				X
Modem remote IP address (L1)				X
Management port				X
Dial-up Option menu (L1)				X
SNMP Management Options				
Trap IP Addresses menu				X
Trap Generation menu				X
READ Community Name				X
WRITE Community Name				X
TRAP Community Name				X

Table 3-8. Console Menu User Privileges (Continued)

Console Menu Item	X indicates a Privilege level under which an item may be altered			
	Guest	Interface	Test	Admin
User Account Management Menu				
Terminal Timeout				X
IP Security				X
IP hosts menu				X
Date				X
Time				X
Alarm Relay Configuration				X
Equipment ID menu				X
Syslog Setup menu				X
Auto-save		X	X	X
Craft baud rate		X	X	X
Utilities Menu				
Load default settings				X
Update flash software				X
Configuration transfer				X
System reset				X
Save Configuration & Alarm Log	X	X	X	X
Loopback Menu				
Activating/Deactivating Loopbacks			X	X
Clear BERR			X	X
Insert Error			X	X
Reset all tests			X	X
Logout	X	X	X	X

Terminal Timeout

Set the amount of time the terminal or Telnet session remains inactive before automatically closing the session, requiring the a new login. The options include Disabled, 1 min., 5 min., 15 min., 60 min., or 1 day.

IP Security

Enable or disable the IP Security option. If Enabled, the unit accepts management commands and Telnet sessions from the IP addresses entered into the IP Hosts fields.

IP Hosts

Enter up to 16 IP addresses of management stations from which the unit should accept management commands. These addresses are only applicable if IP Security is Enabled.

Date and Time

Enter date and time information. Enter the month, date, and year separated by forward slashes (02/23/00). Enter the time in military format separated by colons (13:15:25).

Miscellaneous

Categories available in the Miscellaneous subsection include the following:

- Alarm Relay Configuration on page 3-31
- Equipment Identification on page 3-35
- Syslog Setup on page 3-36
- Auto Save on page 3-36
- Craft baud rate on page 3-36

Alarm Relay Configuration

This screen enables alarm relay response for specific error conditions (**Figure 3-13**). The following charts describe the alarm conditions found in each menu. Conditions marked in the charts with an asterisk (*) sound the critical alarm when enabled. All other conditions sound the non-critical alarm.

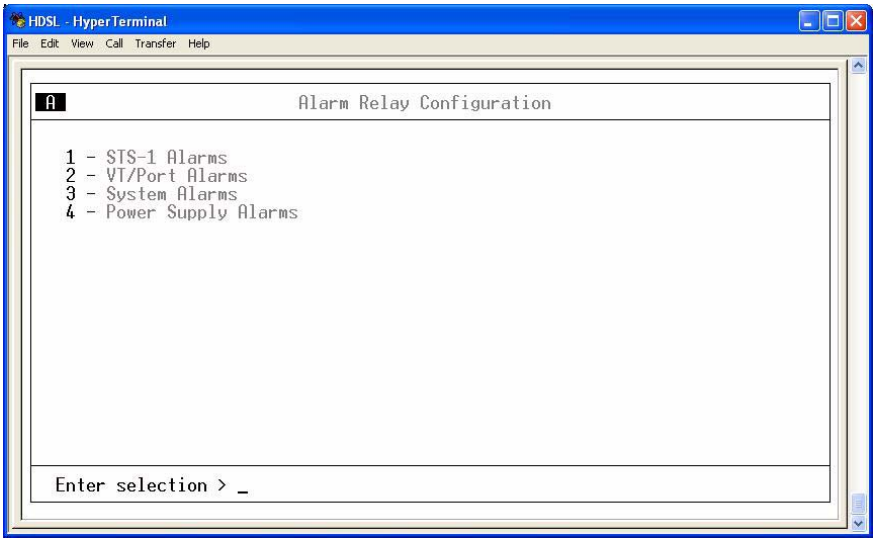

Figure 3-13. Alarm Relay Configuration Menu

As shown on the Alarm Relay Configuration Menu (), available options include the following:

- STS-1 Alarms on page 3-32
- VT/Port Alarms on page 3-33
- System Alarms on page 3-34
- Power Supply Alarms on page 3-35

STS-1 Alarms

Table 3-9 describes the STS-1 Alarm indications.

Table 3-9. STS-1 Alarm Descriptions

Alarm	Meaning	Description
LOS*	Loss of Signal	The unit has lost the network receive signal.
LOF*	Loss of Framing	The unit detects a framing loss from the network.
LOP*	Loss of Pointer	The unit is unable to detect a valid pointer in the receive signal.
LOMF*	Loss of Multiframe	The unit detects loss of H4 multiframe from the network.
AIS-L*	Line Alarm Indication Signal	The unit is receiving a line alarm indication signal. The Section Terminating Equipment generates AIS-L after detecting LOS or LOF.
AIS-P*	Path Alarm Indication Signal	The unit is receiving a path alarm indication signal. AIS-P is defined as all ones in bytes H1, H2, and H3 as well as all ones in the entire STS synchronous payload envelope.
RFI-L*	Line Remote Failure Indication	The unit is receiving a line remote failure indication. RFI-L is declared when the incoming line remote defect indication (RDI-L, “110” pattern in bits 6, 7, and 8 of the K2 line overhead byte) lasts for 2.5 ± 0.5 seconds.
RFI-P*	Path Remote Failure Indication	The unit is receiving a path remote failure indication. RFI-P is declared when the incoming path remote defect indication (RDI-P, “1” in bit 5 of the G1 path overhead byte for contiguous frames) lasts for 2.5 ± 0.5 seconds.
SLM-P*	Path Signal Level Mismatch	A received signal label is mismatched if the received C2 byte does not indicate unequipped (0) or “VT structured payload” (2).
UEQ-P*	Path Unequipped	The path is unequipped if it is not provisioned. Byte C2 of the STS path overhead is set to zero.
TLOS*	Transmit Loss of Signal	The transmitter has failed.

*Critical Alarm

VT/Port Alarms

Table 3-10 describes the VT/Port alarm indications.

NOTE

VT/Port alarms are cleared when the VT/Port is disabled or set to Auto Enable after receiving an alarm.

Table 3-10. VT/Port Alarm Descriptions

Alarm	Meaning	Description
LOS	T1/E1 Loss of Signal	The unit has lost the receive signal on a T1/E1.
CAIS	Carrier Side AIS	The T1 is receiving all ones from the STS side of the network.
LAIS	Loop Side AIS	The T1 is receiving all ones from the DSX-1 interface.
XCV	T1/E1 Excessive Code Violations	The controller card is receiving excessive code violations, exceeding the threshold (refer to XCV Threshold on page 3-16).
VT-LOP	VT Path Loss of Pointer	A VT LOP defect is declared when either a valid pointer is not detected in eight consecutive VT superframes, or when eight consecutive VT superframes are detected with the NDF set to “1001” without a valid concatenation indicator. A VT LOP failure is declared when the VT LOP defect persists for 2.5 ± 0.5 seconds.
VT-AIS	VT Path Alarm Indication Signal	The unit is receiving a VT path alarm indication signal. VT-Path AIS is specified as all ones in bytes V1, V2, V3, and V4, as well as all ones in the entire VT synchronous payload envelope. A VT-Path AIS failure is declared when the VT-Path AIS defect persists for 2.5 ± 0.5 seconds.
VT-RFI	VT Path Remote Failure Indication	The unit is receiving a VT path remote failure indication. VT-RFI is declared when the incoming VT path remote defect indication (VT-RDI, “1” in bit 4 of the VT-Path Overhead byte (V5) in five contiguous frames) lasts for 2.5 ± 0.5 seconds.
VT-SLM	VT Path Signal Label Mismatch	A received signal label is mismatched if the VT label does not indicate “unequipped” (0) or “asynchronously mapped” (2).
VT-UEQ	VT Path Unequipped	The received VT signal label is zero.

System Alarms

Table 3-11 describes System Alarm indications.

Table 3-11. System Alarm Descriptions

Alarm	Description
Protection Switching	
Card Failure	A controller card has failed.
Protection Switch	All data has been routed from the primary card to the standby card.
Communication Fail	Communication between controller cards A and B has failed.
System Timing	
Clock Status*	When enabled, an abnormal clock status condition causes the CRITICAL relay to be thrown.The alarm remains active until the condition clears or the alarm is acknowledged.
PRI EXT Clock Status*	When enabled, a fault condition (LOS/AIS or FAIL) on the PRImary external clock causes the CRITICAL relay to be thrown. The alarm remains active until the condition clears or the alarm is acknowledged.
SEC EXT Clock Status*	When enabled, a fault condition (LOS/AIS or FAIL) on the SEConday external clock causes the CRITICAL relay to be thrown. The alarm remains active until the condition clears or the alarm is acknowledged.
Activity Loss Status*	When enabled, the CRITICAL relay is thrown if the Activity Loss Status indicates the failure of an internal clock. The alarm remains active until the condition clears or the alarm is acknowledged.

* Critical Alarm

Power Supply Alarms

Table 3-12 describes power supply alarm indications.

Table 3-12. Power Supply Alarm Descriptions

Alarm	Description
Malfunction	Power supply card is no longer working. The unit has switched to the backup power supply or battery backup.
Power Low	Power supply output level is abnormally low.
Power Fail	Power supply input power is lost.
Battery Backup Active	Battery charger has lost its AC source and is now running off the battery backup.
Battery Low	Battery backup has reached a critical energy point at which it may be unable to supply the unit with sufficient power to maintain operation.
Temperature High	Power supply card temperature is above normal.
Temperature Critical	Power supply card temperature is so high that it may suffer damage.
Fan Failure	Fan has failed.

Equipment Identification

These fields allows information to be stored that identifies the unit.

- Unit ID

  The Unit ID field allows entry of a text string for a unique name for the MX2800 STS-1 to help distinguish this installation from others. Enter up to 31 alpha-numeric characters in this field, including spaces and special characters (such as an underbar). This information is locally stored and displayed in the upper right-hand corner of the MX2800 STS-1 terminal screens.

- STS-1 J1 Path Trace

  Tx – 62 byte string to be transmitted in the J1 Path Trace (CR/LF are automatically appended to the string).
  Rx – 62 byte string received in the J1 Path Trace.

Syslog Setup

Selections include Transmission, Host IP Address, Severity Level, and Host Facility.

- Transmission

  The options available allow enabling or disabling the transmission of log events to the external Syslog server. The host IP address must first be defined.

- Host IP Address

  This field specifies the IP address of the external server that is running the Syslog host daemon.

- Severity Level

  This field specifies the lowest level of severity that causes messages to be logged to the Syslog server. The levels are listed in **Table 3-13**, in order of decreasing severity. Any message at or above a selected severity level is logged if a transmission is enabled.

Table 3-13. Syslog Severity Levels

Level	Description
Emergency	The system is unusable
Alert	An action must be taken immediately
Critical	Shows critical conditions
Error	Shows error conditions
Warning	Shows warning conditions
Notice	Shows normal, but significant, conditions
Info	Shows informational messages
Debug	Shows a debug-level message

- Host Facility

  Specifies the facility destination of log events. Facilities are located on the host and are managed by the Syslog host daemon running on either a UNIX machine or a PC. Options include Local 0-7.

Auto Save

Enable this function to save the configuration and alarm log every minute (if changed) and upon logout. Disable this option if the configuration and alarm log are not to be saved automatically. The configuration and alarm log may be saved manually from the configuration menu.

Craft baud rate

The front panel Craft port can be set for the following data rate:

Auto (default), 9600, 19200, 38400, 57600

4. UTILITIES

The Utilities menu (**Figure 3-14**) displays the MX2800 STS-1 system information for both controller cards. It includes self-test results and provides the ability to perform the following functions from the menu:

- Load Default Settings on page 3-38
- Update FLASH Software on page 3-39
- Configuration Transfer on page 3-41
- System Reset on page 3-42

Possible results for the self-test are provided in **Table 3-14**.

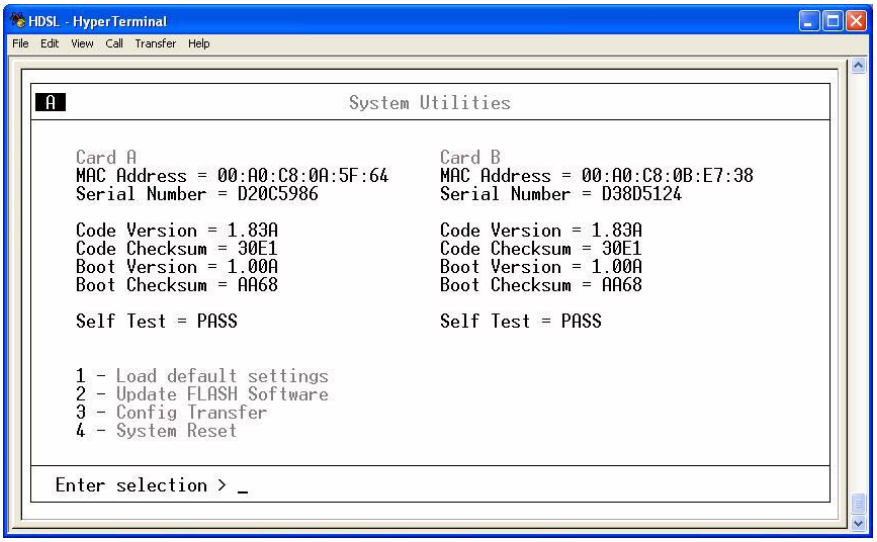

Figure 3-14. System Utilities Menu

Table 3-14. Self-Test Results

If the self test results are...	Then...
PASS	The self-test was successful and the unit is ready to use.
BAD RAM DATA BAD RAM ADDRESS BAD CODE CHECKSUM BAD BOOT SECTOR IOX PROGRAM FAILURE AFE PROGRAM FAILURE MODEM FAILURE ETHERNET FAILURE STS-1 FAILURE DSX FAILURE	Contact ADTRAN Technical Support.
CONFIGURATION CORRUPT	Select **SAVE CONFIGURATION** from the main **CONFIGURATION** menu. If condition persists, contact ADTRAN Technical Support.

Load Default Settings

Select Load Default Settings from the Utilities menu. The screen displays the following message:

!WARNING! Defaulting configuration will disrupt traffic on all ports.

Select Confirm to proceed or press Esc to abort.

NOTE

The IP Address, Default Gateway, and subnet mask are not reset when default settings are loaded.

NOTE

Loading the default settings resets the User Account Management table to a single default account **adtran/adtran/admin**.

Update FLASH Software

Select Update Flash Software from the Utilities menu to update software using either XMODEM protocol or Trivial File Transfer Protocol (TFTP):

NOTE

Before beginning update of FLASH software, ADTRAN recommends disabling the Auto Save feature (from the System Management menu).

Update Via XMODEM

Updating the FLASH Software via XMODEM requires that a VT100 terminal menu session be active through the MX2800 craft port. To update the software via XMODEM, follow the steps below:

1. From the MX2800 Main Menu, select Configuration, select Utilities, select Update FLASH Software, select Update via XMODEM.
2. Once it has been determined where the new binary file is located, select Start to begin the transfer.
3. Once Start has been selected, start the XMODEM transfer from the terminal menu program that is being used by selecting or typing the file path for the location of the new binary file. Refer to the appropriate documentation for the terminal emulator to begin XMODEM transfer.
4. After selecting the binary file, the XMODEM transfer begins. To cancel a transfer in progress, press Ctrl+X three times. The **ACT** LED on the active card is solid amber for the duration of XMODEM transfer. The **ACT** LED on the standby card is flashing green.
5. If updating a unit with redundant controller cards, the active controller begins uploading the new code to the standby controller after the XMODEM transfer has completed and the unit has successfully loaded and programmed the new software into its FLASH memory. If the unit does not have redundant controller cards, go to step 7.
6. While the standby card is having code uploaded, the **ACT** LED on the standby card is solid amber. After the code has finished uploading to the standby card, the card resets and begins running the new code.

CAUTION

The standby card must remain in place until the upload process is complete and the **ACT** LED is no longer solid amber and returns to flashing green. Removing the standby card during the uploading process corrupts the software.

7. The system must be manually reset after downloading new software for the active controller card to begin running the new code. From the Utilities menu, select System Reset, and then select either Immediate Reset to immediately reset the system or Schedule Reset Time to set a time for the system to reset. Once the system has been reset, the new software is active.

NOTE

This function is available only when updating the software through the CRAFT port.

Update via TFTP Server

Updating the FLASH Software via TFTP Server requires that the IP address and file name of the file to be downloaded is known. To update the software via TFTP, follow the steps below:

1. Select Update via TFTP Server from the Utilities menu. A new menu displays allowing the entry of the IP address and the filename of the file to be downloaded to the unit. Once this information is entered, select Start/Stop Transfer.
2. The TFTP transfer begins. The **ACT** LED on the active card is solid amber for the duration of TFTP transfer. The **ACT** LED on the standby card is flashing green.

NOTE

To cancel a transfer in progress, press Ctrl-x three times.

3. When a unit with redundant controller cards is to be updated, the active controller uploads the new code to the standby controller after the XMODEM transfer has completed and the unit has successfully loaded and programmed the new software into its FLASH memory. If the unit does not have redundant controller cards, go to step 5.
4. While the standby card is uploaded, the **ACT** LED on the standby card is solid amber. After the upload is complete on the standby card, the card resets and begins running the new code.

CAUTION

The standby card must remain in place until the upload process is complete and the **ACT** LED is no longer solid amber. Removing the standby card during the uploading process corrupts the software.

5. The system must be manually reset after downloading new software for the active controller card to begin running the new code. From the Utilities menu, select System Reset, and then select either Immediate Reset to immediately reset the system or Schedule Reset Time to set a time for the system to reset. Once the system has been reset, the new software is active.

Configuration Transfer

Select Config Transfer from the Utilities menu to transfer files to and from a TFTP server. The Config Transfer option can save the MX2800 STS-1 configuration as a backup file and use the same configuration with multiple MX2800 STS-1 units. Only one configuration transfer session (upload or download) can be active at a time.

NOTE

Before using Config Transfer, the MX2800 STS-1 should have a valid IP address, subnet mask, and default gateway (if required), and should be connected to an Ethernet network.

CAUTION

Configuration changes are not implemented until all Telnet sessions are closed. Loading a new configuration may disrupt data traffic.

Retrieving from a TFTP Server

To retrieve current configuration information from a TFTP server, follow the steps listed below.

1. Set the Server IP Address field to the IP address of the machine running the TFTP server program.

   When using the ADTRAN TFTP server, the IP address displays in the Server IP Address field. For other TFTP servers, refer to the appropriate documentation.

2. Change the TFTP Server File Name to a unique filename. Include the complete path. This will be the name of the configuration file retrieved from the remote server.
3. Select Load and Use Config.

Saving to a TFTP Server

To save current configuration information to a TFTP server, follow the steps listed below.

1. Set the Server IP Address field to the IP address of the machine running the TFTP server program.

   When using the ADTRAN TFTP server, the IP address displays in the Server IP Address field. For other TFTP servers, refer to the appropriate documentation.

2. Change the TFTP Server Filename to a unique filename. This will be the name of the configuration file saved to the remote server. Use the file naming conventions for the Operating System on the server. (For example, a TFTP server running on a PC under Windows 3.1 may only permit 8.3 format filenames (8 characters, period, and three extension characters).
3. Select Save Config Remotely.

System Reset

The system must be manually reset after downloading new software. When the unit has successfully loaded and programmed the new software into its FLASH memory, it uploads the code to the standby controller that is indicated on the menu. The **STATUS** LED on the standby controller displays solid yellow during this process.

CAUTION

The standby card must remain in place until the process is complete and the **STATUS** LED is no longer solid yellow. Removing the standby card during the uploading process corrupts the software.

Once the upload is complete, the standby card resets and begins running the new code. However, the active card does not reset automatically. The unit must be reset using either of these options, as required:

- Immediate Reset
- Scheduled Reset Time

5. SAVE CONFIGURATION AND ALARM LOG

The Save Configuration option writes the current configuration and alarm log changes to nonvolatile memory. If this option is not selected after making changes to the configuration and the Auto Save feature is disabled, the system reverts to its previous configuration when power cycled.

When the Save option is executed, the success or failure response is momentarily displayed at the bottom of the screen, as shown in **Figure 3-15**.

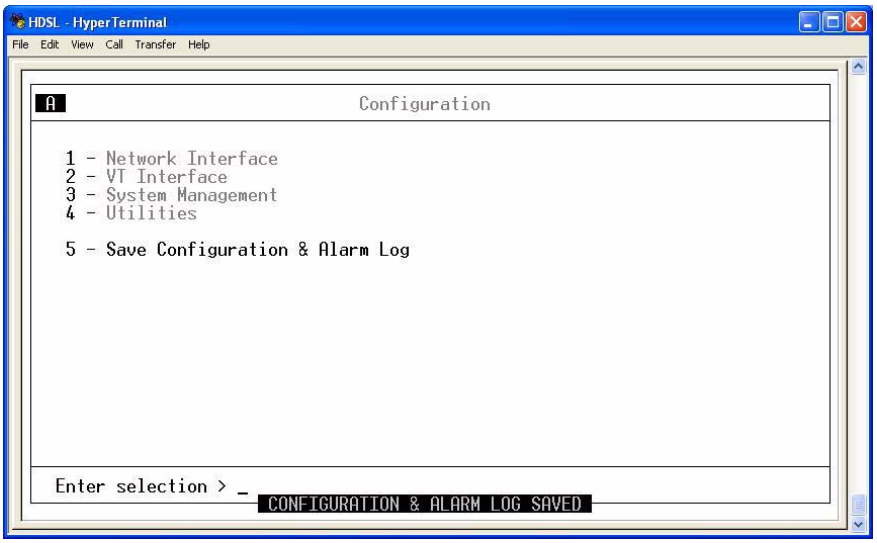

Figure 3-15. Indication of a Saved Configuration and Alarm Log

Section 4
Status

View MX2800 STS-1 status information by selecting Status from the Main Menu. The Status screen is illustrated in **Figure 4-1**.

The Status screen provides information in the following areas:

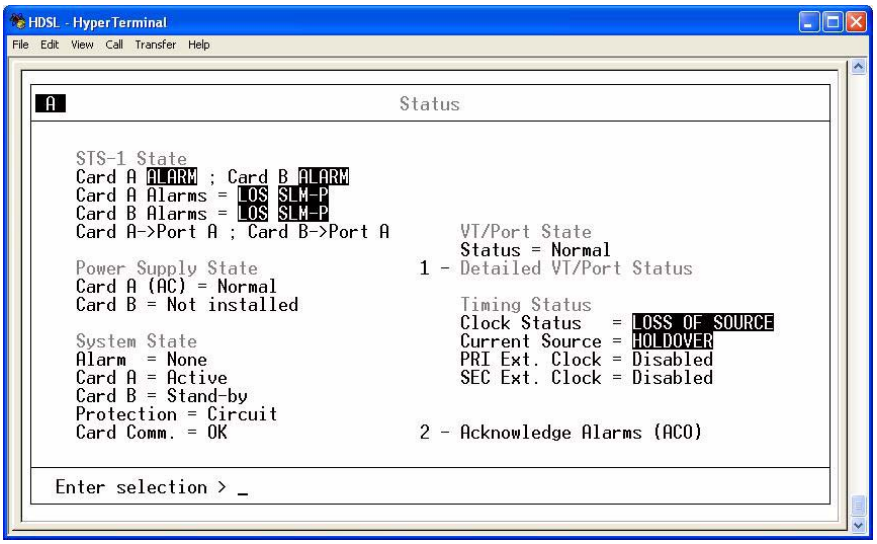

Figure 4-1. Status Menu

1. STS-1 STATE

These fields display the current state of the STS-1. The following sections describe the STS-1 status fields in detail.

Card A and Card B State

These fields display the current condition of the network. Possible conditions are listed in **Table 4-1**.

Table 4-1. STS-1 Card A/Card B

Condition	Description
Normal	The MX2800 STS-1 is ready to pass data.
Alarm	The unit is currently receiving an alarm indication.
In Test	The unit is currently in test mode.

Card A/Card B Alarms

These fields display the current alarm condition of the MX2800 STS-1. Possible conditions and their descriptions are provided in **Table 4-2**.

Table 4-2. STS-1 Alarm Descriptions

Alarm	Meaning	Description
LOS*	Loss of Signal	The unit has lost the network receive signal.
LOF*	Loss of Framing	The unit detects a framing loss from the network.
LOP*	Loss of Pointer	The unit is unable to detect a valid pointer in the receive signal.
LOMF*	Loss of Multiframe	The unit detects loss of H4 multiframe from the network.
AIS-L*	Line Alarm Indication Signal	The unit is receiving a line alarm indication signal. The Section Terminating Equipment generates AIS-L after detecting LOS or LOF.
AIS-P*	Path Alarm Indication Signal	The unit is receiving a path alarm indication signal. AIS-P is defined as all ones in bytes H1, H2, and H3 as well as all ones in the entire STS synchronous payload envelope.
RFI-L	Line Remote Failure Indication	The unit is receiving a line remote failure indication. RFI-L is declared when the incoming line remote defect indication (RDI-L, “110” pattern in bits 6, 7, and 8 of the K2 line overhead byte) lasts for 2.5 ± 0.5 seconds.
RFI-P	Path Remote Failure Indication	The unit is receiving a path remote failure indication. RFI-P is declared when the incoming path remote defect indication (RDI-P, “1” in bit 5 of the G1 path overhead byte for contiguous frames) lasts for 2.5 ± 0.5 seconds.

