ADTRAN

MX2800 STS-1
User Manual

4200659L1	AC Non-Redundant Version with Modem
4200659L2	AC Redundant Version with Modem
4200659L3	DC Non-Redundant Version with Modem
4200659L4	DC Redundant Version with Modem
4200659L5	AC Non-Redundant Version
4200659L6	AC Redundant Version
4200659L7	DC Non-Redundant Version
4200659L8	DC Redundant Version
1200291L1	Breakout Panel
4175043L2	Battery Backup
1200657L2	Battery Backup Adapter Cable
1200287L1	Amp to Punch-Down Cable

Trademark Information

OpenView is a trademark of Hewlett-Packard Company.
Spectrum is a registered trademark of Cabletron.

FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of FCC rules. On the bottom of the equipment housing is a label showing the FCC registration number and ringer equivalence number (REN). If requested, provide this information to the telephone company.

2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.

3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment. Advance notification and the opportunity to maintain uninterrupted service are given.

4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the network until the problem is corrected or it is certain the equipment is not malfunctioning.

5. This unit contains no user-serviceable parts.

6. An FCC compliant telephone cord with a modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.

7. The following information may be required when applying to the local telephone company for a dial-up line for the V.34 modem:

Service Type	REN	FIC	USOC
Loop Start	1.6B/0.8A	02LS2	RJ-11C

8. The REN is useful in determining the quantity of devices you may connect to your telephone line and still have all of those devices ring when your number is called. In most areas, the sum of the RENs of all devices should not exceed five. To be certain of the number of devices you may connect to your line as determined by the REN, call your telephone company to determine the maximum REN for your calling area.

9. This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.

Federal Communications Commission
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.*

> **WARNING**
>
> *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.*

Canadian Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

Canadian Equipment Limitations

Notice: The Canadian Industry and Science Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above limitations may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

> **CAUTION**
>
> *Users should not attempt to make such connections themselves, but should contract the appropriate electric inspection authority, or an electrician, as appropriate.*

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all devices does not exceed 100.

Important Safety Instructions
Save These Instructions

When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

1. Do not use this product near water, such as near a bathtub, wash bowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.

2. Avoid using a telephone (other than a cordless-type) during an electrical storm. There is a remote risk of shock from lightning.

3. Do not use the telephone to report a gas leak in the vicinity of the leak.

4. Use only the power cord, power supply, and/or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for special disposal instructions.

Warranty and Customer Service

ADTRAN will replace or repair this product within ten years from the date of shipment if it does not meet its published specifications or fails while in service. For detailed warranty, repair, and return information refer to the ADTRAN Equipment Warranty and Repair and Return Policy Procedure.

Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

For service, RMA requests, or further information, contact one of the numbers listed at the end of this manual.

LIMITED PRODUCT WARRANTY

ADTRAN warrants that for ten (10) years from the date of shipment to Customer, all products manufactured by ADTRAN will be free from defects in materials and workmanship. ADTRAN also warrants that products will conform to the applicable specifications and drawings for such products, as contained in the Product Manual or in ADTRAN's internal specifications and drawings for such products (which may or may not be reflected in the Product Manual). This warranty only applies if Customer gives ADTRAN written notice of defects during the warranty period. Upon such notice, ADTRAN will, at its option, either repair or replace the defective item. If ADTRAN is unable, in a reasonable time, to repair or replace any equipment to a condition as warranted, Customer is entitled to a full refund of the purchase price upon return of the equipment to ADTRAN. This warranty applies only to the original purchaser and is not transferable without ADTRAN's express written permission. This warranty becomes null and void if Customer modifies or alters the equipment in any way, other than as specifically authorized by ADTRAN.

EXCEPT FOR THE LIMITED WARRANTY DESCRIBED ABOVE, THE FOREGOING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER AND THE EXCLUSIVE LIABILITY OF ADTRAN AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES (EXPRESSED OR IMPLIED). ADTRAN SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING (WITHOUT LIMITATION), ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THIS EXCLUSION MAY NOT APPLY TO CUSTOMER.

In no event will ADTRAN or its suppliers be liable to Customer for any incidental, special, punitive, exemplary or consequential damages experienced by either Customer or a third party (including, but not limited to, loss of data or information, loss of profits, or loss of use). ADTRAN is not liable for damages for any cause whatsoever (whether based in contract, tort, or otherwise) in excess of the amount paid for the item. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to Customer.

Customer Service, Product Support Information, and Training

ADTRAN will replace or repair this product within five years from the date of shipment if the product does not meet its published specification, or if it fails while in service.

A return material authorization (RMA) is required prior to returning equipment to ADTRAN. For service, RMA requests, training, or more information, see the toll-free contact numbers given below.