Table 4-2. STS-1 Alarm Descriptions (Continued)

Alarm	Meaning	Description
SLM-P	Path Signal Level Mismatch	The controller card is detecting a signal label mismatch. A received signal label is mismatched if the received C2 byte does not indicate unequipped (0) or “VT structured payload” (2).
UEQ-P	Path Unequipped	The path is unequipped if it is not provisioned. Byte C2 of the STS path overhead is set to zero.

*Critical Alarm

Network Port Mapping

This entry contains a description of the mapping between network ports and controller cards.

A redundant system with circuit protection will display the following:

Card A ⟶ Port A | Card B ⟶ Port A

A redundant system with network protection will display the following:

Card A ⟶ Port A | Card B ⟶ Port B

OR

Card A ⟶ Port B | Card B ⟶ Port A

2. POWER SUPPLY STATE

These fields indicate which types of power supplies are installed (AC or DC) in Card A and Card B and provides their current state, as shown in **Table 4-3**.

Table 4-3. Power Supply State

Condition	Description
Normal	The power supply is fully operational.
Error	The controller card cannot communicate with the power supply.
Power Low	The power supply output level is abnormally low.
Power Fail	The power supply input power is lost.
Charger Fail	The battery backup charger has failed or has lost its AC connection.
Battery Low	The battery backup has reached a critical energy point at which it may be unable to supply the unit with sufficient power to maintain operation.
Temp High	The power supply card temperature is abnormally high.
Temp Critical	The power supply card temperature is so high that shut-off is imminent.

3. SYSTEM STATE

The system state fields display information regarding the two controller cards. The following sections describe these fields in detail.

Alarm

This field displays any system alarm currently recognized by the unit. The condition is displayed until it clears, with the exception of the Switched condition (which must be cleared manually) and the Excessive Switches (cleared when Protection Switch alarm counts are cleared - refer to Protection Switch Statistics on page 5-13).

To clear the Switched condition, select Acknowledge Alarms (ACO) or push the ACO button on the front panel (refer to ACO Buttons on page 2-13; Acknowledge Alarms (ACO) *on page 4-8*). Possible alarm types are listed in **Table 4-4**.

Table 4-4. System Alarms

Condition	Description
Supply Failure	A power supply card has failed.
Card Failure	A controller card is not passing data.
Excessive Switches	The Max Switching Threshold has been exceeded. Refer to Max. (Maximum) Switch Threshold on page 3-7.
Switched	A card switch has occurred.

Card A/Card B

These fields display the current state of the two controller cards. Possible states for the controller cards are listed in **Table 4-5**.

Table 4-5. Card A/B State

Condition	Description
Not Installed	No controller card is installed in this slot.
Stand By	The controller card is ready to pass data, but is currently acting as a backup card.
Active	The controller card is acting as the primary card.
Failure	The controller card has failed and needs to be replaced.

Protection

This field lists the type of protection mode currently active. Possible states are listed in **Table 4-6**.

Table 4-6. Protection States

Condition	Description
Network	Both controller cards are installed and everything is functioning properly. The unit is in full Network Protection Mode.
Circuit	The unit is in Circuit Protection Mode and everything is functioning properly, or the unit is in Network Protection Mode and a failure on the network has occurred.
None	One controller card is installed, or the unit is in Circuit Protection Mode and the secondary card has failed.

NOTE

For more information on the different types of Protection Modes, Refer to *Section 7, Circuit Redundancy*.

Card Comm

This field displays the current state of the communication link between the two controller cards.

- OK indicates that the cards are communicating
- Failure indicates that the cards are not able to communicate with each other
- Non-Redundant is displayed if there is only one card installed

4. VT/PORT STATE

This field displays the current alarm condition of the VTs/ports. Possible conditions are given in **Table 4-7**.

Table 4-7. VT/Port State

Alarm	Meaning	Description
OFF		VT is unequipped and T1/E1 port is disabled.
OK		VT/Port is in a normal state.
LOS	T1/E1 Loss of Signal	The unit has lost the receive signal on a T1/E1.
CAIS	Carrier AIS	The T1 is receiving all ones from the STS side of the network.
LAIS	Loop Side AIS	The T1 is receiving all ones from the DSX-1 interface.
XCV	T1/E1 Excessive Code Violations	The controller card is receiving excessive code violations, exceeding the threshold set by the user (Refer to XCV Threshold on page 3-16).
VT-LOP	VT Path Loss of Pointer	A VT-LOP defect is declared when either a valid pointer is not detected in eight consecutive VT superframes, or when eight consecutive VT superframes are detected with NDF set to “1001” without a valid concatenation indicator. A VT-LOP failure is declared when the VT-LOP defect persists for 2.5 ± 0.5 seconds.
VT-AIS	VT Path Alarm Indication Signal	The unit is receiving a VT path alarm indication signal. VT-Path AIS is specified as all ones in bytes V1, V2, V3, and V4, as well as all ones in the entire VT synchronous payload envelope. A VT-Path AIS failure is declared when the VT-Path AIS defect persists for 2.5 ± 0.5 seconds.
VT-RFI	VT Path Remote Failure Indication	Unit is receiving a VT path remote failure indication. VT-RFI is declared when the incoming VT path remote defect indication (VT-RDI, “1” in bit 4 of the VT-Path Overhead byte (V5) in five contiguous frames) lasts for 2.5 ± 0.5 seconds.
VT-SLM	VT Path Signal Label Mismatch	The controller card is detecting a signal label mismatch in the VT path. A received signal label is mismatched if the VT label does not indicate “unequipped” (0) or “asynchronously mapped” (2).
VT-UEQ	VT Path Unequipped	The controller card detects that the VT path is unequipped (VT label is zero).
TST		The VT/Port is in test mode.

5. TIMING STATUS

The following entries describe the state of the STS-1 transmit timing subsystem. Information includes the following:

- Status of the selected reference clock(s)
- Availability and status of the external clock sources
- Timing acquisition status
- Internal clock failures.

Clock Status

This entry describes the condition of the clock synchronization circuitry. The clock status can be any of the following values shown in **Table 4-8**.

Table 4-8. Clock Status

Condition	Description
Normal	Clock synchronization is operating normally.
Recovering	Clock synchronization is in the process of recovering from a fault.
Loss of Source	The reference clock source has become invalid.
Out of Range	The clock synchronization circuit is unable to track the reference source.
Out of Lock	The clock synchronization circuit is unable to lock to the reference source.

Current Source

This entry indicates the source of the clock. The values for the clock source are provided in **Table 4-9**.

Table 4-9. Clock Source

Condition	Description
Loop	Timing is currently being derived from the STS-1 receive signal.
PRI Ext	Timing is currently being derived from the source assigned to the primary external clock source.
SEC Ext	Timing is currently being derived from the source assigned to the secondary external clock source.
Free-run	Transmit timing is currently being derived from an internal ±20 ppm (Stratum 4) SONET minimum clock source.
Holdover	A failure in the selected clock source has occurred and the unit has entered hold-over mode. In this mode, the last known good clock reference frequency will be held within 4.1 ppm for a minimum of 24 hours.

PRI Ext. Clock

The PRI EXT Clock alarms indicate when a failure condition is encountered on the PRImary clock source (if configured). The possible values for this alarm are provided in **Table 4-10**.

Table 4-10. PRI External Clock Alarms

Condition	Description
Disabled	The selected clock has been disabled by the user and will not be used.
Normal	The clock source is currently being used as the timing reference.
Available	The clock source is available to be used as a timing source if a failure of the current source occurs.
LOS/AIS	The clock source is not valid due to an LOS or AIS condition.
Fail	An internal hardware failure on the unit prevents the clock source from being used.
Unavailable	The user has specified a T1/E1 port to be used as an external clock source, but the port has not been enabled.

SEC Ext. Clock

The SEC EXT Clock alarms indicate when a failure condition is encountered on the SECondary clock source (if configured). The possible values for this alarm are provided in **Table 4-11**.

Table 4-11. SEC External Clock Alarms

Condition	Description
Disabled	The selected clock has been disabled by the user and will not be used.
Normal	The clock source is currently being used as the timing reference.
Available	The clock source is available to be used as a timing source if a failure of the current source occurs.
LOS/AIS	The clock source is not valid due to an LOS or AIS condition.
Fail	An internal hardware failure on the unit prevents the clock source from being used.
Unavailable	A T1/E1 port is specified to be used as an external clock source, but the port has not been enabled.

6. ACKNOWLEDGE ALARMS (ACO)

This selection allows an active alarm to be acknowledged, which results in the deactivation of the alarm relays and an indication of the acknowledgment by the alarm (**ALM**) LED. It is the software equivalent of the ACO button (described in the section ACO Buttons on page 2-13).

Section 5
Statistics

To access the Statistics menu, select Statistics from the Main Menu. See **Figure 5-1**. Alarm information and performance parameters are available for both the near and far ends of the network. Information is also given for the individual VTs and T1/E1 lines.

Statistical information is given in screens based on these time periods:

- The current 15-minute interval
- A 24-hour history (divided into 96 15-minute intervals)
- The totals for the previous 24 hours
- A cumulative alarm count (this count continues indefinitely until reset by the user)

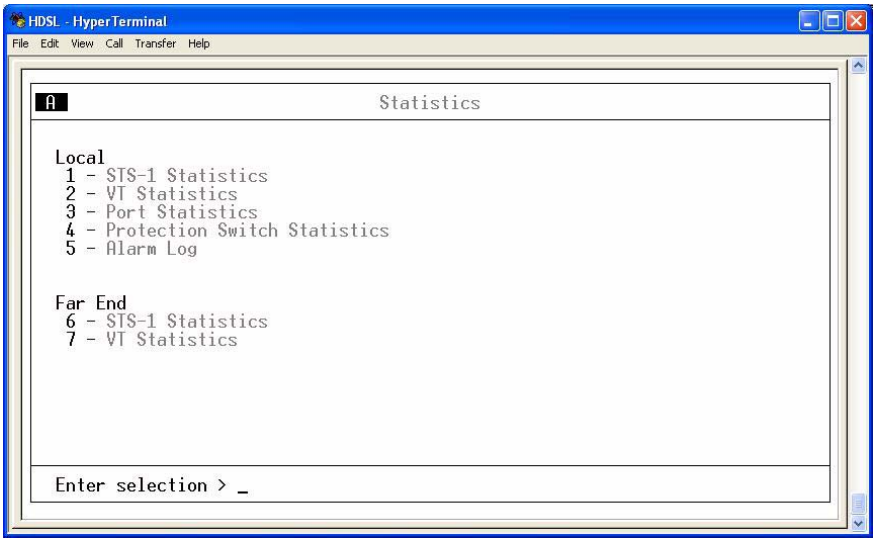

Figure 5-1. Statistics Menu

Local Statistics

Alarm and performance monitoring statistics are available on the local (near-end) STS-1 unit as follows:

Navigation

The screen will provide a prompt indicating that more information is available than that shown on the current screen:

- When a > or < symbol appears in an upper corner of the screen, use the left or right arrow keys on the keyboard to scroll left or right to view additional information.
- When DOWN or UP in reverse video appears in the lower/upper right corner of the screen use the down or up arrow keys to scroll between pages.

Figure 5-2 shows an example of these screen navigation prompts.

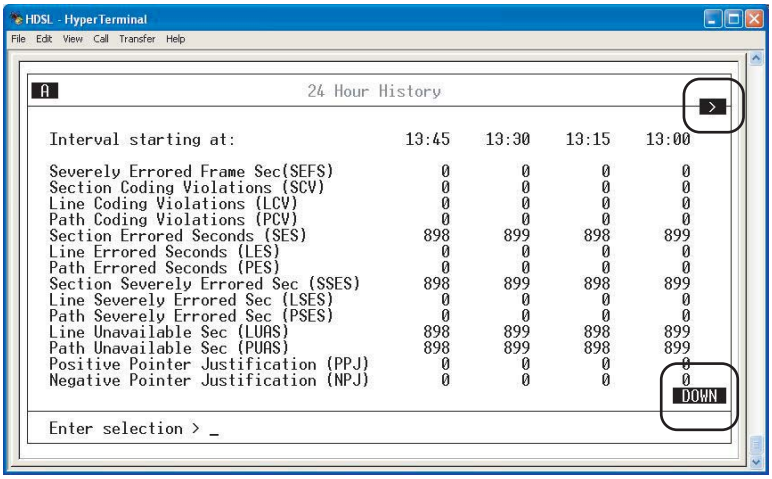

Figure 5-2. Navigation Aids

1. STS-1 STATISTICS

This menu provides submenus for alarm history and performance parameters (see **Figure 5-3**).

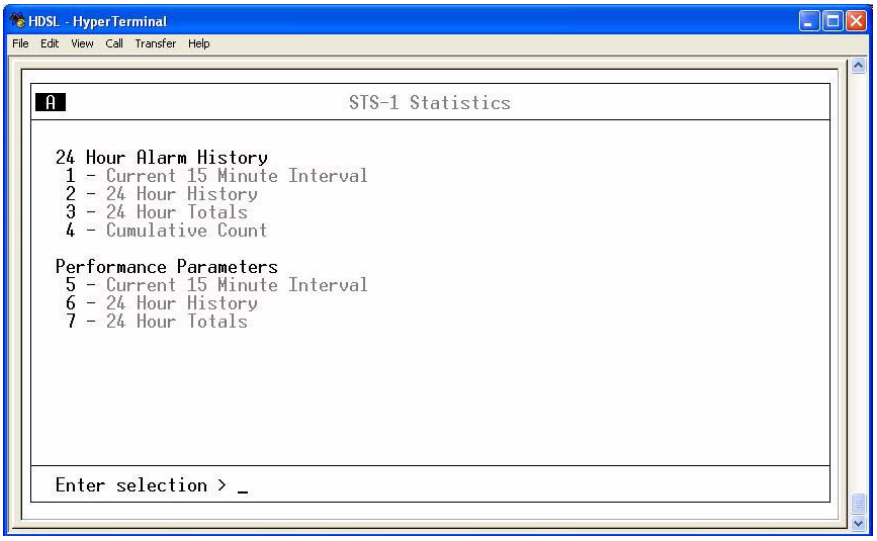

Figure 5-3. Local STS-1 Statistics Menu

The STS-1 Statistics menu is divided into two sections which provide the following information:

Alarm History

The MX2800 STS-1 keeps track of STS-1 alarms for both the near and far ends of the network. View alarm history information in one of the three time period selections, or view a cumulative alarm count. Information in these fields is for the given time period since the last reset. The cumulative alarm count continues indefinitely until Clear All STS-1 Alarm Counts is selected. **Figure 5-4** and **Figure 5-5** show examples of alarm screens.

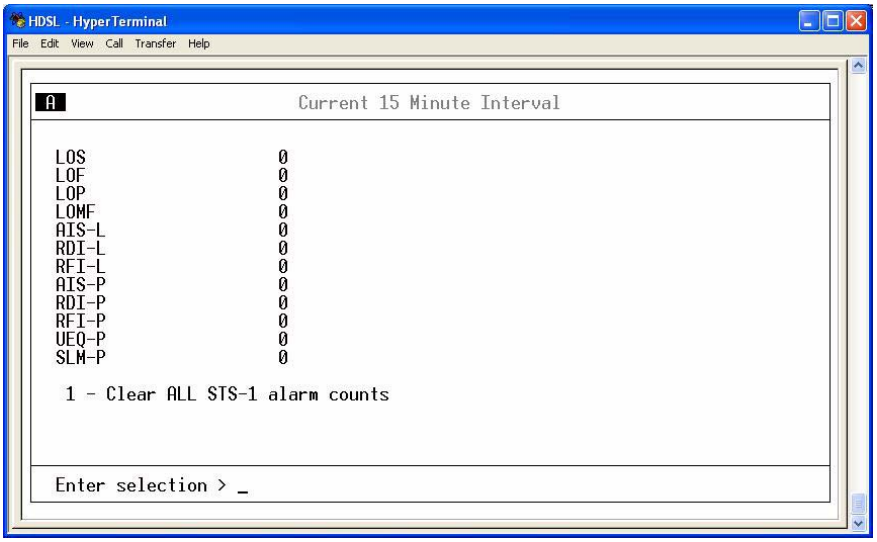

Figure 5-4. Local STS-1 Current Alarm Count Screen

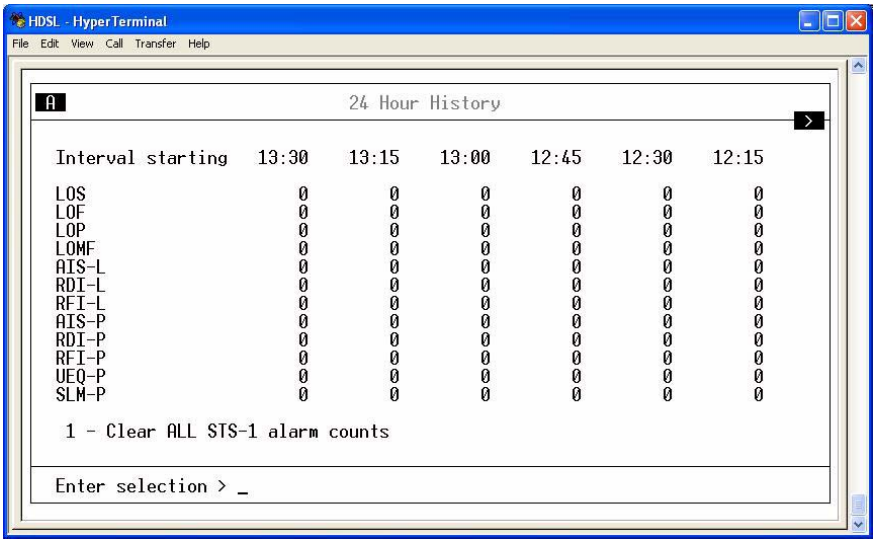

Figure 5-5. Local STS-1 24-Hour Alarm History Screen

Table 5-1 describes the alarm counts provided in this history screen.

Table 5-1. STS-1 Alarm Count Descriptions

Condition	Meaning	Description
LOS	Loss of Signal	The unit has lost the network receive signal.
LOF	Loss of Framing	The unit detects a framing loss from the network.
LOP	Loss of Pointer	The unit is unable to detect a valid pointer in the receive signal.
LOMF	Loss of Multiframe	The unit detects loss of H4 multiframe from the network.
AIS-L	Line Alarm Indication Signal	The unit is receiving a line alarm indication signal. The Section Terminating Equipment generates AIS-L after detecting LOS or LOF.
AIS-P	Path Alarm Indication Signal	The unit is receiving a path alarm indication signal. AIS-P is defined as all ones in bytes H1, H2, and H3 as well as all ones in the entire STS synchronous payload envelope.
RFI-L	Line Remote Failure Indication	The unit is receiving a line remote failure indication. RFI-L is declared when the incoming line remote defect indication (RDI-L, “110” pattern in bits 6, 7, and 8 of the K2 line overhead byte) lasts for 2.5 ± 0.5 seconds.
RFI-P	Path Remote Failure Indication	The unit is receiving a path remote failure indication. RFI-P is declared when the incoming path remote defect indication (RDI-P, “1” in bit 5 of the G1 path overhead byte for contiguous frames) lasts for 2.5 ± 0.5 seconds.
SLM-P	Path Signal Level Mismatch	The controller card is detecting a signal label mismatch. A received signal label is mismatched if the received C2 byte does not indicate unequipped (0) or “VT structured payload” (2).
UEQ-P	Path Unequipped	The path is unequipped if it is not provisioned. Byte C2 of the STS path overhead is set to zero.

NOTE

The count given reflects the number of times the alarm or state has occurred (rather than the number of seconds the alarm was active).

Performance Parameters

View performance parameter information for the network in one of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the 24-hour history statistics screen, use the left and right arrow keys to scroll through all 96 15-minute intervals. See **Figure 5-6**, **Figure 5-7**, and **Figure 5-8** for examples of the performance parameter screens.

Descriptions of the fields follow the screen illustrations.

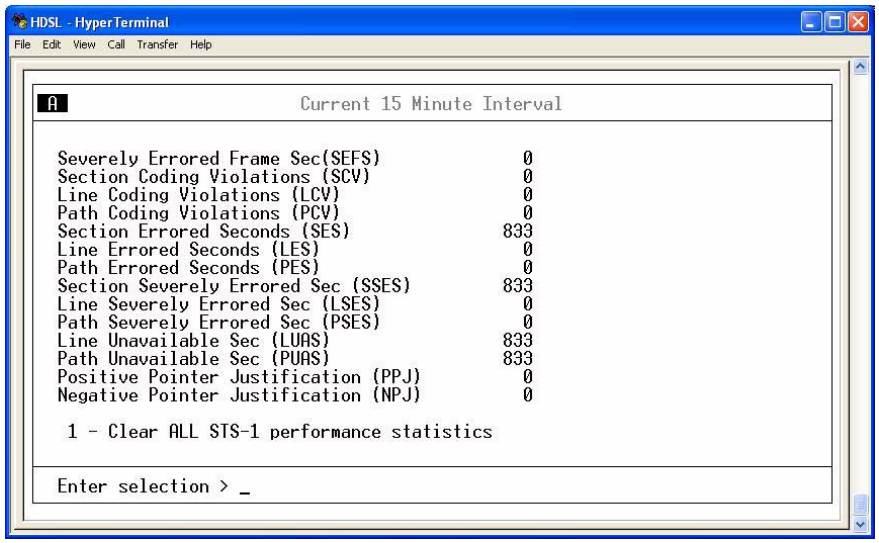

Figure 5-6. Local STS-1 Performance Parameters (Current 15 Minutes)

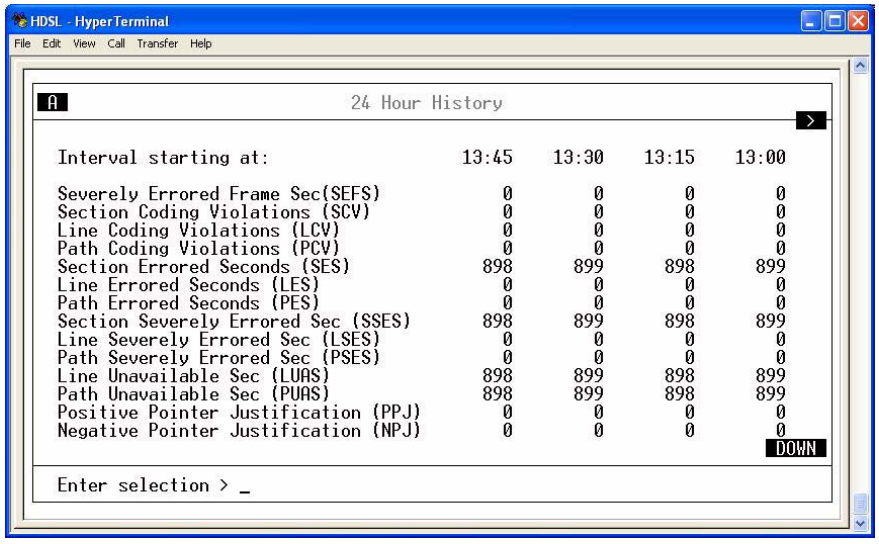

Figure 5-7. Local STS-1 Performance Parameters (24 Hour History)

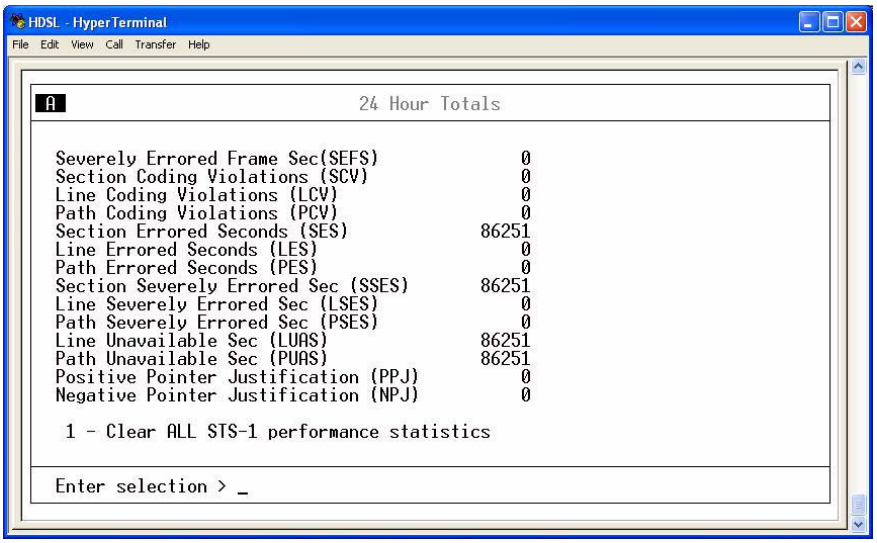

Figure 5-8. Local STS-1 Performance Parameters (24 Hour Totals)

Interval starting at:

This indicates the time that the 15-minute interval began. This field is displayed only in the 24-hour history screen which gives information for the previous 24 hours divided into 15-minute intervals (shown in **Figure 5-7** on page 5).

Severely Errored Framing Seconds (SEFS)

This indicates the number of seconds that contain one or more SEF events. This counter is only counted at the Section layer.

Section Coding Violations (SCV)

This indicates the number of coding violations encountered at the Section layer.

Line Coding Violations (LCV)

This indicates the number of coding violations encountered at the Line layer.

Path Coding Violations (PCV)

This indicates the number of coding violations encountered at the Path layer.

Section Errored Seconds (SES)

This indicates the number of seconds with one or more coding violations or one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at the Section layer.

Line Errored Seconds (LES)

This indicates the number of seconds with one or more coding violations or one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at the Line layer.

Path Errored Seconds (PES)

This indicates the number of seconds with one or more coding violations or one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at the Path layer.

Section Severely Errored Seconds (SSES)

This indicates the number of seconds with X or more coding violations at the Section layer, or a second during which at least one or more incoming defects at the Section layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.

Line Severely Errored Seconds (LSES)

This indicates the number of seconds with X or more coding violations at the Line layer, or a second during which at least one or more incoming defects at the Line layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.

Path Severely Errored Seconds (PSES)

This indicates the number of seconds with X or more coding violations at the Path layer, or a second during which at least one or more incoming defects at the Path layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.

Line Unavailable Seconds (LUAS)

This indicates the time in seconds that the Line layer has been unavailable for data delivery.

Path Unavailable Seconds (PUAS)

This indicates the time in seconds that the Path layer has been unavailable for data delivery.

Positive Pointer Justification (PPJ)

This indicates the number of times the detected pointer value is incremented by one.

Negative Pointer Justification (NPJ)

This indicates the number of times the detected pointer value is decremented by one.

Clear All STS-1 Performance Statistics

This option clears all current information. This selection affects all STS-1 statistical information (not just the displayed screen). When viewing the 24-hour history screen, press the down arrow key to access this selection.

2. LOCAL VT STATISTICS

This menu provides submenus for alarm history and performance parameters (see Figure 5-9).

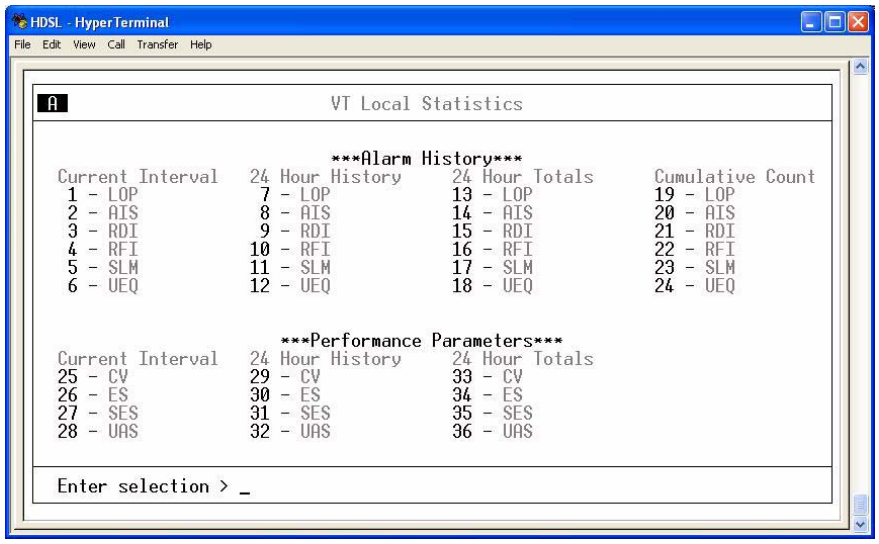

Figure 5-9. Local VT Statistics

Alarm History

The MX2800 STS-1 keeps track of VT alarms for both the near and far ends of the network. View alarm history information in one of the three time period selections, or view a cumulative alarm count. Information in these fields is for the given time period since the last reset. The cumulative alarm count continues indefinitely until Clear All VT Alarm Counts is selected. See **Figure 5-10** and **Figure 5-11** for examples of alarm screens.

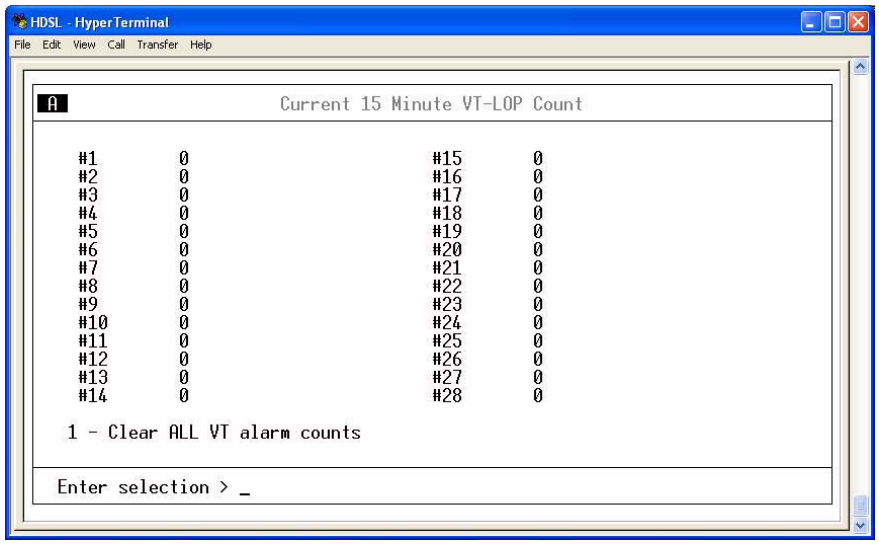

Figure 5-10. Local VT-LOP Alarm Count Screen (Current 15 Minutes)

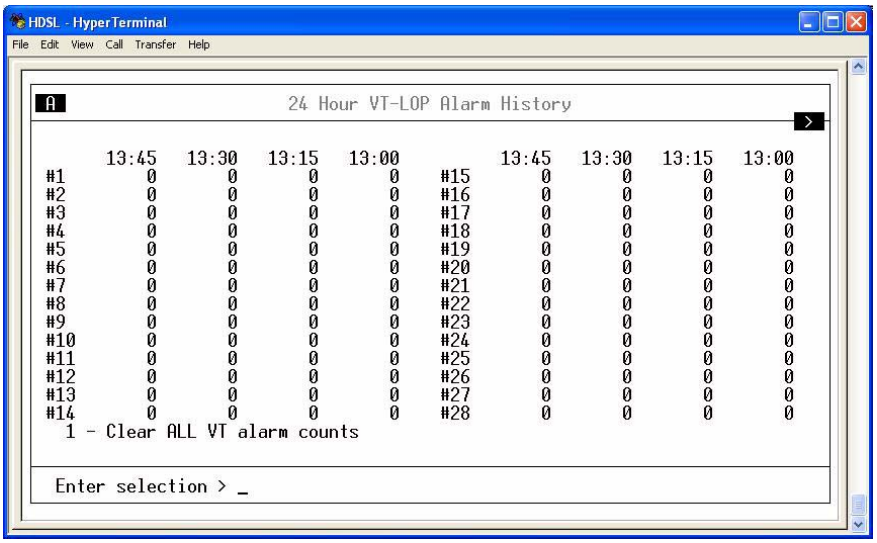

Figure 5-11. Local VT-LOP Alarm Count Screen (24 Hour History)

Table 5-2 describes the alarm counts shown on the VT Statistics screens.

Table 5-2. Alarm Count Descriptions

Condition	Description
LOP	The number of times the unit has failed to find a valid VT pointer.
AIS	The number of times the unit has received a path alarm indication signal. VT-Path AIS is defined as all ones in bytes V1, V2, V3, and V4 as well as all ones in the entire VT synchronous payload envelope. A VT-Path AIS failure is declared when the VT-Path AIS defect persists for 2.5 ± 0.5 seconds.
RDI	Number of times the unit has received a VT path remote defect indication. VT-RFI is declared when the incoming VT path RDI lasts for 2.5 ± 0.5 seconds.
RFI	Number of times the unit has received a VT path remote failure indication. VT-RFI is declared when the incoming VT path RFI lasts for 2.5 ± 0.5 seconds.
SLM	The controller card is detecting a signal label mismatch in the VT path. A received signal label is mismatched if the VT label does not indicate “unequipped” (0) or “asynchronously mapped” (2).
UEQ	The controller card detects that the VT path is unequipped (VT label is zero).

NOTE

The count given reflects the number of times the alarm or state has occurred (rather than the number of seconds the alarm was active).

Performance Parameters

View performance parameter information for the network in one of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the 24-hour history statistics screen, use the left and right arrow keys to scroll through all 96 15-minute intervals. **Figure 5-12** illustrates an example of a VT performance parameter screen.

Table 5-3. Performance Count Descriptions

Condition	Meaning	Description
CV	Coding Violation	The number of coding violations encountered at the VT layer.
ES	Errored Seconds	Number of seconds with one or more coding violations or one or more incoming defects (e.g., AIS, LOP) at the VT layer.
SES	Severely Errored Seconds	Number of seconds with X or more coding violations are the VT layer, or a second during which at least one or more incoming defects at the VT layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.
UAS	Unavailable Seconds	Time in seconds that the VT layer has been unavailable for data delivery.

NOTE

The count given reflects the number of times the alarm or state has occurred (rather than the number of seconds the alarm was active).

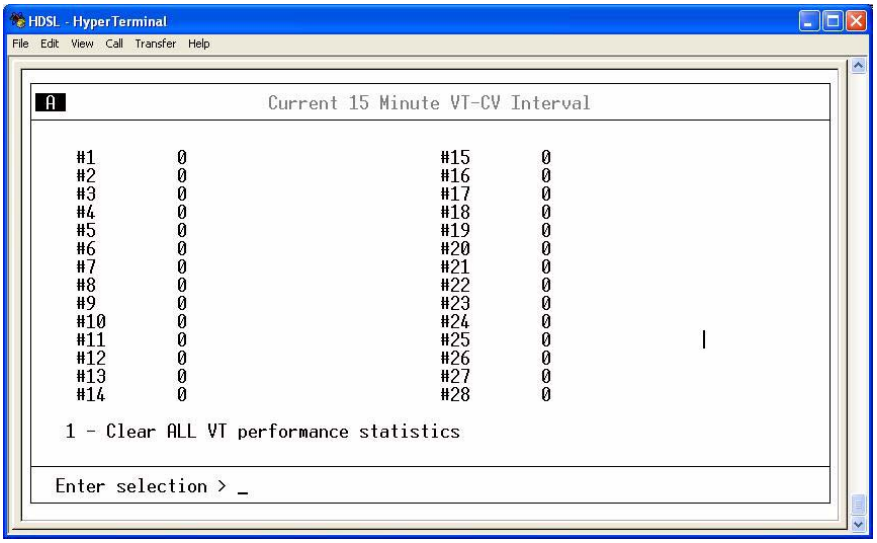

Figure 5-12. Local VT-CV Performance Parameters (Current 15 Minutes)

3. LOCAL PORT STATISTICS

The MX2800 STS-1 keeps track of Loss of Signal Alarms, Bipolar Violation Counts, AIS Loop Alarms, and AIS Carrier Alarms for each of the Ports (T1s/E1s) (see **Figure 5-13**). View this information in one of the three time period selections, or view a cumulative alarm count. Information in these fields is for the given time period (if any) since the last reset. The cumulative alarm count continues indefinitely until Clear All Port Alarm Counts (located in each field) is selected.

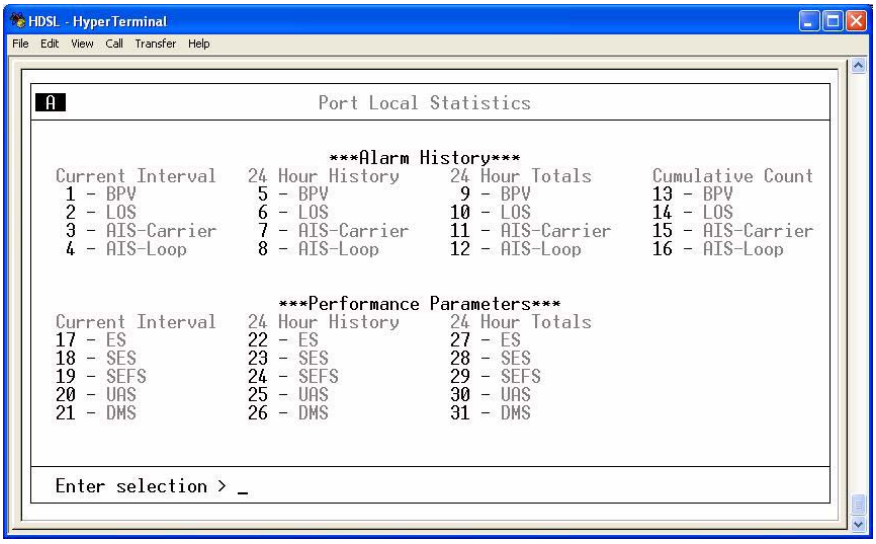

Figure 5-13. Local Port Statistics Menu

Alarm History

Loss of Signal Alarms

This indicates the number of times the unit has activated the LOS alarm for the DSX-1 interface.

Bipolar Violation Counts

This indicates the number of times the unit has received a bipolar violation.

AIS Loop Alarms

This indicates the number of times the T1 has activated the Loop AIS alarm for the DSX-1 interface.

AIS Carrier Alarms

This indicates the number of times the T1 has activated the Carrier AIS alarm from the STS side of the network.

Performance Parameters

Errored Seconds (ES)

This parameter is a count of one-second intervals with one or more BPVs, or one of more excessive zeroes (EXZs), or one or more LOS defects. For a B8ZS-coded signal, BPVs that are part of the zero-substitution code are excluded.

Severely Errored Seconds (SES)

This parameter is a count of one-second intervals with 1544 or more BPVs plus EXZs, or one or more LOS defects. For a B8ZS-coded signal, BPVs that are part of the zero-substitution code are excluded.

Severely Errored Framing Seconds (SEFS)

This parameter is a count of one-second intervals containing one or more SEF defects or one of more AIS defects.

Unavailable Seconds (UAS)

This parameter is a count of one-second intervals for which the DS1 path is unavailable. The DS1 path becomes unavailable at the onset of ten contiguous SESs. The ten SESs are included in unavailable time.

Degraded Minutes (DMS)

This count is derived from the number of errored seconds (not including severely errored seconds).

4. PROTECTION SWITCH STATISTICS

This menu provides statistics regarding protection switches. The number of protection switches that occur within the particular time period will be listed. (See **Figure 5-14**)

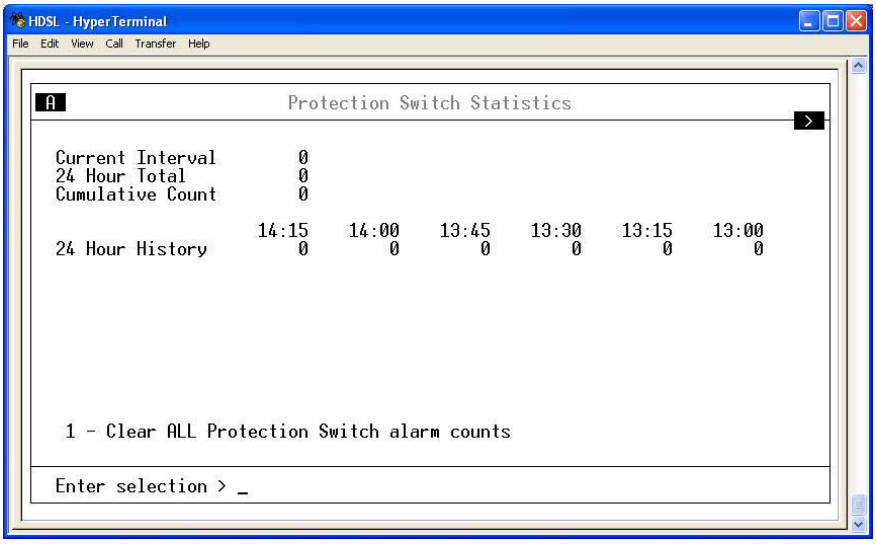

Figure 5-14. Protection Switch Statistics Menu

Performance Parameters

View performance parameter information for protection switch counts in one of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the 24-hour history statistics, use the left and right arrow keys to scroll through all 96 15-minute intervals. Clearing protection switch alarm counts will clear the Excessive Switch State if active.

5. ALARM LOG

This menu provides a list of the last 200 alarms that have occurred on the MX2800. When the alarm log becomes full, new alarms replace the oldest alarms in a first-in, first-out sequence.

The alarm log is periodically stored in nonvolatile memory. Once every minute, if an alarm has been recorded or if the alarm log has been reset since the last time it was saved, the alarm log and system configuration are saved to nonvolatile memory. When executed, both the alarm log and system configuration are saved manually by the Save Configuration & Alarm Log function (refer to Save Configuration and Alarm Log on page 3-43). Each time the system powers up, the alarm log is retrieved from non-volatile memory.

A Reset Alarm Log function is accessible from the alarm log menu. This option clears the alarm log. See **Figure 5-15**.

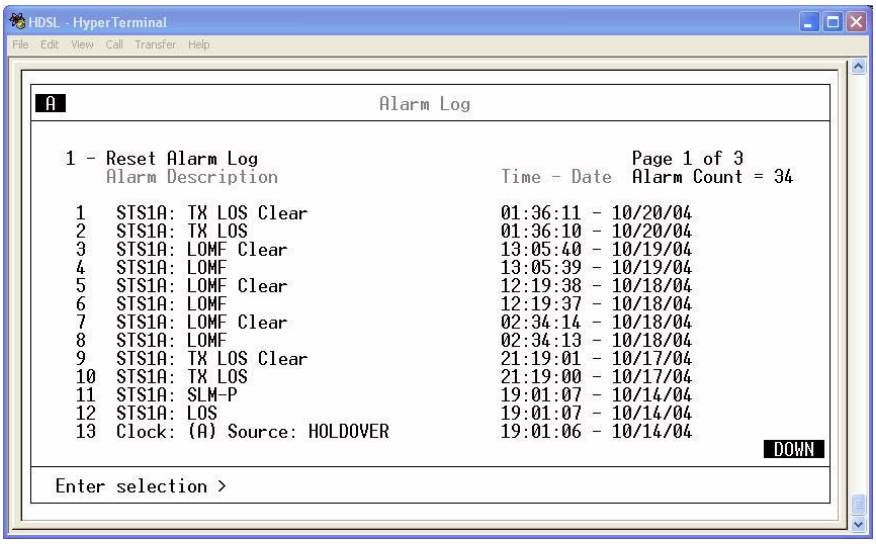

Figure 5-15. Alarm Log

6. FAR END STS-1 STATISTICS

Figure 5-16 illustrates the screen from which far-end performance monitoring statistics can be gathered.

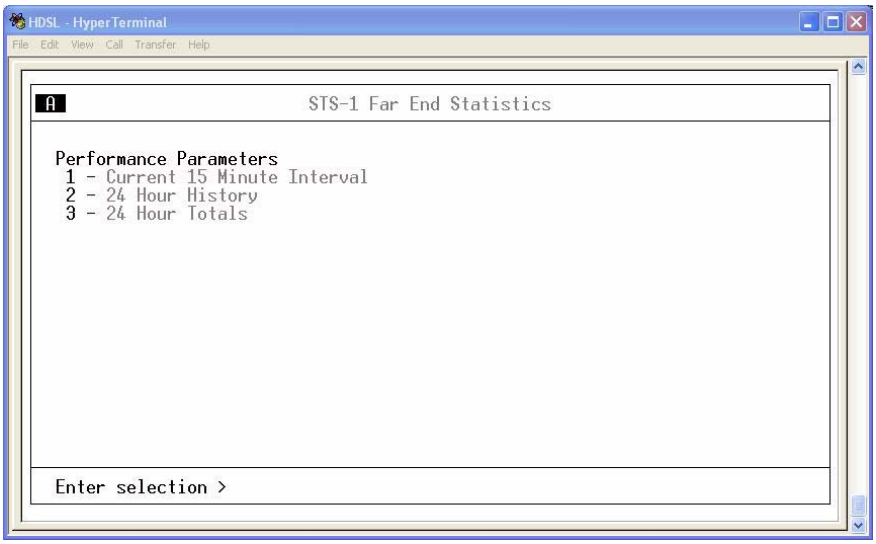

Figure 5-16. Far End STS-1 Statistics Menu

Performance Parameters

View performance parameter information for the network in one of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the 24-hour history statistics screen, use the left and right arrow keys to scroll through all 96 15-minute intervals. **Figure 5-17**, **Figure 5-18**, and **Figure 5-19** show examples of the performance parameter screens.

Descriptions of the individual performance parameters fields follow the screens.

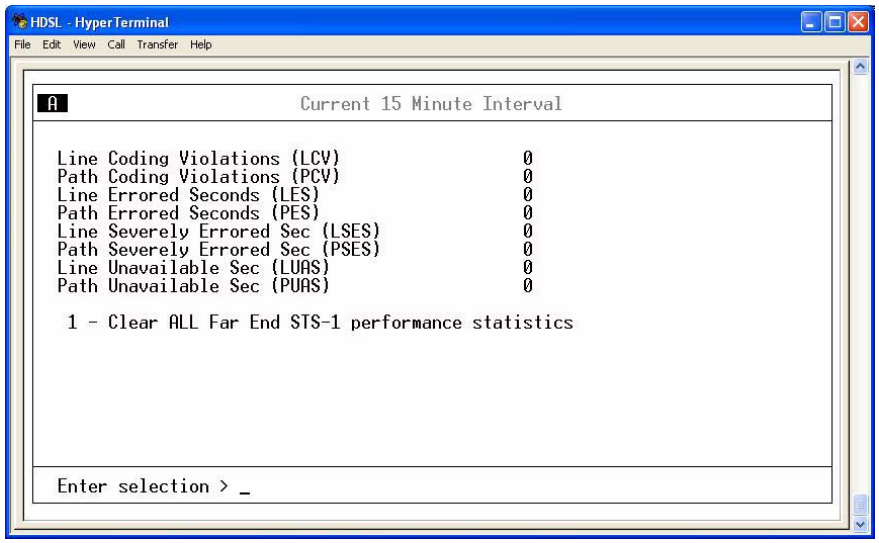

Figure 5-17. Far End STS-1 Performance Parameters (Current 15 Minutes)

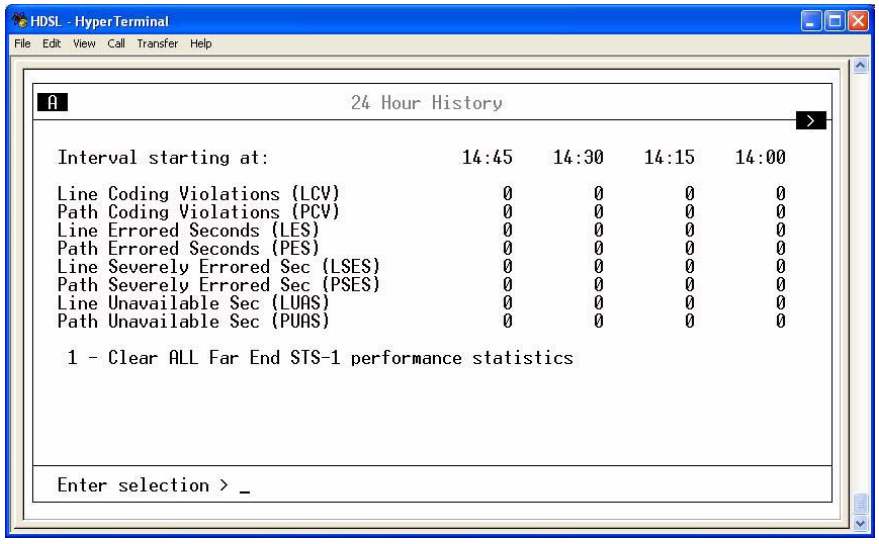

Figure 5-18. Far End STS-1 Performance Parameters (24 Hour History)

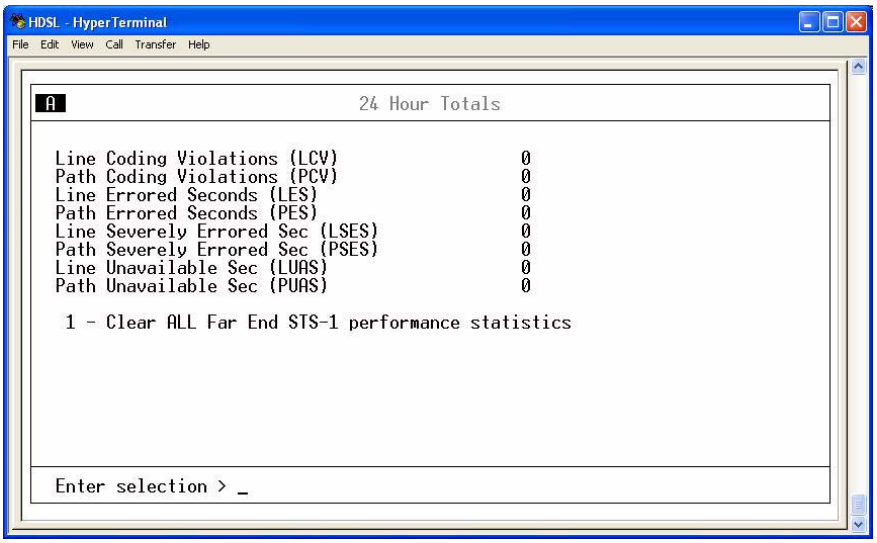

Figure 5-19. Far End STS-1 Performance Parameters (24 Hour Totals)

Interval starting at:

This indicates the time that the 15-minute interval began. This field is displayed only in the 24-hour history screen which gives information for the previous 24 hours divided into 15-minute intervals (shown in **Figure 5-7** on page 5).