Presales Inquiries and Applications Support

Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering	(800) 615-1176
Sales	(800) 827-0807

Post-Sale Support

Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

Technical Support	(888) 4ADTRAN

The Custom Extended Services (ACES) program offers multiple types and levels of service plans which allow you to choose the kind of assistance you need. For questions, call the ACES Help Desk.

ACES Help Desk	(888) 874-2237

Repair and Return

If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Custom and Product Service (CAPS) department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact CAPS directly at the following number:Identify the

CAPS Department   (256) 963-8722

RMA number clearly on the package (below address), and return to the following address:

ADTRAN Customer and Product Service
6767 Old Madison Pike
Building #6 Suite 690
Huntsville, Alabama 35807

RMA # _____

Training

The Enterprise Network (EN) Technical Training offers training on our most popular products. These 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 and courses taught at our facilities or at your site. For more information about training, please contact your Territory Manager or the Enterprise Training Coordinator.

Training - phone   (800) 615-1176, ext. 7500

Training - fax   (256) 963 7941

Training - email   training@adtran.com

Table of Contents

MX2800 STS-1 User Manual

List of Figures

List of Tables

Chapter 1 Introduction

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 10BaseT 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 Hewlett Packard's HP OpenView™ and Cabletron's Spectrum™. 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, diagnostics, and performance monitoring are available through SNMP, Telnet, or a VT-100 terminal interface. This connection can be made via ethernet, a local EIA-232 link, or through the built-in V.34 modem (see the note at the end of this section on page 1-2). 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 10BaseT ethernet or SLIP/PPP dialup
- Detailed performance monitoring for local and remote units
- Simplified configuration through the VT-100 terminal menu structure
- Integrated V.34 modem for dial-up and dial-out access (see the following note)
- Capable of backhauling multiple service types (T1/E1)
- AC or DC power
- VT Hairpining
- VT cross-connect to any DS1
- NEBS Level 3 compliant
- Standard 10-year warranty

> **NOTE**
> *Information regarding the built-in modem applies to the following list of part numbers: 4200659L1, L2, L3, and L4.*

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. See Chapter 7, *Circuit and Network Redundancy* for more information.

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 way to provide 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 hairpining 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.

STS-1 Framing

The STS-1 frame is organized as 9 rows by 90 columns of bytes. 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. 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).

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 line overhead (LOH), and is a count of the number of bytes 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.

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.

Unit Timing

The MX2800 STS-1 multiplexer allows three timing methods. The first is **LOOP** timed, in which 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.

The second mode of operation is **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.

The third timing operation mode is **EXTERNAL**. **EXTERNAL** timing mode allows the MX2800 STS-1 to derive its transmit timing from any one of the 28 DSX-1/E1 physical ports. The ports selected may be data carrying ports. 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. 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.

SNMP

The MX2800 STS-1's embedded SNMP feature allows the unit to be accessed and controlled by a network manager through the 10BaseT 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 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, the network manager, the agent, and the 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.

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 session may be active at a time.

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. Only one TL1 Telnet connection can be active at a time.

AVAILABLE OPTIONS

The following optional equipment is available for use with the MX2800 STS-1. Contact your local distributor or the ADTRAN sales department for more information (see front section of this manual for phone number).

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 Amp cables which allow direct cabling to the MX2800 STS-1 (see *Connecting the Breakout Panel* on page 2-6 for more information).

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.

Chapter 2 Installation and Operation

UNPACK, INSPECT, POWER UP

Receiving Inspection

Carefully inspect the MX2800 STS-1 for any damage that might have occurred in shipment. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Technical Support (see the front section of this manual for phone numbers). Keep the original shipping container to use for future shipment or verification of damage during shipment.

ADTRAN Shipments Include

The following items are included in shipments of the MX2800 STS-1:

- MX2800 STS-1 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 cord (AC Versions only)
- Mounting ears and screws for 19-inch or 23-inch rack installation
- User Manual or CD containing the User Manual

NOTE   *The ADTRAN MX2800 STS-1 MIB is available at* www.adtran.com.

Power Up

The AC version of the MX2800 STS-1 is provided with a six-foot power cord, terminated by a three-prong plug which connects to a grounded 120 VAC power receptacle.

NOTE   *Power to the AC version of the MX2800 STS-1 must be provided from a grounded 120 VAC, 60 Hz receptacle.*

The DC version of the MX2800 STS-1 is provided with two 4-position modular terminal lug connectors. These connectors make it easier to perform initial wiring and to connect and disconnect DC power when replacing rackmount units.

For more detailed information on power connections, refer to Chapter 8, *Power Loss Recovery*.

Once the modular connector is wired, push it firmly into one of the rear panel **POWER** connectors. Figure 2-1 and Table 2-1 on page

2-3 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 connection. If AC fails, a trap is sent to alert user when connected to the 4175043L2 battery backup system or equivalent
-	Negative side of DC power source (usually -48V)
RET	Positive side of DC power source (usually ground)
⏚	Frame Ground

The following UL requirements must be met during installation of the MX2800 STS-1 DC version:

1. Disconnect all power sources prior to servicing (unit may use multiple power sources).

2. Input: Minimum 48 VDC, 0.8 A
          Minimum 120 VAC, 0.32 A

3. Connect to a reliably grounded -48 VDC source which is electrically isolated from the AC source.

4. The branch circuit overcurrent protection shall be a fuse or circuit breaker rated minimum 48 VDC, maximum 20 A.

5. A readily accessible disconnect device that is suitably approved and rated, shall be incorporated in the field wiring.

6. 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.

7. The unit shall be installed in accordance with the requirements of NEC NFPA 70.

8. The unit shall 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 (i.e. Central Office, behind a locked door, or service personnel area only).

9. Care should be taken not to upset the stability of the equipment rack after installation is complete.

CAUTION

To meet the UL requirements during installation, use copper conductors only.

RACKMOUNT INSTALLATION

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

1. Prepare the MX2800 STS-1 mounting ears by scraping the paint away from the mounting ears' portion that makes contact with the rack and the portion where the screw mounts into the side of the MX2800 STS-1.

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

CAUTION *Be sure to install the flanges with the screws provided.*

---

3. 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.

4. Make all network, DTE, and power connections to the rear of the unit. See *Power Up* on page 2-2 for more information on making the DC power connection.

5. 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 unit's internal cards. This design allows the unit to operate without a cooling fan, which increases its overall reliability.*

Connecting the Breakout Panel

The optional breakout panel (P/N 1200291L1) connects to the MX2800 STS-1 via the **IN** and **OUT** Champ 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 Amp cables which allow direct cabling to the MX2800 STS-1. Connect the breakout panel's **IN** Champ connector to the MX2800 STS-1's **IN** Champ connector and the breakout panel's **OUT** Champ connector to the MX2800 STS-1's **OUT** Champ connector (see Figure 2-2).

Front View
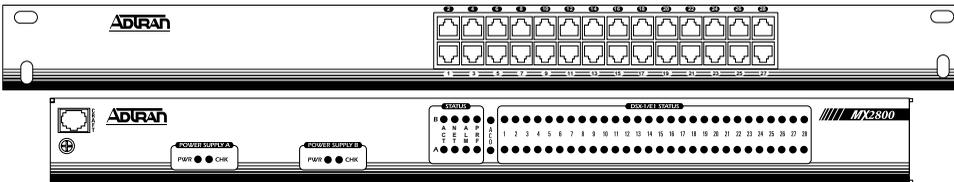
Rear View
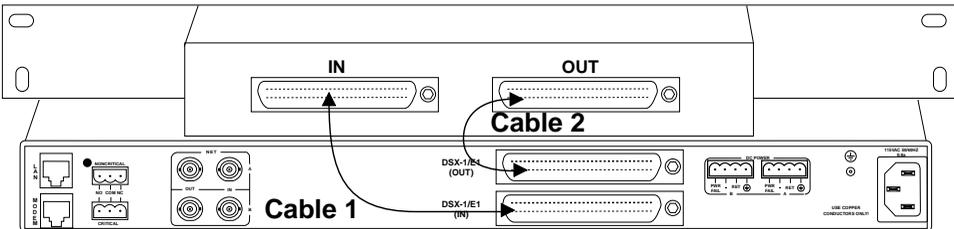
Figure 2-2. The Breakout Panel

REAR PANEL

The MX2800 STS-1 rear panel is equipped with a LAN port, a modem port, two alarm output terminal blocks, two sets of NET in/out jacks, two Amphenol (Amp) connectors, and DC/AC power connections. Figure 2-3 illustrates the rear panel and identifies its equipment. Descriptions for these items follow the figure. Pin assignments are given in *Appendix A, Pinouts.*
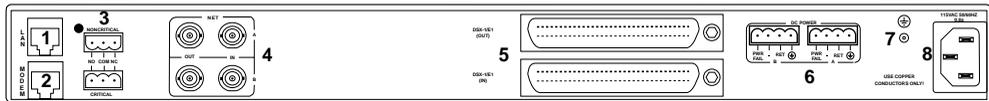
#	Item	Function
1	LAN	10BaseT LAN connection *Note: The LED to the right of this connector illuminates when the unit is connected to an active ethernet segment.*
2	Modem	Telephone line connection for internal V.34 modem (see note on page 2-8)
3	Noncritical/Critical	Connections for external audible/visible alarms
4	NET	Network service connections for controller cards A and B
5	DSX-1/E1	64-pin Amp connectors for T1/E1s
6	Power	DC power connection
7	⏚	Ground stud
8	115 VAC 50/60Hz	AC power connection

Figure 2-3. MX2800 STS-1 Rear View

LAN Port

The **LAN** port is an 8-pin modular connector that provides a 10BaseT 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 list of numbers: 4200659L1, L2, L3, and L4.*

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 (see the section *Alarm Relays* on page 3-18).