Severely Errored Framing Seconds (SEFS)

This indicates the number of seconds that contain one or more SEF events. This counter is only counted at the Section layer.

Section Coding Violations (SCV)

This indicates the number of coding violations encountered at the Section layer.

Line Coding Violations (LCV)

This indicates the number of coding violations encountered at the Line layer.

Path Coding Violations (PCV)

This indicates the number of coding violations encountered at the Path layer.

Section Errored Seconds (SES)

This indicates the number of seconds with one or more coding violations or one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at the Section layer.

Line Errored Seconds (LES)

This indicates the number of seconds with one or more coding violations or one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at the Line layer.

Path Errored Seconds (PES)

This indicates the number of seconds with one or more coding violations or one or more incoming defects (e.g., SEF, LOS, AIS, LOP) at the Path layer.

Section Severely Errored Seconds (SSES)

This indicates the number of seconds with X or more coding violations at the Section layer, or a second during which at least one or more incoming defects at the Section layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.

Line Severely Errored Seconds (LSES)

This indicates the number of seconds with X or more coding violations at the Line layer, or a second during which at least one or more incoming defects at the Line layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.

Path Severely Errored Seconds (PSES)

This indicates the number of seconds with X or more coding violations at the Path layer, or a second during which at least one or more incoming defects at the Path layer has occurred. Values of X vary depending on the line rate and the Bit Error Rate.

Line Unavailable Seconds (LUAS)

This indicates the time in seconds that the Line layer has been unavailable for data delivery.

Path Unavailable Seconds (PUAS)

This indicates the time in seconds that the Path layer has been unavailable for data delivery.

Clear All Far End STS-1 Statistics

This option clears all current information. This selection affects all far-end statistical information (not just the displayed screen). When viewing the 24-hour history screen, press the down arrow key to access this selection.

7. VT STATISTICS - FAR END

This menu provides submenus for alarm history and performance parameters of the far end module (see Figure 5-20).

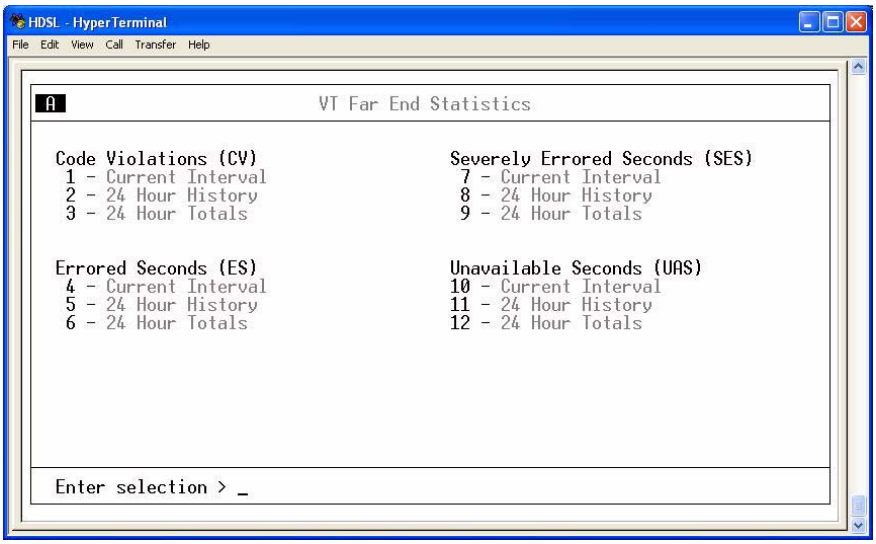

Figure 5-20. Far End VT Statistics

Statistics found on these screens will be similar in nature to those on the Local VT Statistics screen (refer to Local VT Statistics on page 5-8).

Section 6
Loopbacks

The Loopback menu shown in **Figure 6-1** allows initiating loopback tests from the MX2800 STS-1. From this menu, select VT/Port or STS-1. Once this selection is made, a second menu displays the types of tests available.

The VT/Port menu allows selection of any port from 1 to 28. The STS-1 menu loops the STS-1 path. The menu types, their descriptions, including diagrams of the activated loopbacks, are described in this section as follows:

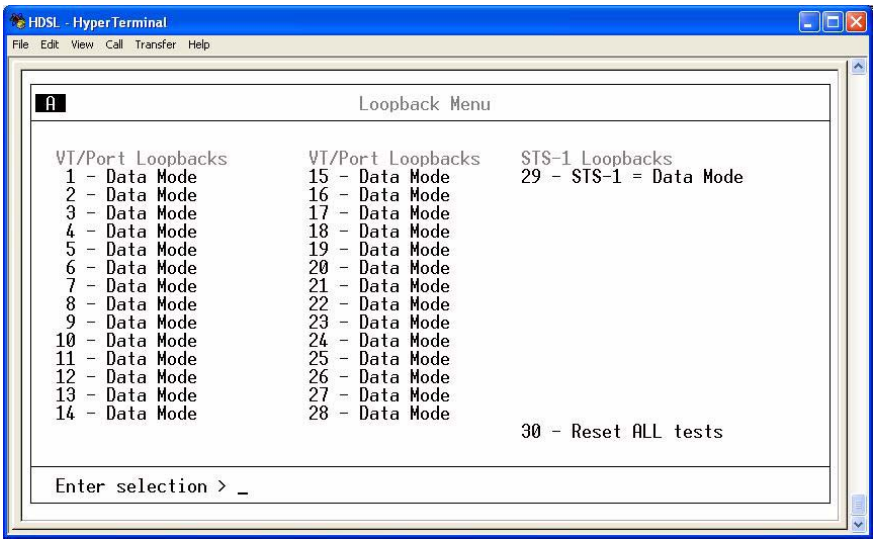

Figure 6-1. Loopback Menu

1. VT/PORT LOOPBACKS

After selecting the number that corresponds with the line to test, the menu in **Figure 6-2** appears. The number selected (1-28) refers to the VT number. The Port (T1/E1) that will be tested is the port mapped to the selected VT number.

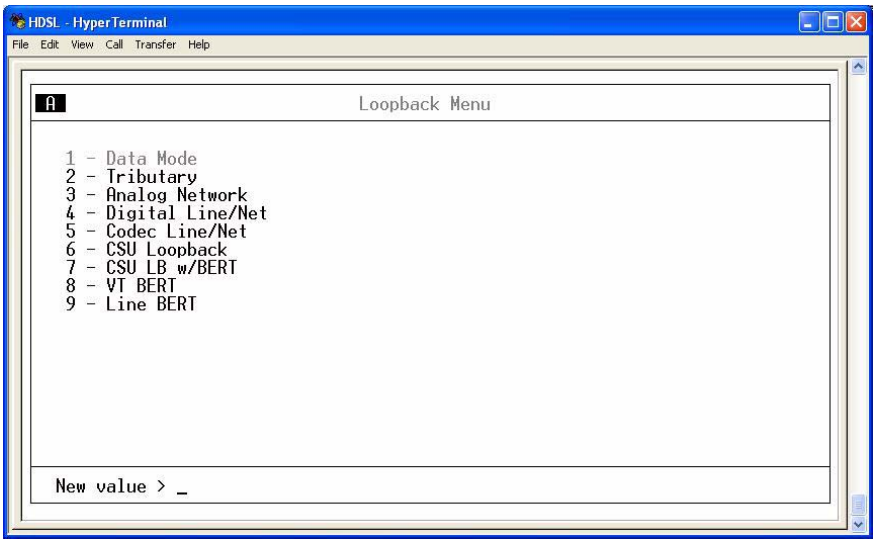

Figure 6-2. VT/Port Loopback Menu

VT/Port Loopback Menu Options

From the VT/Port Loopback menu, various loopbacks can be activated. The loopback menu options include the following:

- Data Mode on page 6-2
- Tributary on page 6-3
- Analog Network on page 6-3
- Digital Line/Net on page 6-4
- Codec Line/Net on page 6-4
- CSU Loopback on page 6-5
- CSU Loopback w/BERT on page 6-5
- VT BERT on page 6-6
- Line BERT on page 6-7

Data Mode

Select Data Mode to terminate a test in progress and return the port to “normal.”

Tributary

A Tributary loopback loops the selected VT/Port back to the network (STS-1). The T1/E1 is looped back through the STS-1 mapper. During this loopback, the corresponding DSX-1/E1 input is overwritten by the outgoing DSX-1/E1 signal. **Figure 6-3** provides a diagram of this test.

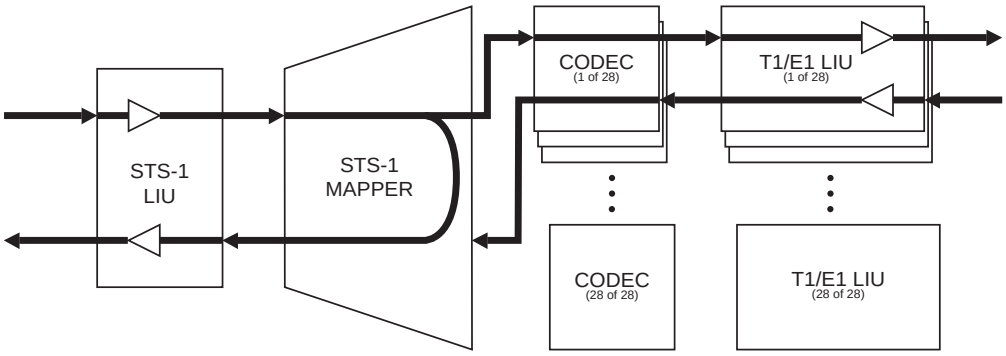

Figure 6-3. Tributary Loopback Test

Analog Network

An Analog Network loopback test (**Figure 6-4**) loops the selected T1/E1 back to the network (STS-1). The T1/E1 is completely de-multiplexed, looped back at the T1/E1 line interface unit (LIU) through the LIU drivers and receivers, and multiplexed back onto the STS-1 network stream.

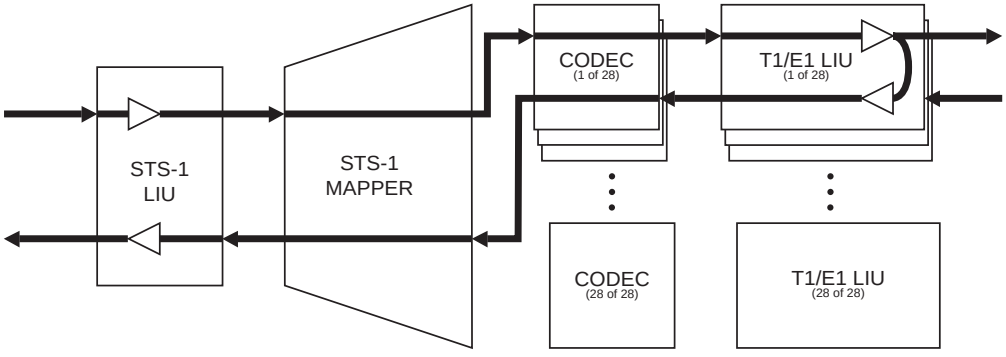

Figure 6-4. Analog Network Loopback

Digital Line/Net

A Digital Line/Net loopback (**Figure 6-5**) performs a loopback of the selected T1/E1 in both the network and local loop directions. Both loopbacks occur at the T1/E1 LIU. The network side loopback occurs deep into the LIU through the receiver, receive equalizer, transmit jitter attenuator, and finally, through the T1/E1 transmit drivers.

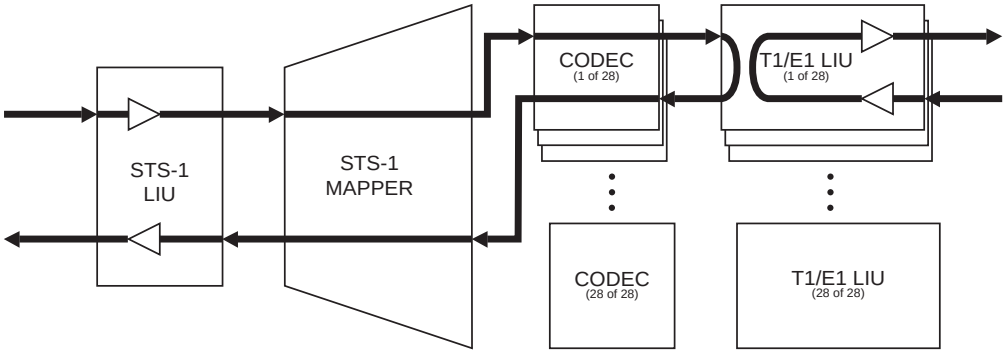

Figure 6-5. Digital Line/Network Loopback

Codec Line/Net

A Codec Line/Net loopback (**Figure 6-6**) performs a loopback of the selected T1/E1 in both the network and local loop directions. Both loopbacks occur at the T1/E1 codec. Both the network and the local loop side of the loopback are executed at the edge of the codec, completely testing the STS-1 mapper and the T1/E1 LIU.

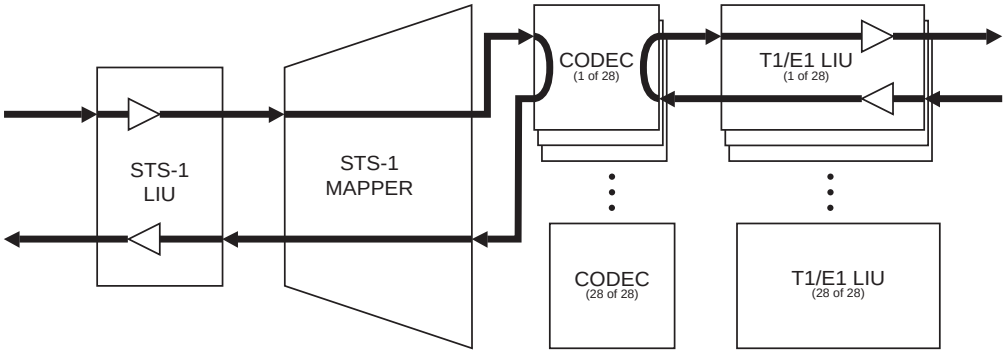

Figure 6-6. Codec Loopback

CSU Loopback

A CSU Loopback enables the MX2800 STS-1 to generate a CSU loopback pattern (001001…) toward the T1 CSU for six seconds. After six seconds have elapsed, the pattern will cease and incoming network traffic will be passed through to the CSU device. If the CSU device successfully responded to the CSU loopback pattern, it will return all data back toward the network. When Data Mode is selected, a loop-down pattern (0000100001….) will be generated toward the CSU for six seconds.

NOTE

When in CSU Loopback, only the Data Mode for the T1 under test may be selected. Selecting any other option will result in an error message.

CSU Loopback w/BERT

A CSU Loopback w/BERT enables the MX2800 STS-1 to test the local T1 loop to the CSU using the standard QRSS pseudo-random bit sequence. When CSU Loopback w/BERT is selected, the MX2800 STS-1 will initiate a CSU loopback pattern toward the CSU attached to the selected T1 line similar to the CSU Loopback test above. Six seconds after starting the CSU loopback pattern, the MX2800 STS-1 will cease sending the CSU loopback pattern and begin sending an unframed QRSS pattern toward the CSU. If the CSU device successfully responded to the CSU loopback pattern, it will return all data back toward the network. The MX2800 STS-1 will check the incoming pattern for errors. Additional menu items will appear to show the state of pattern synchronization, error count, and a clear error count option (see **Figure 6-7**). Selecting Data Mode will cease the transmission of the QRSS pattern and start transmission of a loop-down pattern as previously described.

NOTE

Only one T1 port may engage a CSU Loopback, CSU Loopback w/Bert, or a Line Bert. If one of these tests is already active at the time a new CSU Loopback, CSU Loopback w/Bert, or Line Bert is selected, the former test will be terminated and the latter test will be engaged.

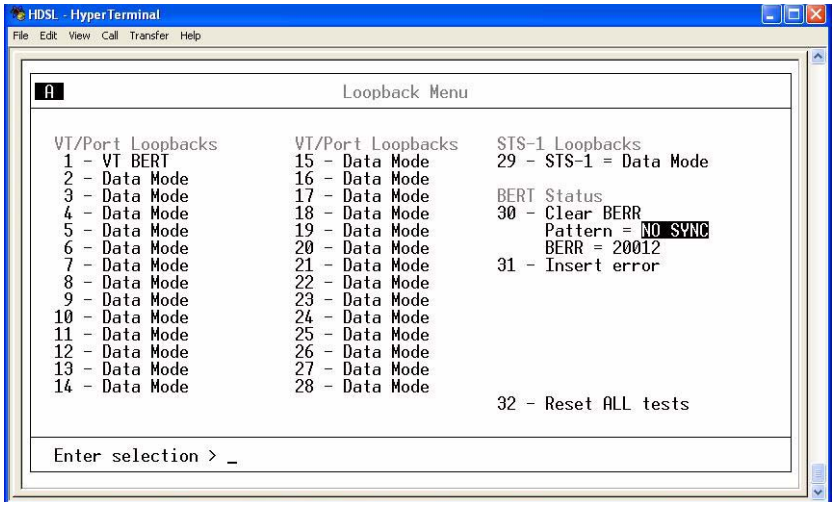

Figure 6-7. Loopback Menu with BERT Selected

VT BERT

A VT BERT test (**Figure 6-8**) enables the MX2800 STS-1 to perform a “head-to-head” BERT test toward the STS-1 network. The VT BERT test replaces all incoming T1/E1 traffic for the T1/E1 mapped to the selected VT with an unframed QRSS pattern toward the network. When VT BERT is selected, additional menu items display to show the state of pattern synchronization, cumulative error count, and a clear error count option. Selecting Data Mode will cease QRSS pattern generation and substitution of the incoming data stream.

NOTE

When in VT BERT mode, only the Data Mode option for the VT/Port under test may be selected. Selecting any other option will result in an error message.

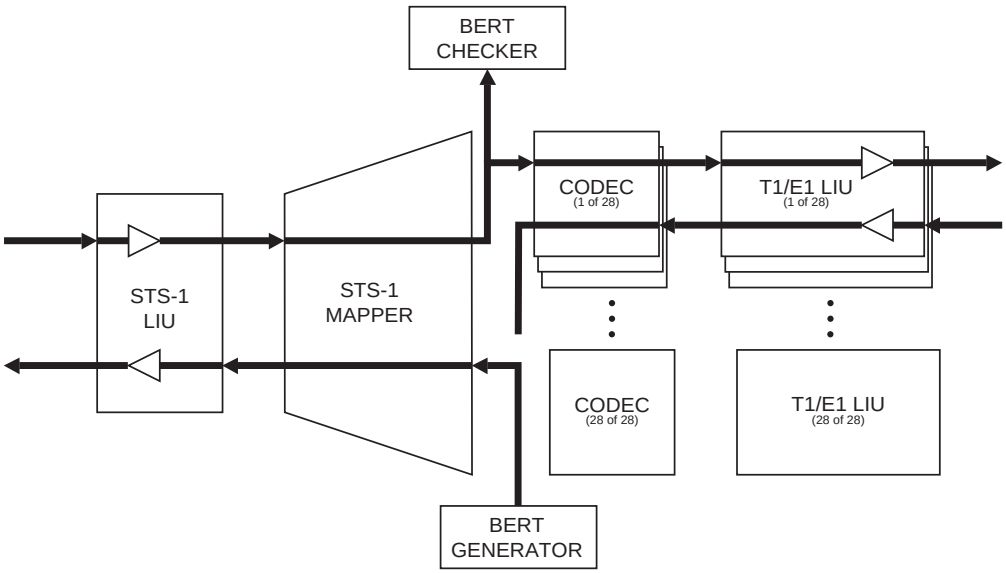

Figure 6-8. VT Bert Test

Line BERT

A Line BERT (**Figure 6-9**) enables the MX2800 STS-1 to perform a “head-to-head” BERT test toward the T1/E1 line mapped to the VT selected. Selecting Line BERT will replace all outgoing T1/E1 traffic for the T1/E1 mapped to the selected VT with an unframed QRSS pattern. When Line BERT is selected, additional menu items will appear to show the state of pattern synchronization, cumulative error count, and a clear error count option. Selecting Data Mode will cease QRSS pattern generation and substitution of the incoming data stream.

NOTE

When in Line BERT mode, only the Data Mode option for the VT/Port under test may be selected. Selecting any other option will result in an error message being displayed.

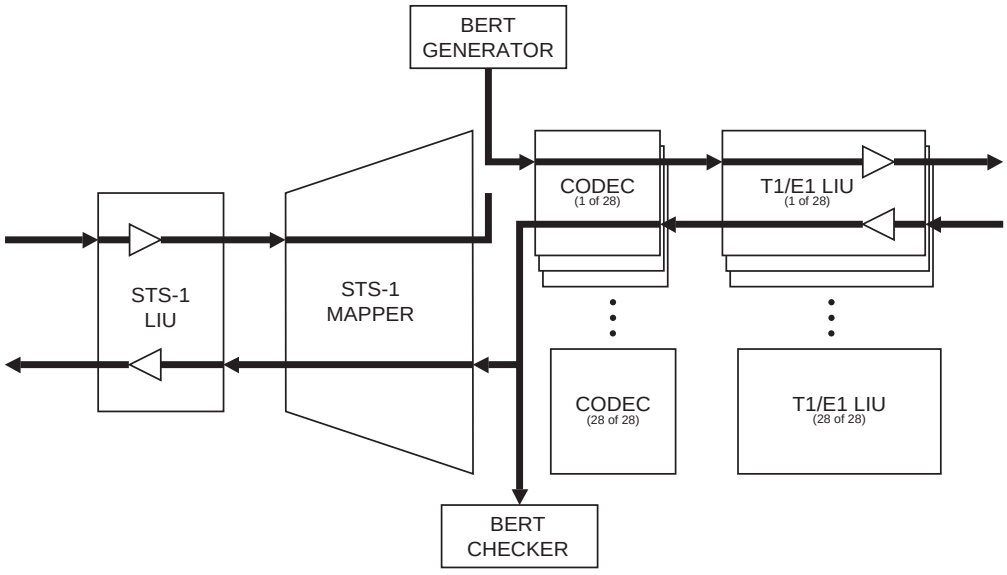

Figure 6-9. Line Bert Test

2. STS-1 LOOPBACKS

An STS-1 loopback option provides a series of tests on the STS-1 path.

The STS-1 Loopback option, from the Loopback menu, displays the screen illustrated in **Figure 6-10**. The sections following the figure provide descriptions and diagrams of the testing options.

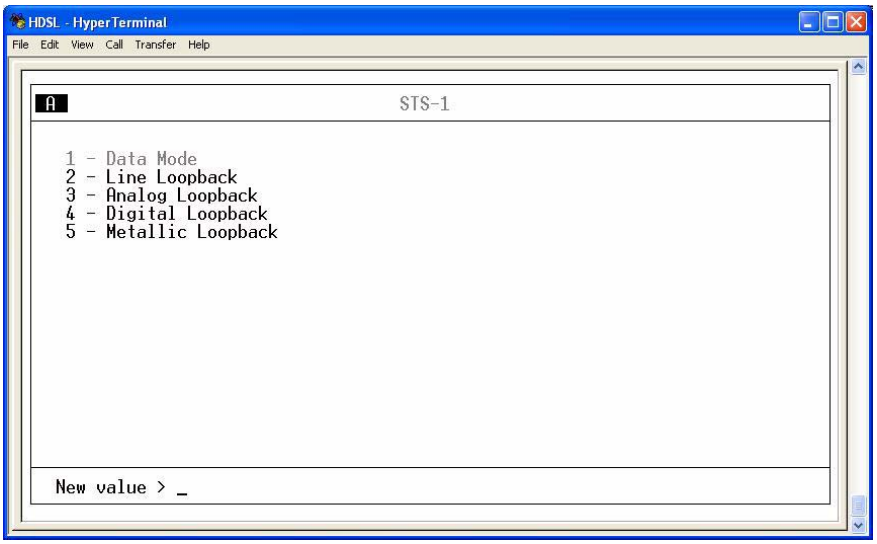

Figure 6-10. STS-1 Loopback Menu

STS-1 Loopback Menu Options

From the STS-1 Loopback menu, various loopbacks can be activated. The loopback menu options include the following:

- Data Mode on page 6-8
- Line Loopback on page 6-9
- Analog Loopback on page 6-9
- Digital Loopback on page 6-10
- Metallic Loopback on page 6-10

Data Mode

Select Data Mode to terminate a test in progress and return the port to “normal.”