Network Interfaces

The network interfaces are full-duplex circuits provided by four BNC coaxial cable connections (two for each controller card). 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 Amp 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 earlier in this chapter on page 2-2.

FRONT PANEL

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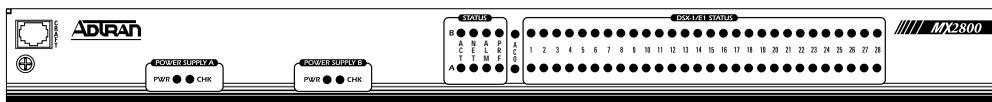
Figure 2-4. MX2800 STS-1 Front Panel

Craft Port

The **CRAFT** port, an 8-pin modular jack, provides connection to a VT-100 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

To connect the MX2800 STS-1 to a VT-100 terminal, follow the steps below:

1. Configure the VT-100 terminal for 9600, 19200, 38400, or 57600 baud, 8-bit characters, no parity, and one stop bit (*xxxx*, 8N1).

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 password prompt appears.

5. Enter the password. The factory default password is **adtran** (all lower-case). The **MAIN MENU** appears (see Figure 2-5 on page 2-11).

6.   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.

```
█ B █                          ADTRAN STS-1 Main Menu

    1 - Status
    2 - Statistics
    3 - Configuration
    4 - Diagnostics

    5 - Logout




 Enter selection >
```

Figure 2-5. Terminal 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:

If you want to...	Press...
select an item	the number corresponding to your choice, and then press the **Enter** key
scroll left and right within the same screen	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	the **ESC** key

If you want to...	Press...
end the terminal session	**Ctrl-C**
refresh the display	**Ctrl-R**

The MX2800 STS-1 **MAIN MENU** consists of the following sections:

Status
Provides information on the current state of the STS-1, power supplies, system, and VT/Port lines. For more detailed information, see *Chapter 4, Status*.

Statistics
Provides detailed statistical information (both current and historical) for the STS-1, VT, and Port lines. For more detailed information, see *Chapter 5, Statistics.*

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

Diagnostics
Performs loopback tests over the STS-1, VT/Port lines. For more detailed information, see *Chapter 6, Diagnostics.*

Logout
The **LOGOUT** selection ends the terminal session and logs out of the system. Password entry is required before a new session can begin. The unit will also logout of a terminal session automatically if the session remains inactive for a certain period of time. For more information, see *Terminal Timeout* on page 3-35.

ACO Buttons

The **ACO** (alarm cut off) buttons allow you to turn off an active audible alarm. The buttons are recessed, so you must use a pen or other pointed instrument to press them. Once you have used an **ACO**

button to deactivate an alarm, it remains disabled until the condition
has cleared.

Alarms can also be turned off remotely by using a selection found
in the **STATUS** menu. See *Acknowledge Alarms (ACO)* on page 4-12
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

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.

Status LEDs

The **STATUS** LEDs apply to the two controller cards. The LEDs
provided are **ACT** (active), **NET**, **ALM** (alarm), and **PRF**
(performance). Different conditions are indicated by the state of the
LED (it remains solid, blinks, 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 2-2 on
page 2-14. LED definitions for T1/E1 cards are provided in Table
2-3 on page 2-15.

Table 2-2. LED Conditions for Active Cards

	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 blinking	Card Failure
NET	green solid	Normal (All OK)
	red blinking	LOS
	red solid	LOFM. AIS-P, AIS-L, RFI-L, RFI-P, LOP, SLM, UEQ
	amber solid	In Test (Local)
	amber blinking	In Test (Remote)
	red/amber alternating	In Test + Alarms
ALM	green solid	Normal (No Alarm)
	red blinking	Critical Alarm
	red solid	Non-Critical Alarm
	amber blinking	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 blinking	Continuous Code Violations
	red solid	XCV Threshold Exceeded

Table 2-3. LED Conditions for Standby Cards

	LED State	Card Condition
ACT	green blinking	Normal (All OK)
	amber solid	Software Update in Progress
	red blinking	Self Test Failed
NET	off	Normal (All OK)
	red blinking	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 2-4 on page 2-16 provides LED definitions for the active and standby cards.