Line Loopback

Line Loopback, illustrated in **Figure 6-11**, performs a loopback of the entire STS-1. This loopback occurs just prior to the HDB3/B8ZS decoder of the LIU; therefore, any coding violations received by the STS-1 will be inserted back into the network without modification.

NOTE

If a Line Loopback is active when the MX2800 STS-1 is operating in the Free-Run timing mode, the timing source for the STS-1 is effectively removed from the circuit. Therefore, it is up to the test equipment or network to provide STS-1 timing into the circuit for the duration of the test.

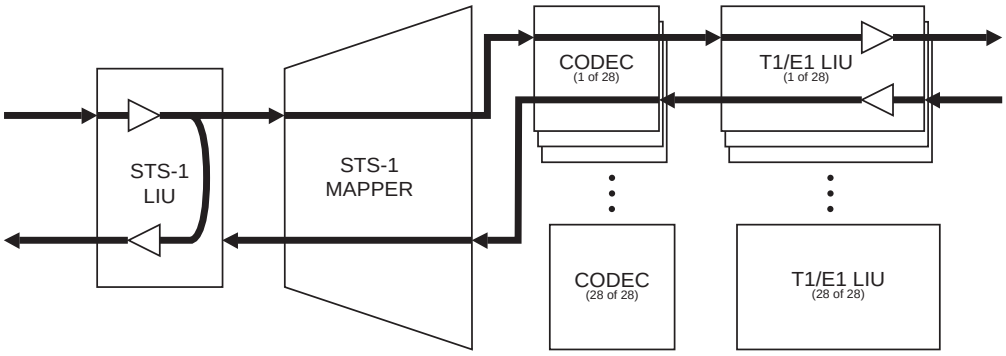

Figure 6-11. STS-1 Line Loopback

Analog Loopback

An Analog Loopback (**Figure 6-12**) loops the entire STS-1 back to the local loop side. The end effect of this test is a loopback of all VT/Ports after passing through the STS-1 mapper and the LIU. The incoming STS-1 data is ignored and the outgoing STS-1 stream is looped back into the “AGC/Receive Equalizer Block” in the LIU.

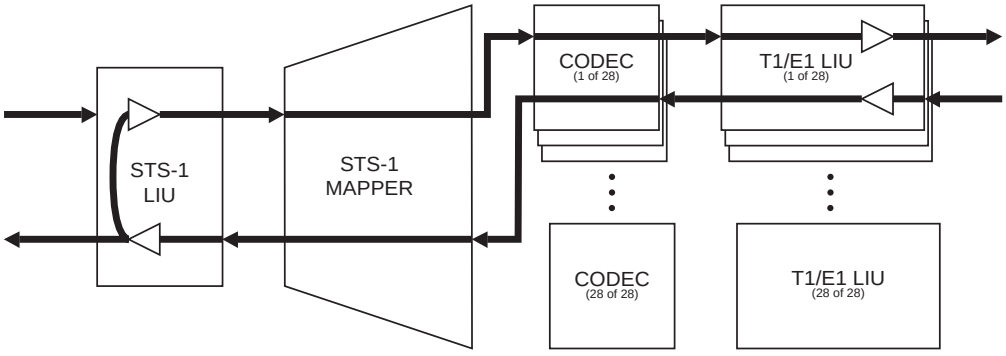

Figure 6-12. STS-1 Analog Loopback

Digital Loopback

A Digital Loopback (**Figure 6-13**) loops the entire STS-1 back to the local loop side. This tests all VT/Ports after passing through the STS-1 mapper and partially through the LIU. The incoming STS-1 data is ignored and the outgoing STS-1 stream is substituted in its place just prior to entering the STS-1 encoder block of the LIU. At this point, the data will be looped back to the “HDB3/B3ZS Encoder” block.

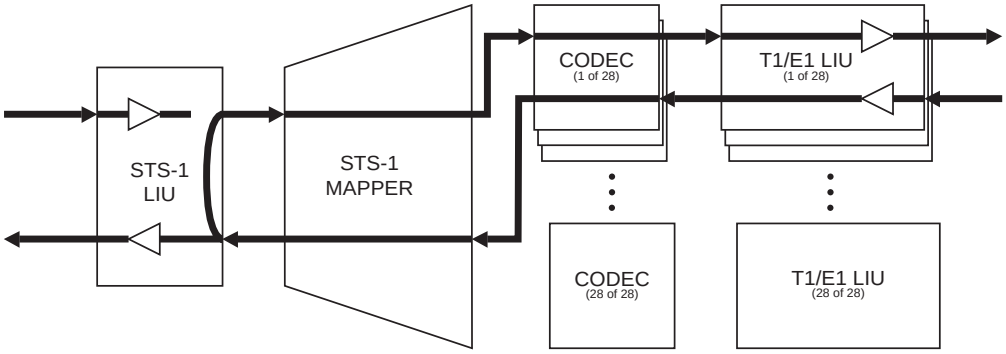

Figure 6-13. Digital Loopback

Metallic Loopback

A Metallic Loopback (**Figure 6-14**) test loops the entire STS-1 back to the local loop side. The end effect of this test is a loopback of all VT/Ports after being fully multiplexed and de-multiplexed to and from the STS-1 and passed through both directions of the LIU. During this test, the incoming STS-1 is disconnected from the STS-1 receiver and the outgoing STS-1 signal is substituted in its place.

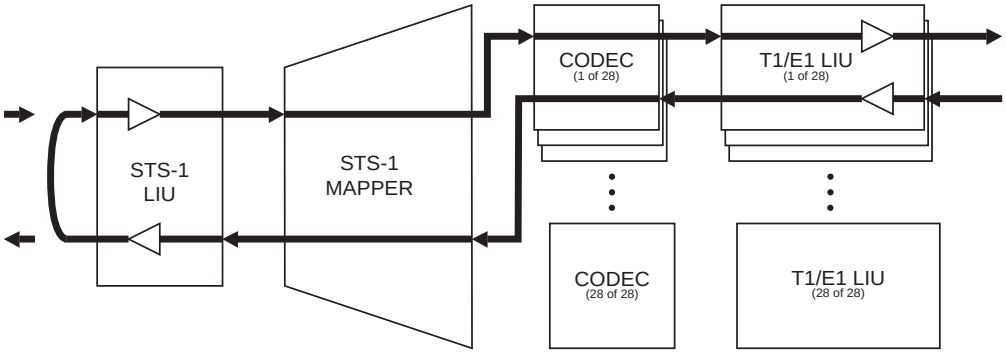

Figure 6-14. Metallic Loopback Test

Section 7
Circuit and Network Redundancy

The MX2800 STS-1 provides backup measures of protection for both circuit and network failure. The following sections describe the three possible modes of operation:

Protection for each mode is described in **Table 7-1**.

Table 7-1. Protection Modes

Mode	Protection Description
Non-Redundant	Does not provide backup protection
Circuit Failure Recovery	Provides backup protection in the event of controller card failure
Circuit and Network Failure Recovery	Provides a complete backup system for both card and network failure

The descriptions given include illustrations and suggested configuration settings. These settings may need modification based on the selected network configuration.

1. NON-REDUNDANT MODE

In Non-Redundant Mode, the MX2800 STS-1 chassis houses only one controller card, and only one network connection is available. Protection in the event of network failure is not provided. In the event of a failure, an alarm is initiated and condition is indicated by the front panel LEDs. **Figure 7-1** is a diagram of the circuit configuration.

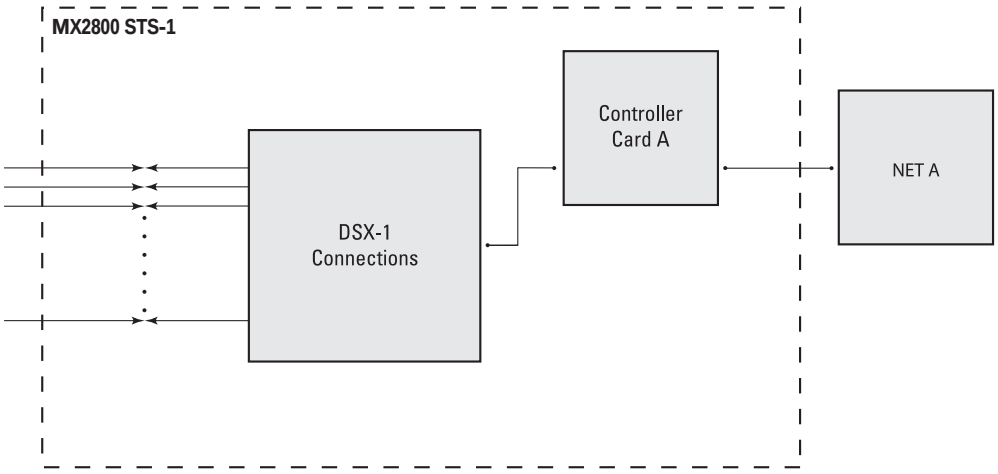

Figure 7-1. Non-Redundant Mode

NOTE

In the Non-Redundant mode, the STS-1 must be connected to the **IN** and **OUT** jacks for **NET A**.

2. CIRCUIT FAILURE RECOVERY MODE

In Circuit Failure Recovery Mode (**Figure 7-2**), two controller cards are installed for a single STS-1 line. In this mode, the MX2800 STS-1 can continue operating in the event of a controller card failure. When both cards are fully functional, the primary card actively processes data while the secondary card remains in standby. The secondary card continuously monitors the line and remains framed to the incoming STS-1 signal.

Table 7-2 provides recommended settings for this mode.

NOTE

During a card switch, service interruption is experienced on both the STS-1 and the DSX-1 connections. However, since the secondary controller card remains framed to the incoming STS-1 signal at all times, it is a minimal interruption.

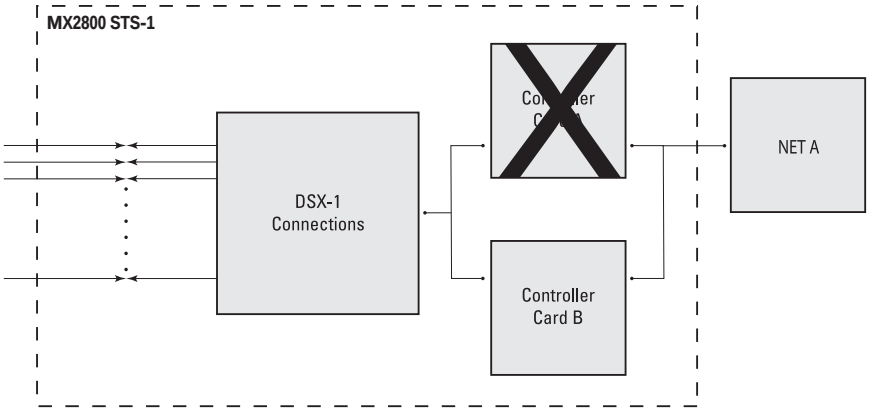

Figure 7-2. Circuit Failure Recovery Mode

Table 7-2. Configuration Requirements for Circuit Recovery

Selection Path	Recommended Setting
Config > Network Interface > XCV Threshold	1E-3 (see the following note)
Config > Network Interface > Network Protection	Disabled
Config > Network Interface > Max. Switch Threshold	3
Config > Network Interface > Min. Switching Period	10 seconds
Config > T1/E1 Interface > T1/E1 Circuit Protection	Enable the T1/E1 channels to be considered for circuit redundancy
Config > T1/E1 Interface > XCV Threshold	1E-3 (see the following note)

NOTE

The XCV Threshold settings are based on the error rates considered acceptable on the STS-1 or DS-1 before switching.

3. CIRCUIT AND NETWORK FAILURE RECOVERY MODE

In this mode, two controller cards are installed and connected to two individual STS-1 lines. This mode provides full STS-1 redundancy. In this mode, the primary controller card is connected to the primary STS-1 line and the secondary controller card is connected to the secondary STS-1 line. The primary card and line actively transmit data, while the secondary card remains in standby. Should a failure occur in *either* the controller card *or* the network, then a switchover occurs to the secondary card *or* network.

The MX2800 STS-1 has the ability to internally re-route the network connection if a controller card and the *opposite* network connection fail. For example, in **Figure 7-3**, failed NET A is connected to healthy Card A; and healthy NET B is connected to *failed* Card B. In such an instance, the MX2800 STS-1 automatically re-routes NET B to Card A.

NOTE

The configuration requirements (shown in **Table 7-2** on page 3) for both failure recovery modes are identical with one exception. In Circuit and Network Failure Recovery mode, set the Network Protection to **`Enable`**.

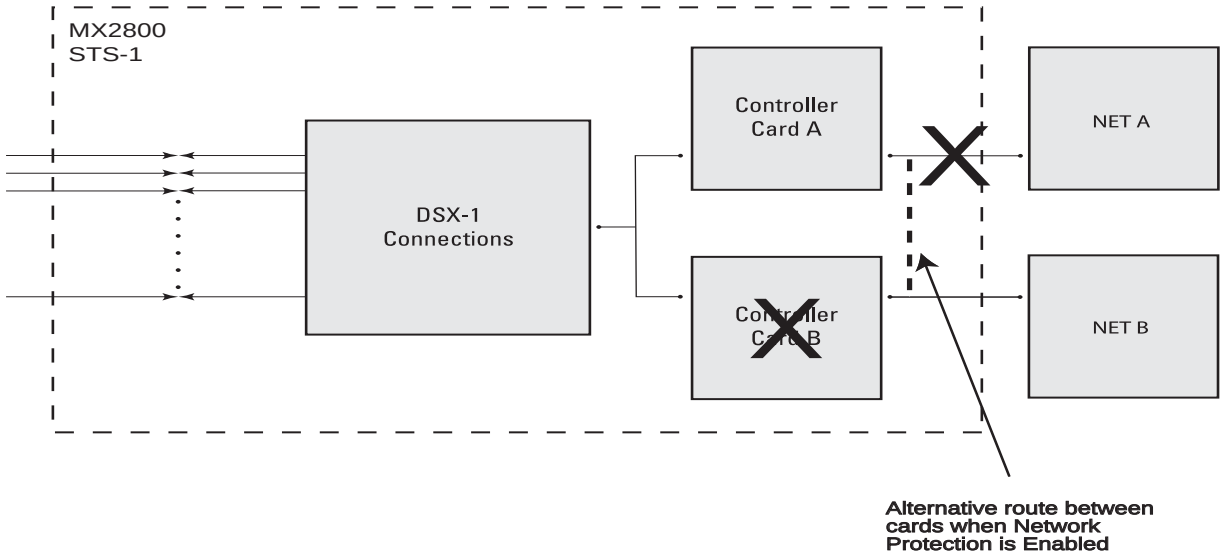

Figure 7-3. Circuit and Network Failure Recovery Mode

Section 8
Power Loss Recovery

The MX2800 STS-1 provides backup measures of protection for both power supply and power source failures. The following sections describe the possible modes of operation:

Power Loss Protection for each mode is described in **Table 8-1**.

Table 8-1. Power Loss Protection Modes

Mode	Protection Description
Non-Redundant Power	Does not provide backup protection
Power Supply Recovery	Backup protection in the event of power supply card failure
Power Supply and Source Recovery	Backup system for both card and source failure
Battery Backup	Battery backup in the event of a power outage

1. NON-REDUNDANT POWER MODE

In Non-Redundant Power Mode, as shown in **Figure 8-1**, the MX2800 STS-1 houses only one power supply card and only one power source is available. Power failure protection is not provided. If a power supply card fails, then the unit is inoperable until the card is repaired or replaced.

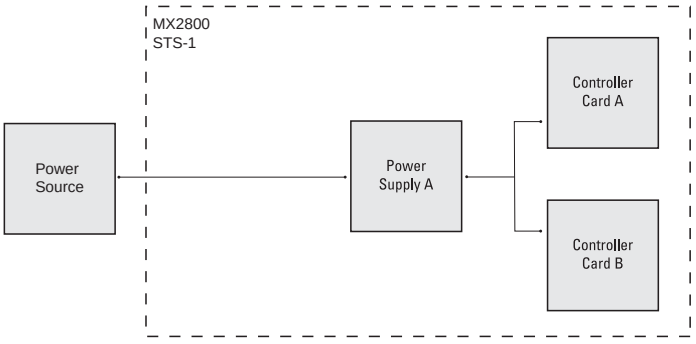

Figure 8-1. Non-Redundant Power Mode

2. POWER SUPPLY RECOVERY MODE

In Power Supply Recovery Mode (**Figure 8-2**), two power supply cards are installed and connected to a single power source. In this mode, the MX2800 STS-1 can continue to operate during a power supply failure without service interruption. The power supplies are load sharing, so either power supply can provide power for the entire unit.

NOTE

When the unit is configured with dual internal AC power supplies, this is the only power protection mode available.

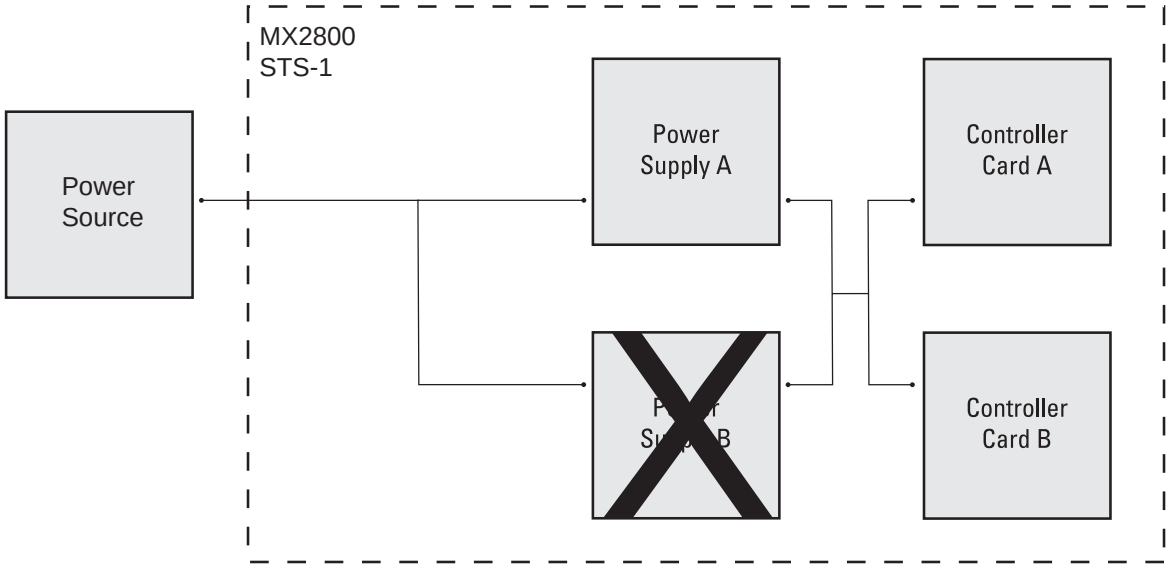

Figure 8-2. Power Supply Failure Recovery Mode

NOTE

Power supply modules are hot-swappable.

3. POWER SUPPLY AND SOURCE RECOVERY MODE

In this mode, two power supply cards are installed and are connected to two individual power sources. The MX2800 STS-1 handles any combination of a single power source failure or single power supply failure.

Much like the backup design for the controller cards, the MX2800 STS-1 is capable of internally re-routing the power source if a power supply card and the opposite power source fail. For example, in the illustration given in **Figure 8-3**, failed Power Source A is connected to functional Card A and functional Power Source B is connected to failed Card B. In this case, the MX2800 STS-1 automatically connects Power Source B to Card A.

NOTE

This configuration is only available with DC power supplies.

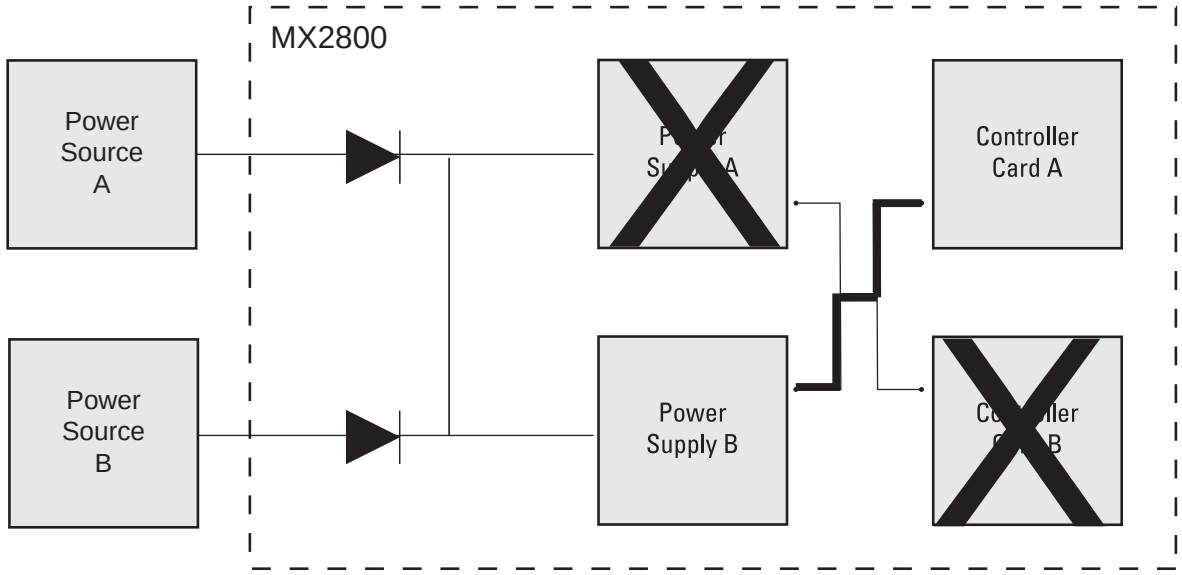

Figure 8-3. Power Supply and Source Failure Recovery Mode

4. BATTERY BACKUP MODE

With the installation of the ADTRAN Power Supply/Battery Charger (PS/BC) and backup battery pack, the MX2800 STS-1 can continue operation without service interruption during a power outage. This PS/BC (P/N 4175043Lx) provides –48 VDC to the MX2800 STS-1. It receives 115 VAC through a standard plug and wall socket. See **Figure 8-4**.

The PS/BC maintains the battery at peak charge (–48 V) at all times. If AC power is lost, the unit automatically transfers power to the battery without service interruption. When AC power is restored, the unit reverts to AC power and recharges the battery. For installation instructions, refer to the documentation provided with the PS/BC.

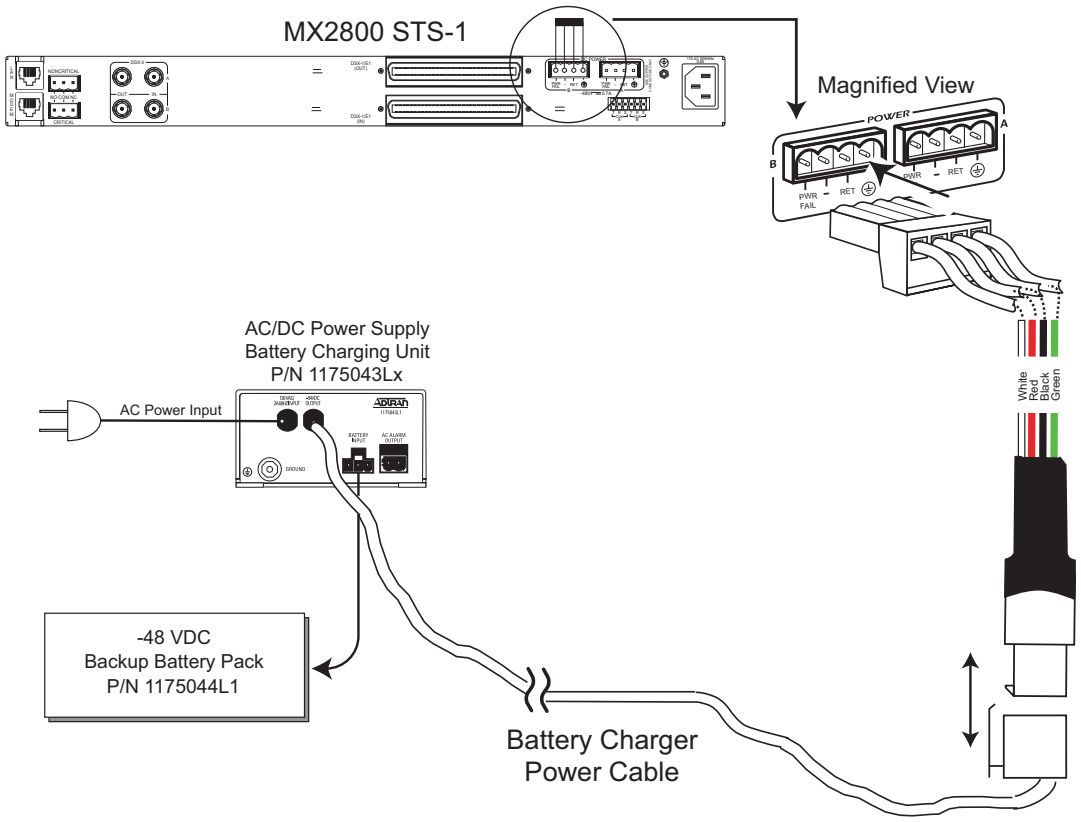

Figure 8-4. Battery Backup System

NOTE

The MX2800 STS-1 can operate on a fully-charged battery for four hours without recharging.

Section 9
Transaction Language 1 (TL1)

1. INTRODUCTION

Transaction Language 1 (TL1) is a BELLCORE standard used in the input and output messages that pass between Operations Systems (OS) and Network Elements (NE) in telecommunication networks. It was developed to standardize equipment surveillance and memory administration, and to test with a common format.

This release of TL1 primarily supports the interactive and autonomous retrieval of system events as part of a valid TL1 session.

2. OVERVIEW

TL1 is an ASCII-based language that supports both command-response and autonomous (NE) message generation. Commonly, TL1 is used over an X.25 packet network but is completely independent of any physical layer protocols. For the MX2800, TL1 is implemented as a Telnet session running over either Ethernet or PPP.

To successfully initiate a TL1 session, the unit must be properly configured for an Ethernet (LAN) or PPP connection. A valid IP address, gateway address, and subnet mask are required. Refer to System Management on page 3-16. User authentication is also required. An account must be set up before initiating a TL1 session.

An account may be set up via the VT100 menus (Configuration/System Management/System Security/User Account Management). An account includes a username, password, and privileges. The privileges are as follows:

- Admin privileges allow the use of all supported commands.
- Guest privileges allow only the activation of a TL1 session, cancellation of a TL1 session, and retrieval of specific system information.
- Interface privileges allow the use of all supported commands except modifying the user account information, setting the MX2800 date and time, configuring alarm relays, and operating loopbacks.
- Test privileges allow the use of all supported commands except modifying the user account information, configuring alarm relays, and setting the MX2800 date and time.

The TL1 account privileges are detailed in **Table 9-1** on page 2**.**

Table 9-1. TL1 Account Privileges

TL1 Command	Guest	Interface	Test	Admin
ACT-USER	X	X	X	X
ALW-MSG-rr	X	X	X	X
CANC-USER	X	X	X	X
DLT-USER-SECU				X
ED-USER-SECU				X
ED-rr (related to loopbacks)			X	X
ED-rr (configuring alarm relays)				X
ED-rr (all remaining)		X	X	X
ENT-USER-SECU				X
INH-MSG-rr	X	X	X	X
OPR-LPBK			X	X
REPT-STAT	X	X	X	X
RLS-LPBK			X	X
RTRV-ALM-rr	X	X	X	X
RTRV-COND-rr	X	X	X	X
RTRV-HDR	X	X	X	X
RTRV-rr	X	X	X	X
RTRV-SYS	X	X	X	X
RTRV-USER-SECU				X
RTRV-VER	X	X	X	X
SET-DAT				X

To bring up a TL1 Telnet connection (up to eight may be active), a Telnet client requests a connection on TCP port 3116. Once the Telnet connection is established, it is necessary to initiate a TL1 session. Establishing a TL1 session involves successful user authentication. Until a TL1 session is established, all commands other than those used to initiate or terminate a session are denied. Autonomous messaging is also disabled. For information on using the Act-User command to initiate a TL1 session, refer to TL1 Commands on page 9-5.

3. TL1 MESSAGES

As stated earlier, TL1 messages are either part of a command-response exchange or are generated autonomously.

The general format for a TL1 command is as follows:

```
<verb>[-<mod1>[-<mod2>]]:<tid>:<aid>:<ctag>:<general block>:<keyword block>: <state block>;
```

Refer to TL1 Commands on page 9-5 for a list of TL1 commands supported by the MX2800 STS-1.

TL1 Responses

There are three types of TL1 responses:

- Acknowledgment messages
- Output Response messages
- Autonomous messages

Acknowledgment Messages

Acknowledgment messages are brief output messages generated in response to received TL1 commands. The MX2800 STS-1 currently supports two types of acknowledgment messages:

- In Progress (IP)
- All Right (OK).

In Progress

The IP acknowledgment message is usually generated as an interim response message to indicate that a message has been received and that the command is being executed. IP messages have the following general format:

```
IP <CTAG><CR><LF>
<
```

All Right

The OK acknowledgment message indicates that a command has been received and that the required action was initiated and completed. This message has the following general format:

```
OK <CTAG><CR><LF>
<
```

Output Response Messages

Output Response messages are generated in response to received commands and have the following general format:

```
<cr><lf><lf>
^^^<tid>^<yr>-<mo>-<day>^<hr>:<min>:<sec><cr><lf>
M^^<ctag>^<completion code><cr><lf>
^^^<errcode><cr><lf>;
```

For the MX2800 STS-1, the Completion Code field will contain one of the following values:

- COMPLD - Successful execution of the received command
- DENY - Denial of the received command

When the received command is denied, the line in the message following the **COMPLETION CODE** line will contain a 4-letter error code. Refer to TL1 Error Codes on page 9-15 for a description of possible MX2800 STS-1 error codes.

The MX2800 STS-1 specifically uses “quoted line(s)” in the response message of successfully executed **RTRV-ALM** commands. The quoted line format is as follows

```
<AID>:<NTFCNCDE>,<CONDTYPE>,<SRVEFF>,<OCRDAT>,<OCRTM>,<LOCN>…
```

The **NTFCNCDE** field will contain one of the following values:

- MN - Minor
- MJ - Major
- CR - Critical

Refer to the condition types listed in **Table 9-3** on page 11 (*MX2800 STS-1 Alarm Events*) for possible MX2800 STS-1 CONDTYPE codes.

Autonomous Messages

The Autonomous message is sent from the NE to the OS and is not associated with any explicit input message. The MX2800 STS-1 uses this message to exclusively report alarmed and non-alarmed events. An autonomous message has the following general format:

```
<cr><lf><lf>
^^^<tid>^<yr>-<mo>-<day>^<hr>:<min>:<sec><cr><lf>
<alarm code>^<atag>^<verb>[^<mod1>[^mod2>]]<cr><lf>
^^^"<aid>:<message parameters>"<cr><lf>;
```

Possible values for the Alarm Code field include:

- *C - Critical Alarm
- ** - Major Alarm
- * - Minor Alarm
- A - Non-alarm
- NULL - (blank)

The MX2800 STS-1 specifically uses “quoted line(s)” in REPT-ALM and REPT-EVT autonomous messages. The REPT-ALM message has the following quoted line format:

<AID>:<NTFCNCDE>,<CONDTYPE>,<SRVEFF>,<OCRDAT>,<OCRTM>,<LOCN>…

The **NTFCNCDE** field will contain one of the following values:

- CL - Alarm Cleared
- TC - Transient Condition
- MN - Minor
- MJ - Major
- CR - Critical

The **REPT-EVT** message has the following quoted line format

<AID>:<CONDTYPE>,<CONDEFF>,<OCRDAT>,<OCRTM>,<LOCN>…

The CONDEFF field will contain one of the following values:

- CL - Standing Condition Cleared
- SC - Standing Condition Raised
- TC - Transient Condition

For possible CONDTYPE codes for both REPT-ALM and REPT-EVT quoted lines, refer to the condition types listed in **Table 9-3** on page 11 and **Table 9-4** on page 14, respectively.

Refer to TL1 Autonomous Messages on page 9-11 for a list of autonomous messages currently supported by the MX2800 STS-1.

4. TL1 COMMANDS

As stated in TL1 Messages on page 9-3, the general format for a TL1 command is:

<verb>[-<mod1>[-<mod2>]]:<tid>:<aid>:<ctag>:<general block>:<keyword block>: <state block>;

Areas of concentration for TL1 support in the MX2800 STS-1 include session initiation, termination, user account management, and system event reporting. **Table 9-2** lists the commands currently supported by the MX2800 STS-1.

NOTE

The Target ID (TID) is the same as the MX2800 Unit ID. (Refer to the VT100 menus: Configuration/System Management/Equipment Identification).

Table 9-2. TL1 Commands

ACT-USER::<username>:<ctag>::<password>;	
Description	**Initiates a TL1 session**
TID*	Target ID
AID	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)
PARAM1	Password for associated username
ALW-MSG-{EQPT|rr|ALL}:<tid>::<ctag>;	
Description	**Allows the transmission of the requested autonomous alarm(s)**
MOD2	Specifies what entity type to allow: EQPT ...General Equipment Unit rr.....Facility or Circuit (i.e. T1, VT1, STS1) ALL.....All entity types
TID*	Target ID
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to allow: MN .....minor MJ .....major CR.....critical ALL.....all notification codes
CANC-USER;	
Description	**Terminates a TL1 session**
TID*	Target ID
AID*	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)
ED-USER-SECU::<username>:::,<password>,,<privileges>;	
Description	**Edits the requested TL1 user's account**
TID*	Target ID
AID	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)
PARAM2	User's new password

* An asterisk indicates optional command blocks.

Table 9-2. TL1 Commands (Continued)

PARAM4	User's new privileges: 0.....disabled 1.....guest 2.....interface 4.....test 8.....admin
ENT-USER-SECU::<username>:::<password>,,<privileges>;	
Description	**Adds the requested user to the TL1 user table**
TID*	Target ID
AID	Username
CTAG*	Transaction Number (integer)
PARAM1	User's password
PARAM3	User's privileges: 0.....disabled 1.....guest 2.....interface 4.....test 8.....admin
DLT-USER-SECU::<username>;	
Description	**Removes the requested user from the TL1 user table**
TID*	Target ID
AID	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)
INH-MSG-{EQPT|rr|ALL};	
Description	**Inhibits the transmission of the requested autonomous alarm(s)**
MOD2	Specifies what entity type to inhibit: EQPT ...General Equipment Unit rr.....Facility or Circuit (i.e. T1, VT1, STS1) ALL.....All entity types
TID*	Target ID
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to inhibit: MN .....minor MJ .....major CR.....critical ALL.....all notification codes

* An asterisk indicates optional command blocks.

Table 9-2. TL1 Commands (Continued)

RTRV-HDR;	
Description	**Replies with a normal "COMPLD" response**
TID*	Target ID
CTAG*	Transaction Number (integer)
RTRV-USER-SECU;	
Description	**Retrieves the current list of users from the TL1 users table**
TID*	Target ID
CTAG*	Transaction Number (integer)
RTRV-ALM-{EQPT|rr|ALL};	
Description	**Retrieves the requested alarm status**
MOD2	Specifies what entity type to query: EQPT ...General Equipment Unit rr.....Facility or Circuit (i.e. T1, VT1, STS1) ALL.....All entity types
TID*	Target ID

* An asterisk indicates optional command blocks.

Table 9-2. TL1 Commands (Continued)

AID*	Identifies the component to which the desired alarm pertains. Identifiers are dependent on the entity specified in "MOD2" as follows: for T1: 101.... DS1#1 102.... DS1#2 . 128.... DS1#28 ALL ... all DS1 circuits (default selection) for VT1: 201.... VT1#1 202.... VT1#2 . 228.... VT1#28 ALL ... all VT1 circuits (default selection) for STS-1: 301.... STS-1#1 302.... STS-1 (Control Card A) 303.... STS-1 (Control Card B) 501 ....J Path Trace ALL ... all STS-1 circuits (default selection) for EQPT: 401.... Generic 402.... Control Card A 403.... Control Card B 404.... Power Supply A 405.... Power Supply B 502 ....BITS Clock (Control Card A) 503.... BITS Clock (Control Card B) ALL ... all EQPT identifiers (default selection) for ALL: x..... specific identifier (e.g. "1", "28",etc.,) ALL ... all identifiers (default selection)
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to query: MN .....minor MJ .....major CR.....critical
RTRV-COND-{EQPT|rr|ALL};	
Description	**Retrieves the requested condition**
MOD2	Specifies what entity type to query: EQPT ...General Equipment Unit rr.....Facility or Circuit (i.e. T1, VT1, STS1) ALL.....All entity types
TID*	Target ID

* An asterisk indicates optional command blocks.

Table 9-2. TL1 Commands (Continued)

AID*	Identifies the component to which the desired alarm pertains. Identifiers are dependent on the entity specified in "MOD2" as follows: for T1: 101.... DS1#1 102.... DS1#2 . 128.... DS1#28 ALL ... all DS1 circuits (default selection) for VT1: 201.... VT1#1 202.... VT1#2 . 228.... VT1#28 ALL ... all VT1 circuits (default selection) for STS-1: 301.... STS-1#1 302.... STS-1 (Control Card A) 303.... STS-1 (Control Card B) 501 ....J Path Trace ALL ... all STS-1 circuits (default selection) for EQPT: 401.... Generic 402.... Control Card A 403.... Control Card B 404.... Power Supply A 405.... Power Supply B 502 ....BITS Clock (Control Card A) 503.... BITS Clock (Control Card B) ALL ... all EQPT identifiers (default selection) for ALL: x..... specific identifier (e.g. "1", "28",etc.,) ALL ... all identifiers (default selection)
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to query: SC .....Standing Condition

* An asterisk indicates optional command blocks.

5. TL1 AUTONOMOUS MESSAGES

Autonomous messages provide a mechanism for real time reporting of system events. Transmission of these messages is disabled by default and must be explicitly enabled. Although most events reported are alarms, some events are only informational. The Verb, Mod1, and Mod2 parameters of the message indicate what type of event has occurred.

NOTE

The default setting for autonomous Message reporting is *OFF.*

REPT-ALM indicates an alarm event. **Table 9-3** lists possible autonomous messages for alarm events.

Table 9-3. MX2800 STS-1 Alarm Events

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM T1	101-128	MJ	TSA	SA	NEND	DS1 In-test
	101-128	MJ	LOS	SA	NEND	Loss Of Signal
	101-128	MJ	FACTERM	NSA	NEND	T1 Failure
REPT ALM VT1	201-228	MN	LOP-V	SA	NEND	VT path Loss of Pointer
	201-228	MN	AIS-V	SA	FEND	VT path Alarm Indication Signal
	201-228	MN	RFI-V	SA	FEND	VT path Remote Failure Indication
	201-228	MN	SLMF	NSA	FEND	VT path Signal Label Mis-match
	201-228	MN	UNEQ-V	NSA	FEND	VT path Unequipped

Table 9-3. MX2800 STS-1 Alarm Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM STS-1	301	MJ	TSA	SA	NEND	STS-1 In-test
	302 (Ctrl A)	CR	LOS	SA	NEND	STS-1 Loss of Signal
	303 (Ctrl B)					
	302 (Ctrl A)	CR	LOF	SA	NEND	STS-1 Loss of Frame
	303 (Ctrl B)					
	302 (Ctrl A)	CR	EXT	SA	NEND	STS-1 Loss of H4 Multiframe
	303 (Ctrl B)					
	302 (Ctrl A)	CR	LOP-P	SA	NEND	STS-1 Loss of Pointer
	303 (Ctrl B)					
	302 (Ctrl A)	CR	AIS-L	SA	FEND	STS-1 Line A arm Signal Indication
	303 (Ctrl B)					
	302 (Ctrl A)	CR	ASI-P	SA	FEND	STS-1 Path Alarm Signal Indication
	303 (Ctrl B)					
	302 (Ctrl A)	MN	RFI-L	SA	FEND	STS-1 Line Remote Failure Indication
	303 (Ctrl B)					
	302 (Ctrl A)	MN	RFI-P	SA	FEND	STS-1 Path Remote Failure Indication
	303 (Ctrl B)					
	302 (Ctrl A)	MN	UNEQ-P	NSA	FEND	STS-1 Path Unequipped
	303 (Ctrl B)					
	302 (Ctrl A)	MN	SLMF	NSA	FEND	STS-1 Path Signal Label Mismatch
	303 (Ctrl B)					

Table 9-3. MX2800 STS-1 Alarm Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM EQPT	401 (General)	MN	CTNEQPT	NSA	NEND	Controller Communication Failure
	402 (Ctrl A) 403 (Ctrl B)	MN	CTNEQPT	NSA	NEND	Controller Card Failure
	402 (Ctrl A) 403 (Ctrl B)	CR	TRMT	SA	NEND	STS-1 Transmit Loss of Signal
	404 (PS A) 405 (PS B)	MN	PWR	NSA	NEND	Power Supply Failure
	404 (PS A) 405 (PS B)	MN	MISC	NSA	NEND	Power Supply Communication Failure
	404 (PS A) 405 (PS B)	MN	PWR-5	NSA	NEND	Power Supply Low
	404 (PS A) 405 (PS B)	MN	BATD SCHRG	NSA	NEND	Power Supply Charger Fail
	404 (PS A) 405 (PS B)	MJ	LWBATVG	NSA	NEND	Power Supply Battery Low
	404 (PS A) 405 (PS B)	MN	HITEMP	NSA	NEND	Power Supply Temp High
	404 (PS A) 405 (PS B)	MJ	HITEMP	NSA	NEND	Power Supply Temp Critical
	404 (PS A) 405 (PS B)	MN	CLFAN	NSA	NEND	Power Supply Fan Failure

REPT-EVT indicates an informational event. **Table 9-4** lists possible autonomous messages for informational events.

Table 9-4. MX2800 STS-1 Informational Events

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT EVT T1	101-128	EVT	BPV	NSA	NEND	Excessive Bipolar Violations
	101-128	EVT	AIS	NSA	FEND	T1 Line AIS (LAIS)
	101-128	EVT	AIS-STS	NSA	FEND	T1 Path AIS (CAIS)
REPT EVT STS1	402 (Ctrl A)	EVT	BPV	NSA	NEND	STS-1 Excessive Code Violations
	403 (Ctrl B)					
	501	EVT	TIM-P	NSA	NEND	J Path Trace Change
REPT EVT EQPT	401 (General)	EVT	WKSWPR	NSA	NEND	Protection Switch
	401 (General)	EVT	ESW	NSA	NEND	Excessive Protection Switches
	402 (Ctrl A)	EVT	NORMAL	NSA	NEND	Controller Card Inserted
	403 (Ctrl B)					
	402 (Ctrl A)	EVT	PROTNA	NSA	NEND	Controller Card Removed
	403 (Ctrl B)					
	404 (Ctrl A)	EVT	NORMAL	NSA	NEND	Power Card Inserted
	405 (Ctrl B)					
	404 (Ctrl A)	EVT	PROTNA	NSA	NEND	Power Card Removed
	405 (Ctrl B)					
	502 (Ctrl A)	EVT	SYNC STAT CHNG	NSA	NEND	Synchronization Status Change
	503 (Ctrl B)					

Table 9-4. MX2800 STS-1 Informational Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT EVT EQPT (cont'd)	502 (Ctrl A)	EVT	RCVRY	NSA	NEND	Synchronization Source Change
	503 (Ctrl B)					
	502 (Ctrl A)	EVT	SYNCPRI	NSA	NEND	Primary BITS Clock Change
	503 (Ctrl B)					
	502 (Ctrl A)	EVT	SYNCSEC	NSA	NEND	Secondary BITS Clock Change
	503 (Ctrl B)					
	502 (Ctrl A)	EVT	INT	NSA	NEND	Loss of Activity Failure
	503 (Ctrl B)					

6. TL1 ERROR CODES

When the MX2800 STS-1 denies a received TL1 command, the Output Response message has an associated 4-letter error code indicating the reason for denial. **Table 9-5** lists possible error codes.

Table 9-5. TL1 Error Codes

Error Code	Description
ICNV	Input, Command Not Valid
IITA	Input, Invalid Target Identifier
IPNV	Input, Parameter Not Valid
PIUI	Privilege, Input, User Not Valid
PLNA	Privilege, Login Not Active; or Insufficient Privileges
SSRE	Status, System Resources Exceeded
IDRG	Input, Data Range
IIAC	Input, Invalid Access identifier
SROF	Status, Requested Operation Failed

TL1 Editing

TL1 editing commands allow the MX2800 to be provisioned through a TL1 session rather than through the menu system that is accessed using a VT100 terminal emulator. User account information must be provisioned through a console menu session or TL1 session prior to initiating a TL1 session. Once a TL1 session has been initiated using the ACT-USER command, see **Table 9-2** on page 6, the TL1 editing commands may be used. The standard format for an edit command is as follows:

ED-rr:<tid>:<aid>:<ctag>:::<keyword>=<value>;

The parameter descriptions are as follows:

- rr is T1, VT1, STS1, or EQPT
- <tid> is the Target Identifier
- <aid> is the Access Identifier
- <ctag> is a 1-to-6 character correlation tag (echoed in response)
- <keyword> is one of the entries from the data dictionaries in **Table 9-6** on page 18, **Table 9-7** on page 21, **Table 9-8** on page 24, or **Table 9-9** on page 26.
- <value> is one of the enumerated types in the data dictionaries, an integer, or Y/N, depending on the TYPE.

NOTE

<aid> and <ctag> are optional parameter. The placemarker : must remain in place. The default <aid> is All and the default <ctag> is 1.

TL1 Editing Examples:

ED-STS1:UNIT-1:301:1:::TMG=LPD; (This edits timing for STS1 #1 to be loop timing.)

ED-VT1:UNIT-1:205:2:::LBO=133TO266; (This edits line build out for VT1 #5 to be 133 to 266.)

ED-EQPT:UNIT-1:401:4:::PSTEMPCRITRLY=Y; (This enables the alarm relay for power supply temperature critical.)

To view the value of a parameter, a retrieve (RTRV) command is used. The standard format for the RTRV command is as follows:

RTRV-rr:<tid>:<aid>:<ctag>:::<keyword>;

The parameter descriptions are as follows:

- rr is T1, VT1, STS1, or EQPT
- <tid> is the Target Identifier
- <aid> is the Access Identifier
- <ctag> is a 1 to 6 character correlation tag (echoed in response)
- <keyword> is one of the entries from the following data dictionaries in **Table 9-6** on page 18, **Table 9-7** on page 21, **Table 9-8** on page 24, or **Table 9-9** on page 26.

NOTE

<aid> and <ctag> are optional parameters. The placemarker : must remain in place. The default <aid> is All and the default <ctag> is 1.

TL1 RTRV examples:

RTRV-T1::109:4; (This returns the values for all parameters related to T1 #9.)

NOTE

If no parameter is specified, all valid parameters to the <aid> are retrieved.

RTRV-STS1:UNIT-1:301:1:::STS1CVTHRS; (This returns the value of Code Violation Threshold for the STS-1.)

RTRV-VT1:UNIT-1:205:2:::LINECDE; (This returns the Line Code Type on VT1 #5.)

RTRV-EQPT:UNIT-1:404:5:::PSTEMPCRITRLY; (This returns the status [enabled or disabled] of the alarm relay for power supply A temperature critical setting.)

Data Dictionaries

The data dictionaries that follow are to be used while performing TL1 editing or retrieve commands. Each data dictionary contains four columns. The columns are as follows:

- Keyword gives the values to be placed in the <keyword> portion of the edit command.
- Type describes the type of <value> that is required to be entered in the edit command.
  - ENUM requires a text and/or number string to be entered as the <value>.
  - Y/N requires a Y or N representing yes or no to be entered as the <value>.
  - INT requires that an integer be entered as the <value>.
- Domain describes valid entries that may be entered into the <value> portion of the edit command.
- Description explains each of the edit or retrieve commands.