Table 2-4. T1/E1 LED Conditions

	LED State	T1/E1 Condition
Active Card	green solid	Normal (All OK)
	off	Disabled
	red blinking	LOS
	red flash (once per event)	Single/Burst CV
	red/green alternating	XCV Threshold Exceeded
	amber solid	In Test (Local)
	amber blinking	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 blinking	T1/E1 Failure

Chapter 3   Configuration

To configure the MX2800 STS-1, use a 10BaseT ethernet
connection, a SLIP/PPP modem port, or a VT-100 terminal. Figure
3-1 shows the **CONFIGURATION** menu and Figure 3-2 on page 3-2
shows the menu tree.

```
┌──────────────────────────────────────────────────────────────┐
│ ▣ A                        Configuration                       │
├──────────────────────────────────────────────────────────────┤
│                                                                │
│    1 - Network Interface                                       │
│    2 - VT Interface                                            │
│    3 - System Management                                       │
│    4 - Utilities                                               │
│                                                                │
│    5 - Save Configuration                                      │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
├──────────────────────────────────────────────────────────────┤
│ Enter selection >                                              │
└──────────────────────────────────────────────────────────────┘
```
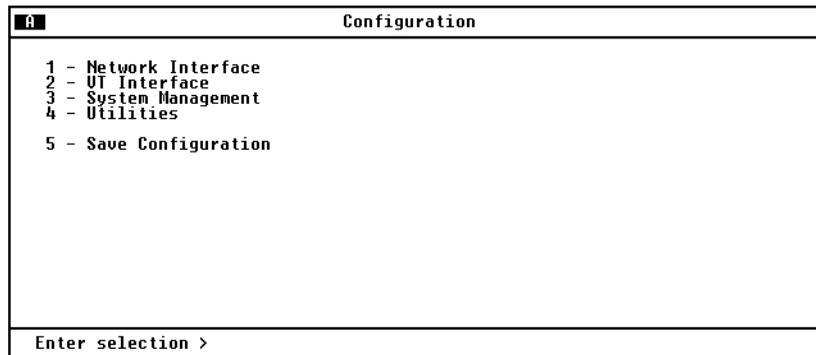
Figure 3-1. Configuration Menu

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

		Line Length	
	STS-1 Configuration	Timing	
		XCV Threshold	
Network Interface		VT Mode	Active Controller
	Protection Configuration		Network Protection
			Max Switch Threshold
	Miscellaneous	Loopback Timeout	Min Switching Period
	External Clock Configuration	PRI Ext. Clock	
		VT/Port Mapping>	First
		T1 State	Last
	VT Interface #1-28	T1 Coding	State
		T1 Remote Loopbacks	Line Coding
		T1 Circuit Protection	T1 Line Length
		Hairpin Loopback	Circuit Protection
		Line ID	Loopback Detection
VT Interface	Set Multiple		Apply State
	Set Cross-Connect Mapping		Apply Line Length
	Restore VT Mapping Defaults		Apply Circuit Protection
	Protection Threshold		Apply Loopback Protection
	XCV Threshold	Local IP Address	Apply All
		Gateway IP Address	
		Subnet Mask	
		Management Port	Trap IP Address
		Dial-up Options	Trap Generation
	MGMT Options	TL1 Setup	Read Community Name
System	SNMP MGMT Options		Write Community Name
Management			Trap Community Name
		Password	
		Terminal Timeout	Alarm Relay Configuration
	System Security	IP Security	Equipment Identification
	Date & Time	IP Hosts	Syslog Setup
	Miscellaneous		Save on Logout
			Craft baud rate
	Load Default Settings	Update via XMODEM	
Utilities	Update FLASH Software	Update via TFTP Server	Server ID
	Config Transfer		Server Filename
			Load and Use
	System Reset	Immediate	Save Config Remotely
Save Configuration		Scheduled Reset Time	

Figure 3-2. Configuration Menu Tree

NETWORK INTERFACE

Select **NETWORK INTERFACE** to access the network configuration parameters (see Figure 3-3). Configure the MX2800 STS-1 network settings to match the STS-1 signal received from the service provider.

```
 B                         Network Configuration

 STS-1 Configuration                        External Clock Configuration
  1 - Line length = Short (0-255 ft.)       11 - PRI Ext. Clock = Port #1
  2 - Timing = Free-run                     12 - SEC Ext. CLock = Port #2
  3 - XCV Threshold = Disabled
  4 - VT Mode = VT1.5 (T1)

 Protection Configuration
  5 - Active Controller = B
  6 - Network Protection = Disabled
  7 - Max. Switch Threshold = 3
  8 - Min. Switching Period (sec.) = 10

 Miscellaneous
  9 - Loopback Timeout = 5 min.
 10 - Shutdown Stand-by


 Enter selection > ▮
```

Figure 3-3. Network Configuration Menu

STS-1 Configuration

Use the **STS-1 CONFIGURATION** selections described below to configure the STS-1 network settings to match your application.

Line Length

Set the line length to reflect the physical length of the STS-1 network line. Set to **LONG** if the cabling distance is between 225-450 feet; set to **SHORT** if the distance is less than 225 feet.

Timing

Selects the source of timing used to derive the transmit signal. The MX2800 STS-1 has three modes of timing operation: **LOOP**, **FREE-RUN**, and **EXTERNAL**. **LOOP** timing configures the unit to recover clocking from the STS-1 receive signal. Loss of the STS-1 receive

signal or reception of AIS will cause the unit to enter 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.