STS-1 Data Dictionary

Table 9-6 contains entries that are used to edit or retrieve options for the STS-1 portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be STS1, and the <aid> value should be the following:

301 for STS-1 #1

Table 9-6. TL1 Editing Data Dictionary for STS-1

Keyword	Type	Domain	Description
CFGACTIVECON-TROLLER	ENUM	One of the following: • A • B	Selects which controller card is active • controller card A is active • controller card B is active
CARDSWRLY	Y/N	Y or [N]	Provisions alarm relay response for the System Protection Switch alarm relay • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
DIAGSTS1	ENUM	One of the following: • DATAMODE • LINELPBK • ANALOGLPBK • DIGLPBK • METLPBK	Enables the selected STS-1 loopback • Refer to Data Mode on page 6-8 • Refer to Line Loopback on page 6-9 • Refer to Analog Loopback on page 6-9 • Refer to Digital Loopback on page 6-10 • Refer to Metallic Loopback on page 6-10
LINELEN	ENUM	One of the following: • LONG • SHORT	STS-1 Line Build-out: • LONG - 255 to 450 feet • SHORT - less than 255 feet
STS1AISLRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 AIS-L alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1AISPRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 AIS-P alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1LOSRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 LOS alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response

Table 9-6. TL1 Editing Data Dictionary for STS-1 (Continued)

Keyword	Type	Domain	Description
STS1LOFRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 LOF alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1LOMFRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 LOMF alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1LOPRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 LOP alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1RFILRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 RFI-L alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1RFIPRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 RFI-P alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1SLMPRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 SLM-P alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1TLOSRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 TLOS alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1UEQPRLY	Y/N	Y or [N]	Provisions alarm relay response for the STS-1 UEQ-P alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
STS1CFGPRI EXTCLK	ENUM	One of the following: • DISABLED • EXTA	Provision primary clock reference (Disabled or External A)

Table 9-6. TL1 Editing Data Dictionary for STS-1 (Continued)

Keyword	Type	Domain	Description
STS1CFGSEC EXTCLK	ENUM	One of the following: • DISABLED • EXTB	Provision secondary clock reference (Disabled or External B)
STS1CVTHRS	ENUM	One of the following: • Disable • 1E3 • 1E4 • 1E5 • 1E6	Indicates a limit on the number of code violations accepted by the unit over the DS3 before the unit switches controller cards • 1E3 - 1 out of every 1,000 bits contains a CV • 1E4 - 1 out of every 10,000 bits contains a CV • 1E5 - 1 out of every 100,000 bits contains a CV • 1E6 - 1 out of every 1,000,000 bits contains a CV
STS1MAXNUMSW	INT	0, 1, 2, ..., N	Maximum number of times per hour the unit is allowed to switch between controller cards (if number is exceeded, the unit will issue a trap)
STS1MINSWPERIOD	INT	0, 1, 2, ..., N	Number of seconds that must pass after a protection switch before another protection switch will be allowed
STS1PROT	Y/N	Y or [N]	Identifies status of system network protection • Yes (Y) - enables system network protection • No (N) - disables system network protection
SYSCARDCOMMRLY	Y/N	Y or [N]	Identifies status of System Communication Fail alarm relay • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
SYSCARDRLY	Y/N	Y or [N]	Identifies status of System Controller Card alarm relay • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
TMG	ENUM	One of the following: • LPD • INT • EXTNONREV • EXTREV	Identifies timing supply for the DS3 • Loop timing • Internal (free-run) timing • External non-revertive • External revertive

VT1 Data Dictionary

Table 9-7 contains entries that are used to edit or retrieve options for the VT1 portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be VT1 and the <aid> value should be one of the following:

201 - VT1#1
202 - VT1#2
.
.
.
228 - VT1#28

Table 9-7. TL1 Editing Data Dictionary for VT1

Keyword	Type	Domain	Description
DIAGVTTESTSTATE	ENUM	One of the following: • DATAMODE • TRIBUTARY • ANALOG • DIGNET • CODEC • CSULPBK • CSUBERT • VTBERT • LINEBERT	Identifies DS2 Diagnostic Loopback • Refer to Data Mode on page 6-2 • Refer to Tributary on page 6-3 • Refer to Analog Network on page 6-3 • Refer to Digital Line/Net on page 6-4 • Refer to Codec Line/Net on page 6-4 • Refer to CSU Loopback on page 6-5 • Refer to CSU Loopback w/BERT on page 6-5 • Refer to VT BERT on page 6-6 • Refer to Line BERT on page 6-7
LBO	ENUM	One of the following: • 0TO133 • 133TO266 • 266TO399 • 399TO533 • 533TO655 • MINUS7R5 • E10TO3000 • UNAVAIL	Line Build Out (returns UNAVAIL if VT is unequipped)
LINECDE	ENUM	One of the following: • AMI • B8ZS • E1AMI • E1HDB3 • UNAVAIL	Line Code (returns UNAVAIL if VT is unequipped)

Table 9-7. TL1 Editing Data Dictionary for VT1 (Continued)

Keyword	Type	Domain	Description
VTAISRLY	Y/N	Y or [N]	Provisions alarm relay response for the VT AIS alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
VTCFGMODE	ENUM	One of the following: • T1 • E1	Identifies VT1 Configuration • T1 sets VT1 configuration to M12 (4xT1). • E1 sets VT1 configuration to G.747 (3xE1).
VTCFGSTATE	ENUM	One of the following: • DISABLE • ENABLE • AUTO • UNAVAIL	State (returns UNAVAIL if VT is unequipped)
VTCFGCIRCUITPROT	ENUM	One of the following: • DISABLE • ENABLE • UNAVAIL	Circuit protection (returns UNAVAIL if VT is unequipped)
VTLBKDETECTION	ENUM	One of the following: • DISABLE • CSU • NIU • UNAVAIL	Loopback detection (returns UNAVAIL if VT is unequipped)
VTHAIRPINNING	ENUM	One of the following: • DISABLE • ENABLE • UNAVAIL	VT Hairpin status (returns UNAVAIL if VT is unequipped)
VTLOPRLY	Y/N	Y or [N]	Provisions alarm relay response for the VT LOP alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
VTMAPPING	ENUM	1, 2, 3, ..., 28 UNEQUIPPED	T1/E1 port to which the VT is mapped
VTRFIRLY	Y/N	Y or [N]	Provisions alarm relay response for the VT RFI alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response

Table 9-7. TL1 Editing Data Dictionary for VT1 (Continued)

Keyword	Type	Domain	Description
VTSLMRLY	Y/N	Y or [N]	Provisions alarm relay response for the VT SLM alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
VTUEQRLY	Y/N	Y or [N]	Provisions alarm relay response for the VT UEQ alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response

T1 Data Dictionary

Table 9-8 contains entries that are used to edit or retrieve options for the T1 portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be T1, and the <aid> value should be one of the following:

101 - DS1#1
102 - DS1#2
.
.
.
128 - DS1#28

Table 9-8. TL1 Editing Data Dictionary for T1

Keyword	Type	Domain	Description
DSXCAISRLY	Y/N	Y or [N]	Provisions alarm relay response for DSX CAIS alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
DSXCVTHRS	ENUM	One of the following: • DISABLE • 1E3 • 1E4 • 1E5 • 1E6	Indicates a limit on the number of code violations accepted by the unit over a single T1/E1 before the unit switches controller cards • 1E3 - 1 out of every 1,000 bits on a single T1/E1 contains a CV • 1E4 - 1 out of every 10,000 bits on a single T1/E1 contains a CV • 1E5 - 1 out of every 100,000 bits on a single T1/E1 contains a CV • 1E6 - 1 out of every 1,000,000 bits on a single T1/E1 contains a CV
DSXLAISRLY	Y/N	Y or [N]	Provisions alarm relay response for the DSX LAIS alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
DSXLOSRLY	Y/N	Y or [N]	Provisions alarm relay response for the DSX LOS alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
DSXPROTTHRS	INT	1-28	Number of Enabled lines that must fail before a protection switch occurs

Table 9-8. TL1 Editing Data Dictionary for T1 (Continued)

Keyword	Type	Domain	Description
DSXXCVRLY	Y/N	Y or [N]	Provisions alarm relay response for the DSX XCV alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response

EQPT Data Dictionary

Table 9-9 contains entries that are used to edit or retrieve options for the equipment portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be EQPT, and the <aid> value should be the following:

401 - Generic

Table 9-9. TL1 Editing Data Dictionary for EQPT

Keyword	Type	Domain	Description
CLOCKSTATUSRLY	Y/N	Y or [N]	Provisions alarm relay response for the Clock Status Changed alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
CLOCKPRIRLY	Y/N	Y or [N]	Provisions alarm relay response for the Primary Reference Failure alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
CLOCKSECRLY	Y/N	Y or [N]	Provisions alarm relay response for the Secondary Reference Failure alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
CLOCKLOARLY	Y/N	Y or [N]	Provisions alarm relay response for the Clock Loss of Activity alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
DIAGBERCLEARCOUNT	Y/N	Y or [N]	Clears BERT count • Yes (Y) - clears the BERT count • No (N) - does not clear the BERT count
DIAGBERTCOUNT	INT	0, 1, 2, ..., N	Error count
DIAGBERTSYNC	ENUM	One of the following: • NOSYNC • SYNC	Identifies state of Pattern Synchronization • NOSYNC - there is no pattern sync • SYNC - pattern sync is available

Table 9-9. TL1 Editing Data Dictionary for EQPT (Continued)

Keyword	Type	Domain	Description
DIAGLPBKTIMEOUT	ENUM	One of the following: • DISABLE • 1-MIN • 5-MINL • 10-MIN • 15-MIN • 30-MIN • 45-MIN • 1-HR	Identifies the amount of time before a Diagnostic Loopback will time out • DISABLE - timeout is disabled • 1-MIN - timeout value is one minute • 5-MINL - timeout value is five minutes • 10-MIN - timeout value is ten minutes • 15-MIN - timeout value is 15 minutes • 30-MIN - timeout value is 30 minutes • 45-MIN - timeout value is 45 minutes • 1-HR - timeout value is 60 minutes
DIAGRESET	Y/N	Y or [N]	Resets Diagnostic Loopbacks • Yes (Y) - reset the diagnostic loopback • No (N) - do not reset the diagnostic loopback
PSBATTERYLOWRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Battery Low alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
PSCHARGERFAILRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Charger Fail alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
PSFANFAILRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Fan Fail alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
PSMALFNCRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Malfunction alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
PSPOWERFAILRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Power Fail alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
PSPOWERLOWRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Power Low alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response

Table 9-9. TL1 Editing Data Dictionary for EQPT (Continued)

Keyword	Type	Domain	Description
PSTEMPCRITRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Temperature Critical alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response
PSTEMPHIGHRLY	Y/N	Y or [N]	Provisions alarm relay response for the Power Supply Temperature High alarm • Yes (Y) - enables alarm relay response • No (N) - disables alarm relay response

TL1 Loopback Commands

The OPR-LPBK and RLS-LPBK commands are provided as an alternative to ED commands to perform loopbacks through TL1. The general format for these commands is as follows:

`OPR-LPBK-{VT1|STS1}:<tid>:<aid>:<ctag>::<locn>,,,<lpbktype>;`

`RLS-LPBK-{VT1|STS1}:<tid>:<aid>:<ctag>::<locn>,,,<lpbktype>;`

Table 9-10 describes each of the STS-1 loopbacks that can be initiated or released with these commands.

Table 9-10. STS-1 TL1 Loopback Commands

Verb	MOD2	<aid>*	<locn>	<lpbktype>	Description
OPR	STS1	3xy	NEND	LINE	Initiates the STS-1 Line Loopback
RLS	STS1	3xy	NEND	LINE	Releases the STS-1 Line Loopback
OPR	STS1	3xy	NEND	DIGLPBK	Initiates the STS-1 Digital Loopback
RLS	STS1	3xy	NEND	DIGLPBK	Releases the STS-1 Digital Loopback
OPR	STS1	3xy	NEND	TERMINAL	Initiates the STS-1 Metallic Loopback
RLS	STS1	3xy	NEND	TERMINAL	Releases the STS-1 Metallic Loopback
OPR	STS1	3xy	NEND	ANALOGLPBK	Initiates the STS-1 Analog Loopback
RLS	STS1	3xy	NEND	ANALOGLPBK	Releases the STS-1 Analog LoopbacK
RLS	STS1	3xy			Releases any active STS-1 Loopback

* The value of xy may be 00 through 03.

Table 9-11 describes each of the DS1 loopbacks that can be initiated or released with DS1 TL1 loopback commands.

Table 9-11. DS1 TL1 Loopback Commands

Verb	MOD2	<aid>*	<locn>	<lpbktype>	Description
OPR	VT1	2xy	NEND	NETWORK	Initiates the DS1 Tributary Loopback
RLS	VT1	2xy	NEND	NETWORK	Releases the DS1 Tributary Loopback
OPR	VT1	2xy	NEND	TERMINAL	Initiates the DS1 Analog Loopback
RLS	VT1	2xy	NEND	TERMINAL	Releases the DS1 Analog Loopback
OPR	VT1	2xy	NEND	DIGNET	Initiates the DS1 Digital Line/Net Loopback
RLS	VT1	2xy	NEND	DIGNET	Releases the DS1 Digital Line/Net Loopback
OPR	VT1	2xy	NEND	CODEC	Initiates the DS1 Codec Line/Net Loopback
RLS	VT1	2xy	NEND	CODEC	Releases the DS1 Codec Line/Net Loopback
OPR	VT1	2xy	FEND	CSULPBK	Initiates the DS1 CSU Loopback
RLS	VT1	2xy	FEND	CSULPBK	Releases the DS1 CSU Loopback
OPR	VT1	2xy	FEND	CSUBERT	Initiates the DS1 CSU Loopback w/BERT
RLS	VT1	2xy	FEND	CSUBERT	Releases the DS1 CSU Loopback w/BERT
RLS					Releases any active DS1 Loopback

* The value of xy may be 01 through 28, corresponding to the desired VT. The loopback activation or deactivation will occur on the DS1 that is mapped to the specified VT.

Appendix A
Acceptance Test Procedure

1. INTRODUCTION

This appendix describes the procedures to be used in performing acceptance testing of the Total Access MX2800 STS-1 Multiplexer. It is assumed that the MX2800 has already been installed, powered-up, and cabled to the DSX-1 and STS-1 cross connects, according to the specifications described in the MX2800 User Manual and local operating company practices.

The MX2800 multiplexer consolidates 28 DS1 circuits onto an STS-1 circuit. Several configuration options are available. This procedure addresses the following tasks:

2. VERIFY INSTALLED OPTIONS

The installed configuration determines the level of redundancy supported by the unit. One or two Power Supply Units (PSU) may be installed; one or two Controller Card Units (CCU) may be installed. One of each is required for non-redundant operation (two of each for full redundancy). Refer to Replacing or Installing Cards on page 2-16 for instructions on removing the front panel and identifying the cards.

Inventory the cards installed using **Table A-12**, record in the table below, and then replace the front panel.

Table A-12. MX2800 STS-1 Card Inventory

If this card is installed...	Check
Power Supply A (far left slot) installed?	
Power Supply B (next slot to right) installed?	
STS-1 Controller A (lower controller card) installed?	
STS-1 Controller B (upper controller card) installed?	

3. CONFIGURE THE UNIT FOR TEST

Prior to performing the desired tests, a minimal configuration must be established on the MX2800. Follow the process in the following subsections:

- Access the Craft Port on page A-2
- Provision the STS-1 on page A-2
- Provision the DS1 Ports on page A-3
- Configure Alarm Relays on page A-4

Access the Craft Port

The MX2800 is shipped with a flat silver-satin cable and a DB-9 adapter. Follow this procedure to connect the MX2800 with the terminal/PC and access the menu system.

1. Plug the silver-satin cable into the **CRAFT** port on the front panel of the MX2800.
2. Using the DB-9 adapter (if required) connect the other end of the cable into the COMx port of the terminal/PC.
3. Initiate a terminal emulation program on the terminal or PC.
4. For PC access, use a terminal emulator applications (i.e. Procomm, Crosstalk, HyperTerminal, etc.). Set options for VT100 emulation, with a character format of 9600, N, 8, 1.
5. Press the <ENTER> key until a “username” prompt appears.
6. The default factory username and password are **adtran** (all lower case).
7. When username and password are successfully entered, the MX2800 STS-1 Main Menu appears. This is the screen from which all other functionality is accessed, and will be used in subsequent steps.

For help in navigating the menu screens, or if difficulty is encountered, refer to Craft Port on page 2-8 for more details.

Provision the STS-1

To put the MX2800 STS-1 in operation, both the STS-1 and DS1 ports must be properly provisioned. The next subsections provide guidance in provisioning of the STS-1 and then the DS1 ports.

- Provision the STS-1 on page A-2
- Provision the DS1 Ports on page A-3

From the Main Menu, select Configuration, then select Network Interface. The Network Configuration screen should appear. Set each of the options on this screen as follows:

STS-1 Configuration

- Line Length = (Use Short if distance to STS-1 cross connect is less than 225 feet or Long if 225-450 feet)
- Timing = Free-Run for internal option or set to External Nonrevertive or External Revertive if using external BITS clock

NOTE

When using external option, the external clock must be configured. Select Primary External Clock, then select External A. Choose Secondary External Clock, then select External B.

- XCV Threshold = Disabled
- VT Mode = VT1.5 for T1 or VT2 for E1 (Note – VTs 22-28 become unavailable when set for VT2)

Protection Configuration

- Active Controller = A
- Network Protection = Disabled
- Max Switch Threshold = 3
- Min. Switching Period (sec.) = 10

Miscellaneous

- Loopback Timeout = 5 minutes

For more information on any of the above options, please refer to Network Interface on page 3-5 in the MX2800 User Manual.

Press the ESC key to get back to the main Configuration Menu.

Provision the DS1 Ports

From the main Configuration menu screen, select VT Interface. The Configure VT Interface menu should display. There are 28 ports to configure which all need to be set identically for testing; therefore, the “Set Multiple” provisioning feature of the MX2800 will be used extensively during this step.

1. Select #29 – Set Multiple
2. Press #3 until State = Enabled
3. Press #4 until Line Coding = B8ZS/HDB3
4. Select #5 – Line Length and choose 0-133 feet
5. Press #6 until Circuit Protection = Enabled
6. Press #7 until Loopback Detection = Disabled
7. Set First = 1 and Last = 28, then select #13 to Apply All

8. Press ESC to return to the Configure VT Interface screen
9. Select #32 – XCV Threshold, and set to Disabled
10. Press ESC to return to the main Configuration Menu

Configure Alarm Relays

Numerous alarm configuration options are available on the MX2800. This test will only be utilized to generate one CRITICAL and one NON-CRITICAL alarm. This determines that the two sets of alarm contacts are operating and wired correctly, and that the appropriate alarm indications are relayed back to the Central Office alarm panel.

1. From the main Configuration menu, select System Management. From this menu, select Alarm Relay Configuration.
2. Select STS-1 Alarms. From this menu, select LOS = Enabled (This will generate a CRITICAL alarm when the STS-1 port sees a Loss of Signal condition.)
3. Press ESC to return to the Alarm Relay Configuration menu.
4. Select VT/Port Alarms. From this menu, select LOS = Enabled (This will generate a NON-CRITICAL alarm when one of the DS1 ports detects a Loss of Signal condition.)
5. Press ESC to return to the Alarm Relay Configuration menu.

4. VERIFY DATA THROUGHPUT

With essential provisioning entered into the MX2800 STS-1, proceed with the actual acceptance testing of the unit. The first test is to verify that the MX2800 STS-1 will pass traffic between the DS1 port(s) and the STS-1 port.

Three different methods of testing are presented. Select the method according to the type of test equipment that is available. The methods are presented in order of preference. All of the tests are performed at the DSX-1 and STS-1 cross-connect bays. This tests both the MX2800 circuitry as well as the Central Office cabling.

DS1 Daisy-chain to STS-1 (hard) Loopback (Method #1)

This is the most desirable of the alternative tests, since it effectively loads all 28 ports of the MX2800 STS-1 with traffic at the same time.

Equipment Required: 1 – DS1 Test set capable of running a BERT test
28 – Mini-Bantam test cords
1 – STS-1 DSX test cord

1. At the STS-1 cross-connect, use a test cord to loop the STS-1 from the MX2800 back on itself.
2. At the DSX-1 cross-connect, insert the TX output of the DS1 test set into the INPUT of the first DS1 channel of the MX2800.
3. At the DSX-1 cross-connect, install a Bantam test cord from the OUTPUT of the first DS1 channel to the INPUT of the second DS1 channel. Then connect a second Bantam test cord from the OUTPUT of the second DS1 channel to the INPUT of the third DS1 channel. Repeat this procedure for all 28 DS1 channels.
4. Connect the OUTPUT of the 28th DS1 channel to the RX input of the DS1 test set.
5. Set the test set options for ESF/B8ZS and run a standard BERT test per operating company practices.
6. All alarms should clear, and the BERT test should run error free.
7. Leave this test set-up in place, as it will be used during the redundancy testing in the Controller Card Redundancy section of this appendix.

If problems are encountered, referring to *Section 4, Status* and *Section 5, Statistics* in the MX2800 User Manual can help in troubleshooting and isolating where the problem lies.

DS1 to STS-1 “Head to Head” Test (Method #2)

This test tests one DS1 channel at a time, using a DS1 test set at the DSX-1 cross-connect, and an STS-1 test set at the STS-1 cross connect.

Equipment Required: 1 – DS1 Test Set capable of running a BERT test
1 – STS-1 Test Set capable of accessing and running a BERT on a single DS1

1. At the STS-1 cross-connect bay, connect the STS-1 test set to the STS-1 coming from the MX2800. Configure the STS-1 test set for the appropriate line build-out option (LBO). Configure the STS-1 test set to drop out DS1 #1 and to run a BERT on it in ESF/B8ZS mode.
2. At the DSX-1 cross-connect bay, connect the DS1 test set to the first DS1 channel of the MX2800. Configure the test set for the same BERT pattern as the STS-1 test set is sending.
3. The DS1 #1 LED will turn solid green. All other unterminated DS1 port LEDs will be red. Data will pass error free between the STS-1 test set and the DS1 test set.
4. Repeat for DS1 channels 2-28 by moving the DSX-1 test cables, and reconfiguring the STS-1 test set to drop out the appropriate DS1 channel under test. Ensure that the LED for the DS1 under test turns green.
5. Leave this test set-up in place, as it will be used during the redundancy testing in the Controller Card Redundancy section of this appendix.

If problems are encountered, referring to *Section 4, Status* and *Section 5, Statistics* in the MX2800 User Manual can help in troubleshooting and isolating where the problem lies.

DS1 to STS-1 (hard) Loopback (Method #3)

This test requires minimal test equipment, and only tests one DS1 at a time.

Equipment Required: 1 – DS1 Test Set capable of running a BERT test
1 – STS-1 DSX Test Cord

1. At the STS-1 cross-connect bay, use a test cord to loop the STS-1 from the MX2800 back on itself.
2. At the DSX-1 cross-connect bay, insert the TX output of the DS1 test set to the DS1 INPUT of the first channel of the MX2800. Connect the RX input of the test set to the OUTPUT of the first DS1 channel of the MX2800.
3. Set the DS1 test set for ESF/B8ZS and the desired BERT pattern.
4. The DS1 #1 LED will turn solid green. All other unterminated DS1 port LEDs will be red. Data will pass error free.
5. Repeat the above procedure for DS1 channels 2-28. Ensure that the LED for the DS1 under test turns green.
6. Leave this test set-up in place, as it will be used during the redundancy testing in the Controller Card Redundancy section of this appendix.

If problems are encountered, referring to *Section 4, Status* and *Section 5, Statistics* in the MX2800 User Manual can help in troubleshooting and isolating where the problem lies.

5. VERIFY ALARMS

The MX2800 has two sets of alarm relay contacts available for connection to external alarm systems. They are located on the back panel, and are designated as CRITICAL and NON-CRITICAL (the Critical/Major/Minor, and Audible/Visual nomenclature is not used on the MX2800 product). The CRITICAL alarm is activated when the STS-1 port experiences a Loss of Signal (LOS) event. The NON-CRITICAL alarm is activated when one of the 28 DS1 ports experiences a Loss of Signal event. Normally OPEN and Normally CLOSED contacts are available for each of the two relay outputs.

The tests are described below:

CRITICAL Alarm Relay Test

This test will actuate the CRITICAL alarm relay contacts of the back panel of the MX2800.

1. Ensure that the STS-1 is not in alarm. The easiest way to do this is to install a hard loopback of the STS-1 toward the MX2800 using a test cord at the STS-1 DSX cross-connect bay. With the loopback in place, all alarms should clear on the STS-1 port. (Use the STATUS LED's on the front panel to determine the state of the STS-1 port. Refer to Controller Card Status LEDs on page 2-14 for the meanings of the LED states).
2. Remove the loopback from the STS-1, and insure that no other STS-1 signal is entering the MX2800 through the STS-1 Cross-connect bay (i.e. another upstream MUX).
3. The MX2800 should go into CRITICAL alarm, thus closing the relay contacts and sending the alarm to the Central Office alarm monitoring equipment.
4. Verify that the alarm is being properly reported.

NON-CRITICAL Alarm Relay Test

This test will actuate the NON-CRITICAL alarm relay contacts on the back of the MX2800.

1. Ensure that the STS-1 is not in alarm. The easiest way to do this is to install a hard loopback of the STS-1 toward the MX2800 using a test cord at the STS-1 DSX cross-connect bay. With the loopback in place, all alarms should clear on the STS-1 port. (Use the STATUS LED's on the front panel to determine the state of the STS-1 port. Refer to Controller Card Status LEDs on page 2-14 for the meanings of the LED states).
2. Ensure that the 28 DS1's are out of alarm. The easiest way to accomplish this is as follows: At the DSX-1 cross-connect, insert the TX output of the DS1 test set into the INPUT of the first DS1 channel of the MX2800. Install a Bantam test cord from the OUTPUT of the first DS1 channel to the INPUT of the second DS1 channel. Then connect a second Bantam test cord from the OUTPUT of the second DS1 channel to the INPUT of the third DS1 channel. Repeat this procedure for all 28 DS1 channels.