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).

Setting the unit to **EXTERNAL** timing mode configures the unit to derive clocking from one of the two external sources selected in the **PRI EXT. CLOCK** and **SEC EXT. CLOCK** options. These two entries select which of the 28 active T1/E1 ports will be used as the external clock source. The external clock source may be disabled (if only one source exists, or no external clock sources are desired). A valid clock source is one on which neither LOS or AIS conditions exist. The selected T1/E1 may be a data carrying tributary. When both sources are configured, failure of one source will cause the unit to switch to the other source (if it is a valid source). Failure of both sources will cause 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.

> 🖎 **NOTE** *Switching between* **PRI***mary and* **SEC***ondary external clock sources is non-reverting.*

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 will 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 STS-1 can frame the 7 VT groups as either VT1.5 or VT2. 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, become unavailable. All E1 ports are available for mapping.

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 selections in this menu allow you to customize the unit's protection setup.

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 you select **B**, a switch-over occurs immediately.

Network Protection

Enable or disable the unit's ability to automatically route information to the backup STS-1 in the event of a primary STS-1 failure. With **NETWORK PROTECTION** set to **ENABLED**, all information is automatically routed to the backup STS-1 in the event that the primary STS-1 fails. When **NETWORK PROTECTION** is set to **DISABLED**, the stand-by controller will be used to protect against failures of the circuitry on the active controller.

> **NOTE**
>
> *When choosing a setting for* **NETWORK PROTECTION**, *there are many cabling and network provisioning issues to consider. For configuration examples of the different modes of protection, refer to Chapter 7, Circuit and Network Redundancy.*

Max. 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 the cards switch more than the **MAX SWITCH THRESHOLD** within one hour, the unit issues a trap and stops switching cards for the next 24 hours. The default setting is **3** times an hour.

Min. Switching Period

After the unit switches controller cards, the number of seconds entered in this field must pass before another card switch will be allowed. The default setting is **10** seconds.

Miscellaneous

Loopback Timeout

Sets the loopback timeout to **DISABLED**, **1 MIN.**, **5 MIN.**, **10 MIN.**, **15 MIN.**, **30 MIN.**, **45 MIN**. or **1 HR**.

External Clock Configuration

PRI Ext. Clock and SEC Ext. Clock - When timing is set to external, these entries allow selection of the primary and secondary clock source. Any one of the 28 ports, so long as it is active, can be used. If the selected port does go into AIS or LOS, the selected clock becomes invalid.

VT INTERFACE

The **VT INTERFACE** menu (shown in Figure 3-4 on page 3-7) allows you to activate/deactivate individual T1s and E1s and to set their line coding, length, loopback detection, circuit protection, and line ID string. The T1/E1 code violation threshold is also configured through this menu. Configuration selections are described in the sections following Figure 3-4 on page 3-7.

> **NOTE** *A VT group can be divided into either three E1s or four T1s. Therefore, when dealing with an E1 configuration, some of the fields in the **VT INTERFACE** menus do not apply (and therefore display **N/A**).*

```
┌─────────────────────────────────────────────────────────────────┐
│ ▐A▌                    Configure VT Interface                     │
│                                                                   │
│   1 - VT  #1        8 - VT  #8       15 - VT #15     22 - VT #22   │
│   2 - VT  #2        9 - VT  #9       16 - VT #16     23 - VT #23   │
│   3 - VT  #3       10 - VT #10       17 - VT #17     24 - VT #24   │
│   4 - VT  #4       11 - VT #11       18 - VT #18     25 - VT #25   │
│   5 - VT  #5       12 - VT #12       19 - VT #19     26 - VT #26   │
│   6 - VT  #6       13 - VT #13       20 - VT #20     27 - VT #27   │
│   7 - VT  #7       14 - VT #14       21 - VT #21     28 - VT #28   │
│                                                                   │
│                                                                   │
│   29 - Set Multiple                                               │
│   30 - Set Cross-Connect Mapping                                  │
│   31 - Restore VT Mapping Defaults                                │
│   32 - Protection Threshold (1-28) = 1                            │
│   33 - XCV Threshold = Disabled                                   │
│                                                                   │
│                                                                   │
│   Enter selection >                                               │
└─────────────────────────────────────────────────────────────────┘
```

Figure 3-4. VT Interface Menu

VT Interface #1-28

The VT Interface menu allows the user to map a Port (T1/E1) to a VT, activate/deactivate the T1 and E1 mapped to the VT, and to set the line coding, length, loopback detection, circuit protection, line ID string, and disable/enable the hairpin loopback. Configuration selections are described in the section following Figure 3-5.

```
┌─────────────────────────────────────────────────────────────┐
│ ▄▄             Configure VT Interface #1                     │
├─────────────────────────────────────────────────────────────┤
│                                                              │
│   1 - VT # 1 Map = Port #1                                   │
│                                                              │
│   2 - T1 State = Disabled                                    │
│   3 - T1 Coding = B8ZS                                       │
│   4 - T1 Line Length = 0-133 ft.                             │
│   5 - T1 Remote Loopback = CSU                               │
│   6 - T1 Circuit Protection = Enabled                        │
│   7 - Hairpin Loopback = Disabled                            │
│                                                              │
│   8 - Line ID =                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│ Enter selection > ▮                                          │
└─────────────────────────────────────────────────────────────┘
```

Figure 3-5. Configure VT Interface #1 Menu

VT/Port Mapping

Map a T1/E1 port to a VT. Any available port (1-28) can be mapped to a VT. An error will be returned if the port is already mapped to another VT. Selecting **UNEQUIPPED** will free the port from mapping and disable the VT.

T1 State

Set unused T1 lines to **DISABLED**. Set used T1 lines to **ENABLED**.

T1 Coding

Set the line code for each individual T1 interface to match the connected device. The choices available for T1 are **AMI** and **B8ZS**.

T1 Line Length

Set the line length for each T1 interface according to the distance from the MX2800 STS-1 to your DTE device. Set to **-7.5 dB** if the attached DTE device only supports DS1 levels.

T1 Remote Loopback

Allows a selected T1 to respond to CSU or NIU loopbacks arriving from the STS-1 side.

T1 Circuit Protection

T1 Circuit Protection determines which circuit will be allowed to initiate a protection switch if a failure in the circuitry for that channel is detected. If a T1 is set to **DISABLED**, then the failure of the circuitry of that one channel will not cause a protection switch. If set to **ENABLED**, then the failure of a channel *could* cause a protection switch to occur (depending on the **PROTECTION THRESHOLD** setting).

Hairpin Loopback

Hairpin back the VT to the STS-1 signal for dropping farther down the SONET ring.

Line ID

Enter user-configurable text strings to name the individual T1 lines. This field will accept up to 18 alpha-numeric characters, including spaces and special characters (such as an underbar).

Set Multiple

SET MULTIPLE (see Figure 3-6 on page 3-10) can be used to enable/ disable a contiguous group or all of the VTs at one time. It may also be used to make multiple changes to the line coding, length, circuit protection or loopback detection of a contiguous group or all VTs at one time.

To make changes to all VTs, set **FIRST** to **1** and **LAST** to **28**. Make the necessary changes and select **APPLY ALL** (or select the **APPLY** option that corresponds to the change made) before leaving the menu. To make changes to some of the VTs, set the **FIRST** and **LAST** fields to correspond to the lines you want to change. Select **APPLY ALL** (or select the **APPLY** option that corresponds to the change made). You can now either leave the menu or continue to enter new **FIRST** and **LAST** numbers for other lines. Remember to apply the settings following each change.

```
┌─■─────────────────────────Set Multiple────────────────────────────┐
│                                                                    │
│   1 - First = 1                                                    │
│   2 - Last  = 28                                                   │
│                                                                    │
│   3 - State = Enabled              8 - Apply State                 │
│   4 - Line Coding = B8ZS/HDB3      9 - Apply Line Coding           │
│   5 - T1 Line Length = 0-133 ft.  10 - Apply Line Length           │
│   6 - Circuit Protection = Enabled 11 - Apply Circuit Protection   │
│   7 - Loopback Detection = CSU    12 - Apply Loopback Detection    │
│                                                                    │
│                                   13 - Apply ALL                   │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│ Enter selection >                                                  │
└────────────────────────────────────────────────────────────────────┘
```

Figure 3-6. Set Multiple Menu

Set Cross-Connect Mapping

Any VT can be cross-connect mapped to any available T1/E1 port. Selecting **UNEQUIPPED** will free the port and disable the VT. The default mapping for VTs 1-28 is 1-to-1.

```
┌──────────────────────────────────────────────────────────────────────┐
│ ■           Set Cross-Connect Mapping                                  │
│                                                                        │
│    1 - VT # 1 Map = Port #1          15 - VT #15 Map = Port #15         │
│    2 - VT # 2 Map = Port #2          16 - VT #16 Map = Port #16         │
│    3 - VT # 3 Map = Port #3          17 - VT #17 Map = Port #17         │
│    4 - VT # 4 Map = Port #4          18 - VT #18 Map = Port #18         │
│    5 - VT # 5 Map = Port #5          19 - VT #19 Map = Port #19         │
│    6 - VT # 6 Map = Port #6          20 - VT #20 Map = Port #20         │
│    7 - VT # 7 Map = Port #7          21 - VT #21 Map = Port #21         │
│    8 - VT # 8 Map = Port #8          22 - VT #22 Map = Port #22         │
│    9 - VT # 9 Map = Port #9          23 - VT #23 Map = Port #23         │
│   10 - VT #10 Map = Port #10         24 - VT #24 Map = Port #24         │
│   11 - VT #11 Map = Port #11         25 - VT #25 Map = Port #25         │
│   12 - VT #12 Map = Port #12         26 - VT #26 Map = Port #26         │
│   13 - VT #13 Map = Port #13         27 - VT #27 Map = Port #27         │
│   14 - VT #14 Map = Port #14         28 - VT #28 Map = Port #28         │
│                                                                        │
│   29 - Restore Defaults                                                │
│                                                                        │
├──────────────────────────────────────────────────────────────────────┤
│ Enter selection > ■                                                    │
└──────────────────────────────────────────────────────────────────────┘
```