   Connect the OUTPUT of the 28th DS1 channel to the RX input of the DS1 test set. Set the test set options for ESF/B8ZS and run a standard BERT test per operating company practices.
3. At this point, nothing should be in alarm. Remove any one of the Bantam cords from the DSX bay. This will cause a DS1 LOS alarm, which will result in the actuation of the NON-CRITICAL alarm relay.
4. Verify that the alarm is being properly reported to the Central Office alarm monitoring equipment.

6. VERIFY SYSTEM REDUNDANCY

This section will address the redundancy features of the MX2800. The MX2800 supports redundancy of both the power supply and controller cards. The information gathered in *Verify Installed Options* (card inventory) will be utilized to determine the type of tests. The following sections describe the tests for various configurations.

Power Supply Redundancy

When installed in a bay, the MX2800 can be wired to have either one or two –48VDC power feeds (A and B). In addition, the MX2800 chassis can be equipped with either one or two power supply cards. Test scenarios for the two most common configurations can be found below:

Dual Power Feed, Single Power Supply Card

When the MX2800 is equipped with only a single power supply card, there is no protection against a failure of the card itself. However the single power supply card is capable of utilizing the A and B power feeds to protect against a failure in one of the power sources feeding the shelf. To verify that the MX2800 is properly utilizing the A and B power feeds, the following procedure is suggested:

1. With the MX2800 installed and operating normally, go to the fuse panel at the top of the bay, and remove the fuse corresponding to the “A” power feed for the MX2800 shelf. This should have no effect on the operation of the shelf, as the MX2800 is now operating on the “B” power feed.
2. Reinsert the fuse for the “A” power feed.
3. Remove the fuse corresponding to the “B” power feed for the MX2800 shelf. There should be no effect on the operation of the shelf, as the MX2800 is now operating on the “A” power feed.
4. Reinsert the fuse for the “B” power feed.

Dual Power Feed, Dual Power Supply Cards

When the MX2800 is equipped with two power supply cards, the shelf is protected against a failure of either of the power supply cards, as well as a failure in one of the power sources feeding the shelf. Use the following procedure to demonstrate the operation of this fully redundant configuration:

1. With the MX2800 installed and operating normally, open the front panel and remove the “A” power supply card (the one on the left). This should have no effect on the operation of the shelf, as the MX2800 is now operating on the “B” power supply.
2. Go to the fuse panel at the top of the bay and remove the fuse corresponding to the “A” power feed. This should have no effect on the operation of the shelf, as the “B” power supply is now running on the “B” power feed.
3. Reinsert the fuse for the “A” power feed.
4. Remove the fuse corresponding to the “B” power feed to the shelf. This should have no effect on the operation of the shelf, as the “B” power supply is now operating on the “A” power feed.
5. Reinsert the fuse for the “B” power feed.
6. Reinsert the “A” power supply into the MX2800 chassis.

7. Remove the “B” power supply card (the one on the right). This should have no effect on the operation of the shelf, as the MX2800 is now operating on the “A” power supply.
8. Go to the fuse panel at the top of the bay and remove the fuse corresponding to the “A” power feed. This should have no effect on the operation of the shelf, as the “A” power supply is now running on the “B” power feed.
9. Reinsert the fuse for the “A” power feed.
10. Remove the fuse corresponding to the “B” power feed to the shelf. This should have no effect on the operation of the shelf, as the “A” power supply is now operating on the “A” power feed.
11. Reinsert the fuse for the “B” power feed.
12. Reinsert the “B” power supply into the MX2800 chassis.
13. Reinstall the front panel on the MX2800.

Controller Card Redundancy

The MX2800 can be equipped with either one or two controller cards. The controller card contains all of the MX2800’s critical circuits (DS1 interfaces, STS-1 interfaces, host controller, etc.). If the MX2800 is equipped with only one controller card, there is no failure protection. If a failure occurs, an alarm is initiated and the front panel LEDs reflect the condition.

If the MX2800 is equipped with two controller cards, all data traffic is protected, and can be switched over to the opposite controller card in the event of a card failure. The following procedure will demonstrate the functionality of a controller switchover:

1. Using the BERT setup that should still be in place after completing the tests in the Verification of Data Throughput section, insure that the system is still passing data error-free.
2. Log into the Craft Port (if necessary) and access the Main Menu screen. From there, select Configuration, then Network Interface, then Active Controller. Determine which controller (A or B) is currently active.
3. Force a switchover to the other Controller Card. If the A controller is active, select controller B as the active controller. This will force a switchover to the B controller. (If the B controller is the active controller, force a switchover to the A controller).
4. Check the BERT display for errors. Data traffic will be interrupted momentarily during the switch, but should become stable and error-free again on the new controller card.
5. The active controller can be left as either A or B. Both cards are identical.

7. RESTORE DEFAULT SETTINGS

The Total Access MX2800 may be restored to the default settings by following the procedure below.

1. Log into the MX2800 Craft Port (if necessary), and access the Main Menu screen. Select Configuration, then Utilities, then Load Default Settings.
2. Once the settings have been retrieved, **Command Accepted** will appear at the bottom of the screen.

8. TURN UP UNIT FOR CUSTOMER TRAFFIC

When these acceptance tests are completed successfully, and the default settings are restored, the MX2800 is considered ready for customer traffic. Refer to *Section 3, Configuration* for details on the various configuration options and features.

9. CHECKLIST/SIGN-OFF

Use the table below to check and initial the completion of the Acceptance Test Procedure steps.

Acceptance Test Procedure Steps	Completed (Initial)
Verification of Installed Options	
Configuring the Unit for test	
Accessing the Craft Port	
Provisioning the STS-1 Port	
Provisioning the DS1 Ports	
Alarm Relay Configuration	
Verification of Data Throughput (complete one of three)	
DS1 Daisy-chain to STS-1 (hard) Loopback	
DS1 to STS-1 “Head to Head” Test	
DS1 to STS-1 (hard) Loopback	
Verification of Alarms	
CRITICAL Alarm Relay Test	
NON-CRITICAL Alarm Relay Test	
Power Supply Redundancy (complete one of two)	
Dual Power Feed, Single Power Supply Card	
Dual Power Feed, Dual Power Supply Cards	
Controller Card Redundancy Test	
Restoration of Default Settings	
Customer Traffic Turnup	

Appendix B
Pinouts

The following tables give the pin assignments for the connectors located on the MX2800 STS-1. For more information on these connectors, Refer to *Section 2, Installation and Operation*.

Table B-1. Craft Port Pin Assignments

RJ Pin#	DB-9	Function	Direction
1	5	GND	
2	7	RTS	I
3	3	TD	I
4	6	DSR	O
5	2	RD	O
6	8	CTS*	O
7	4	DTR	I
8	1	DCD	O
-	9	not used	-

* Used for hardware flow control.

Table B-2. LAN Port Pin Assignments

Pin	Name	Description
1	TD+	The positive signal for the TD differential pair. This signal contains the serial output data stream transmitted onto the network.
2	TD–	The negative signal for the TD differential pair (pins 1 and 2).
3	RD+	The positive signal for the RD differential pair. This signal contains the serial input data stream received from the network.
4, 5	N/A	Not used
6	RD–	The negative signal for the RD differential pair (pins 3 and 6).
7, 8	N/A	Not used

Table B-3. Modem Port Pin Assignments

Pin	Description
1, 2, 3	Not used
4	Tip
5	Ring
6, 7, 8	Not used

NOTE

Information regarding the built-in modem applies to the following ADTRAN products:

4204659L1 AC Non-Redundant Version with Modem
4204659L2 AC Redundant Version with Modem
4204659L3 DC Non-Redundant Version with Modem
4204659L4 DC Redundant Version with Modem
4204659L10 STS-1 AC/DC Redundant with Modem
4204659L11 AC Non-Redundant with Modem with Fans
4204659L12 AC Redundant with Modem with Fans
4204659L13 DC Non-Redundant with Modem with Fans
4204659L14 DC Redundant with Modem with Fans

Table B-4. Amphenol Pin Assignments

Pin	Function		Pin
1	RING 1	TIP 1	33
2	RING 2	TIP 2	34
3	RING 3	TIP 3	35
4	RING 4	TIP 4	36
5	RING 5	TIP 5	37
6	RING 6	TIP 6	38
7	RING 7	TIP 7	39
8	RING 8	TIP 8	40
9	RING 9	TIP 9	41
10	RING 10	TIP 10	42
11	RING 11	TIP 11	43
12	RING 12	TIP 12	44
13	RING 13	TIP 13	45
14	RING 14	TIP 14	46
15	RING 15	TIP 15	47
16	RING 16	TIP 16	48
17	RING 17	TIP 17	49
18	RING 18	TIP 18	50
19	RING 19	TIP 19	51
20	RING 20	TIP 20	52
21	RING 21	TIP 21	53
22	RING 22	TIP 22	54
23	RING 23	TIP 23	55
24	RING 24	TIP 24	56
25	RING 25	TIP 25	57
26	RING 26	TIP 26	58
27	RING 27	TIP 27	59
28	RING 28	TIP 28	60
29			61
30			62
31			63
32	FGND	FGND	64

NOTE

Table B-4 applies to both the **In** and **Out** DSX-1/E1 amphenol connectors.

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Appendix C
Specifications Summary

1. SPECIFICATIONS AND FEATURES

This section describes the standard specifications and features incorporated in the MX2800 STS-1.

STS-1 Network Interface

SONET STS-1 Asynchronously mapped
VT1.5 or V2 Tributaries
Line length: short (0-225) and long (225-450) feet to cross connect
Line rate: 51.84 Mbps

Line interface: dual 75-ohm BNC coax female connectors

DSX-1 Interface(s)

Line length: 0-655 feet
Line rate: 1.544 Mbps
Line code: AMI or B8ZS
Line interface(s): two 64-pin amphenol connectors

Clocking

Network: receive from STS-1
Local: internally generated
External: receive from BITS clock from wire-wrap pins on back of chassis.

Loopbacks

STS-1 Network

ANSI T1.107 compatible loopbacks
Line loopbacks

VT/Port Interfaces

Local and network loopbacks

Management

VT-100 Terminal Interface

RJ-48, EIA-232 compatible, female DB-9 adapter provided

Integrated Modem Interface (4200290L1, L2, L3, and L4)

Dial-up access for VT-100, SNMP, or Telnet
Dial out “cry for help”

SNMP/Telnet

Integrated 10Base-T ethernet
MIB II (RFC 1213), RFC 1215 and RFC 1595 compliant
ADTRAN Enterprise MIB for extended monitoring and control/configuration

Alarms

External alarm contacts for critical and noncritical alarms
Normally Open (NO) and Normally Closed (NC) pinout
Front panel alarm cutoff switch

Agency Approvals

FCC Part 15, Class A, Part 68
Industry Canada CS03
UL and CUL
NEBs level 3

Environment

Operating: 0 to +50 °C (32 to 122°F)
Storage: –20 to +70 °C (–4 to 158°F)
Relative Humidity: Up to 95%, non-condensing

Power

AC version: 120 VAC, 30 watts
DC version: 48 VDC, 30 watts

Physical

Dimensions: Depth: 7.86 inches; Width: 17.0 inches; Height: 1.7 inches

Weight: 5.5 pounds (redundant); 4.5 pounds (non-redundant)

Appendix D
Acronyms/Abbreviations

A

ACO ..... alarm cut off

ACT ..... active

AIS ..... alarm indication signal

ALM ..... alarm

AMI ..... alternate mark inversion

Amp ..... amphenol

ANSI ..... American National Standards Institute

async ..... asynchronous

B

BERT ..... bit error rate test

bps ..... bits per second

BPV ..... bipolar violation

C

CA ..... communications equipment available

CAIS ..... carrier side alarm indication signal

CCITT ..... Consultive Committee for International Telephony and Telegraphy

CCV ..... C-bit coding violation

CD ..... carrier detect

CES ..... C-bit errored seconds

CO ..... central office

CPE ..... customer premise equipment

CRC ..... cyclic redundancy check

CS ..... clear to send

CSES ..... C-bit severely errored seconds

CSU ..... channel service unit

CTS ..... clear to send

CV ..... coding violation

D

dB ..... decibel

DBU ..... dial backup

DCD ..... data carrier detect

DCE ..... data communications equipment

DDS ..... digital data service

DLCI ..... data link connection identifier

DS1 ..... digital signal level one

DS3 ..... digital signal level three

DSR ..... data set ready

DSU ..... data service unit

DSX-1 ..... digital signal cross connect, level 1

DTE ..... data terminal equipment

DTR ..... data terminal ready

E

ES ..... errored seconds

Eq ..... equipment

Eqpt ..... equipment

EXZ ..... excessive zeros

F

FBE ..... F-bit errors

FCC ..... Federal Communications Commission

FDL ..... facility datalink

FEAC ..... far-end alarm and control

FEBE ..... far end block error

H

HSSI ..... high-speed serial interface

I

IP ..... internet protocol

K

KA ..... keep alive

L

LAIS ..... loop side alarm indication signal
LAN ..... local area network
LCV ..... line coding violation
LED ..... light emitting diode
LES ..... line errored seconds
LIU ..... line interface unit
LL ..... local loopback
LOF ..... loss of framing
LOS ..... loss of signal

M

MBE ..... M-bit errors
Mbps ..... megabits per second
MIB ..... management information base
ms ..... millisecond

N

NC ..... normally closed
NI ..... network interface
NMS ..... network management system
NO ..... normally open
NRZ ..... non-return to zero
NSA ..... non service affecting

O

OCU ..... office channel unit
OOF ..... out of frame
OOS ..... out of service

P

PCV ..... P-bit coding violation
PES ..... P-bit errored seconds
POP ..... point of presence
PPP ..... point-to-point protocol
PRF ..... performance
PSES ..... P-bit severely errored seconds

PSTN ..... public switched telephone network

PVC ..... permanent virtual circuit

R

RD ..... receive data

RDL ..... remote digital loopback

RL ..... remote loopback

RMA ..... return material authorization

RS ..... request to send

RTS ..... request to send

Rx ..... receive

S

SA ..... service affecting

SEFS ..... severely errored framing seconds

SES ..... severely errored seconds

SLIP ..... serial line internet protocol

SNMP ..... simple network management protocol

SONET ..... synchronous optical network

SR ..... data set ready

SW56 ..... switched 56

sync ..... synchronous

T

TA ..... terminal equipment available

TD ..... transmit data

TDM ..... time division multiplexing

TM ..... test mode

TR ..... data terminal ready

Tx ..... transmit

U

UAS ..... unavailable seconds

W

WAN ..... wide area network

X

XCV ..... excessive coding violations

APPENDIX E
Glossary

10Base-T Ethernet connector which implements the IEEE standard on 24-gauge, unshielded twisted-pair wiring.

A

AMI Alternate mark inversion. A bipolar line-coding format in T1 transmission systems whereby successive ones are alternately inverted.

ANSI American National Standards Institute. A non-profit organization that coordinates voluntary standards activities in the United States.

asynchronous A method of data transmission which allows characters to be sent at irregular intervals by preceding each character with a start bit, followed by a stop bit.

B

bandwidth The bandwidth determines the rate at which information can be sent through a channel (the greater the bandwidth, the more information that can be sent in a given amount of time).

baud rate A measure of transmission speed over an analog phone line. Baud rate measures the shortest signaling elements per second in the analog signal that a modem sends over an analog phone line. Does not necessarily equal the bit rate.

BERT Bit error rate test. A test that uses any of a number of stress patterns to test STS-1, T3, T1, FT1, and DDS circuits.

bipolar A signal containing both positive and negative amplitude components.

bipolar violation See *BPV*.

bit A binary digit representing a signal, wave, or state as either a one or a zero. A bit is the smallest unit of information a computer can process.

bit error The receipt of an encoded bit that differs from what was sent by the transmitter.

bit rate The speed at which bits are transmitted, usually expressed in bits per second (bps).

bps Bits per second. The number of bits passing a specific point per second. Examples of common rates are kbps (one thousand bits per second) and Mbps (one million bits per second). T3 operates at 44.736 Mbps. STS-1 operates at 51.84 Mbps.

BPV Bipolar violation. A violation in the alternate mark inversion (AMI) line code for which consecutive 1s are represented by pulses of opposite polarity. BPVs that are not intentional (B8ZS) are counted as errors. Could also be the presence of two consecutive 1 bits of the same polarity on the T-carrier line.

bridge A data communications device that connects two or more networks and forwards packets between them.

byte Generally, an 8-bit quantity of information. This term is used mainly in referring to parallel data transfer, semiconductor capacity, and data storage.

C

carrier The provider of the telecommunication services to the customer site. Carriers can be local telephone companies, regional telephone companies, or any inter-exchange carrier such as AT&T, Sprint, or MCI.

CCITT Consultive Committee for International Telephony and Telegraphy. A standards organization that devises and proposes recommendations for international communications. See also *ANSI*.

CD Carrier detect. A signal generated by a modem or DSU/CSU indicating the presence of a carrier signal on a communications link.

channel A transmission path between two or more termination points; also called a circuit, facility, line, link, or path.

channel bank Equipment in a telephone central office or customer premises that performs multiplexing of lower speed digital channels into a higher speed composite channel. The channel bank also detects and transmits signaling information for each channel, thereby transmitting framing information so that time slots allocated to each channel can be identified by the receiver.

channel service unit See *CSU*.

clocking An oscillator-generated signal that provides a timing reference for a transmission link. A clock provides signals used in a transmission system to control the timing of certain functions. The clock has two functions: (1) to generate periodic signals for synchronization, and (2) to provide a time base.

CPE Customer premises equipment. All telecommunications terminal equipment located on the customer premises, including telephone sets, private branch exchanges (PBXs), data terminals, and customer-owned, coin-operated telephones.

craft port The electrical interface between the MX2800 STS-1 and the control terminal. The control terminal is used to communicate commands to the unit.

CSU Channel service unit. A device used to connect a digital phone line coming in from the phone company to either a multiplexer, channel bank, or directly to another device producing a digital signal; for example, a digital PBX, a PC, or data communications device. A CSU performs certain line-conditioning and equalization functions, and responds to loopback commands sent from the central office. A CSU also regenerates digital signals. It monitors them for problems and provides a way of testing the digital circuit.

CTS Clear to send. A signal on the DTE interface indicating that the DCE is clear to send data.

D

data communications equipment See *DCE*.

data service unit See *DSU*.

dB Decibel. A unit of measure of signal strength; usually the relation between a transmitted signal and a standard signal source.

DCE Data communications equipment. Device that provides all the functions required for connection to telephone company lines and for converting signals between telephone lines and DTE. Also see *DTE*.

DDS Digital data service. A private line digital service for transmitting data end-to-end at speeds of 2.4, 4.8, 9.6, and 56 kbps (and in some cases 19.2, 38.4, or 64 kbps). The systems can use central hub offices for obtaining test access, bridging legs of multi-point circuits, and cross connecting equipment. DDS is offered on an inter-LATA (local access and transport area) basis by AT&T and on an intra-LATA basis by the Bell operating companies.

delay The amount of time by which a signal is delayed. A round-trip transmission delay measurement helps detect possible causes of protocol timeouts.

DLCI Datalink communications identifier. A unique number assigned to a PVC endpoint in a frame relay network. Identifies a particular PVC endpoint within a user's access channel in a frame relay network and has local significance only to that channel.

DSR Data set ready. A signal on the DTE interface that indicates if a connection exists and if the devices are ready to start handshaking control signals so communications can begin.

DSU Data service unit. A device designed to transmit and receive digital data on digital transmission facilities.

DTE Data terminal equipment. The end-user terminal or computer that plugs into the termination point (DCE) of a communications circuit. The main difference between the DCE and the DTE is that pins two and three are reversed.

E

E1 Transmission rates of 2.048 Mbps are available on T1 communication lines. See also *T1*.

end device The ultimate source or destination of data flowing through a network (sometimes referred to as DTE).

end user Subscriber who uses (rather than provides) telecommunications services.

ES Errored seconds. A second with one or more coding violations (CVs).

ethernet Transmission protocol for packet-switching LANs.

F

facilities The equipment used by carriers to provide communication services.

far end The distant end to that being considered. Not the end where testing is being carried out.

FCC Federal Communications Commission. The U.S. federal agency responsible for regulating interstate and international communications by radio, TV, wire, satellite, and cable.

FDL Facility datalink. FDL bits provide overhead communication between the terminal equipment in ESF framing.

G

gateway A device which enables information to be exchanged between two dissimilar systems or networks.

H

host computer The primary or controlling computer in a multiple computer operation.

I

idle code In a T3 circuit, an idle code consists of a sequence of 1100 over the entire payload bandwidth.

in-band Signaling (dialing, loopbacks, management, configuration, etc.) over the same channel used for data.

IP Internet protocol. A protocol which provides for transmitting blocks of data between hosts identified by fixed-length addresses.

L

LAN Local area network. A privately owned network that offers high-speed communications channels to connect information processing equipment in a limited geographic area.

local loopback (LL) A type of test used to verify the operation of the local terminal equipment, the CSU, and the connection between the two. The signal from the DTE is looped back by the CSU and is sent back to the DTE.

loopback The technique for testing the processing circuitry of a communications device. May be initiated locally or remotely via a telecommunications circuit. Device being tested will echo back received test data. The results are compared with the original data.

LOS Loss of signal. Defined as a line state in which no pulses are received for 175 bit positions.

M

Mbps Megabits per second (one million bits per second).

MIB Management information base. A database of network management information used by SNMP.

modem Acronym for modulator/demodulator. Equipment that converts digital signals to and from analog signals. Used to send digital signals over analog phone lines.

monitor To watch or listen to a signal non-intrusively.

multi-point circuit A single communications circuit that has more than two terminations.

N

NC Normally closed. Relay switch contacts that remain closed when inactive.

near end The unit on-site.

NI Network interface. The demarcation point between the CPE and the PSTN.

NO Normally open. Relay switch contacts that remain open when inactive.

NRZ Non return to zero. A mode in which the digital level is low for a 0 bit and high for a 1 bit, and does not return to zero between successive 1 bits.

O

out-of-band Signaling that is separated from the channel carrying information (voice, data, video, etc.). Typically the separation is accomplished by a filter. The signaling includes dialing and other supervisory signals.

P

point-to-point Type of communications link that connects a single device to another single device, such as a remote terminal to a host computer.

POP Point of presence. Physical place within a LATA (local access and transport area) where a long distance carrier or a cellular provider interfaces with the network of the local exchange carrier (LEC). A POP is usually a building serving as the point of termination which houses switches and transmission equipment.

protocol A set of rules controlling the orderly exchange of information between stations in data communications networks or systems.

PSTN Public switched telephone network. Usually refers to the world-wide voice telephone network available for public use.

R

remote configuration A feature designed into ADTRAN products that allows remote units to be configured from a local unit or a VT 100 compatible terminal.

router A device that supports communications between networks. Routers are similar to bridges, with the exception that routers provide more functionality (such as finding the best route between networks and providing network management capabilities).

S

service The provision of telecommunications to customers by a common carrier, administration, or private operating agency using voice, data, and/or video technologies.

service provider A company that delivers or sells a telecom service.

SES Severely errored seconds. A second in which more than 320 code violations (CVs) occurred or an OOF condition occurred.

signaling Communication between switches to set up and terminate calls.

SNMP Simple network management protocol. A control and reporting scheme widely used to manage devices from different vendors. SNMP operates on top of the Internet protocol.

SONET Synchronous optical network. A standard format for transporting a wide range of digital telecommunications services over optical fiber. SONET is characterized by standard line rates, optical interfaces, and signal formats.

synchronous Communications in which the timing is achieved by sharing a single clock. Each end of the transmission synchronizes itself with the use of clocks and information sent along with the transmitted data.

T

T1 Transmission rates of 1.544 Mbps are available on T1 communication lines. Also referred to as digital signal level 1 (DS-1). See also *E1*.

TDM Time division multiplexing. A technique for transmitting two or more signals at the same time over a single communication medium. This is accomplished by allocating channels to the bandwidth for specific increments of time.

Telnet The standard TCP/IP remote login protocol specified in RFC-854.

transceiver A combination of transmitter and receiver providing both output and input interfaces within a single device.

transmission The signaling of data over telecommunications channels.

V

V.35 A standard for trunk interface between a network access device and a packet network that defines signaling for data rates greater than 19.2 kbps.

VT-100 A non-intelligent terminal or terminal emulation mode used for asynchronous communications. Used to configure the MX2800 STS-1.

W

WAN Wide area network. A communications network serving geographically separate areas. A WAN typically extends a LAN outside the building to link to other LANs over telephone lines.

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Appendix F
Warranty

1. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found at www.adtran.com/warranty.

Refer to the following subsections for sales, support, Customer and Product Service (CAPS) requests, or further information.

ADTRAN Sales

Pricing/Availability:
800-827-0807

ADTRAN Technical Support

Pre-Sales Applications/Post-Sales Technical Assistance:
800-726-8663

Standard hours: Monday - Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for Repair/Upgrade:
(256) 963-8722

Repair and Return Address

Contact CAPS prior to returning equipment to ADTRAN.

ADTRAN, Inc.
CAPS Department
901 Explorer Boulevard
Huntsville, Alabama 35806-2807

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