Figure 3-7. Set Cross-Connect Mapping Menu

Restore Defaults

> Restores VT mapping to 1-to-1 mapping.

Restore VT Mapping Defaults

> Select **RESTORE VT MAPPING DEFAULTS** from the **VT INTERFACE** configuration menu. The following message will display on the screen: **!WARNING! RESTORING DEFAULTS WILL DISRUPT TRAFFIC.** Select **CONFIRM** to continue or press **Esc** to abort.

Protection Threshold (1-28)

> The **PROTECTION THRESHOLD** setting determines how many of the **ENABLED** lines must fail before a card switch occurs. If you want the failure of a single protected (enabled) line to cause a card switch, set the **PROTECTION THRESHOLD** to **1**. Choices include **1** through **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 (see Figure 3-8). If set to **DISABLED**, code violations will 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.

```
■A■                          XCV Threshold

    1 - Disabled
    2 - 1E-3
    3 - 1E-4
    4 - 1E-5
    5 - 1E-6




New value >
```

Figure 3-8. XCV Threshold Menu

SYSTEM MANAGEMENT

Configure the MX2800 STS-1 for management through SNMP, Telnet, or a VT-100 interface (see Figure 3-9). Embedded SNMP and Telnet are available via a SLIP/PPP modem port or 10BaseT ethernet interface. This menu also includes options used to customize your unit's alarm and trap generation, security setup, and equipment identification.

```
┌─────────────────────────────────────────────────────────────────┐
│ ■A■              System Management Configuration                  │
│                                                                   │
│ Management Options                System Security                 │
│  1 - Local IP Address   = 10.200.1.125   10 - Password = ******   │
│  2 - Gateway IP Address = 10.200.254.254 11 - Terminal timeout = Disabled │
│  3 - Subnet Mask        = 255.255.0.0    12 - IP Security = Disabled │
│                                          13 - IP Hosts            │
│ Alarm Relays                                                      │
│  4 - Alarm Relay Configuration    Date & Time                     │
│                                   14 - Date = 01/22/00            │
│ SNMP Management Options            15 - Time = 22:08:08           │
│  5 - TRAP IP Addresses                                            │
│  6 - TRAP Generation              Miscellaneous                   │
│  7 - READ  Community Name = public  16 - Equipment Identification │
│  8 - WRITE Community Name = private 17 - Syslog Setup             │
│  9 - TRAP  Community Name = trap    18 - TL1 Account Management   │
│                                     19 - Save on Logout = Enabled │
│                                     20 - Craft baud rate = AUTO   │
│                                                                   │
│ Enter selection > █                                               │
└─────────────────────────────────────────────────────────────────┘
```

Figure 3-9. System Management Configuration Menu

> **WARNING**
>
> *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 Telnet sessions are 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

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 your network administrator.

Gateway IP Address

Enter the gateway IP address of the MX2800 STS-1. This address is necessary only if the MX2800 STS-1 and the network manager are connected through a gateway node. If an IP packet is to be sent to a different network, the unit sends it to the gateway.

Subnet Mask

Enter the subnet mask of the MX2800 STS-1. This address is available from your network administrator.

Management Port

Assign the management port as either LAN or Modem. The Modem setting applies only to units equipped with an internal modem.

Dialup Options

Configure the dialup capabilities of the MX2800 STS-1 (see Figure 3-10 on page 3-15). These options apply only to units equipped with an internal modem.

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▣                         Dialup Options                               │
├──────────────────────────────────────────────────────────────────────┤
│                                                                        │
│    1 - Primary Phone Number =              Last Modem Response = OK     │
│    2 - Secondary Phone Number =                                        │
│    3 - Init String = ATZ                                               │
│    4 - Dial String = ATDT                                             │
│                                                                        │
│    5 - Maximum redial attempts = 10                                    │
│    6 - Idle timeout = 10                                               │
│    7 - Connection timeout (> 20 sec) = 60                              │
│    8 - Pause between calls = 3                                         │
│                                                                        │
│    9 - Dialout on trap = Disabled                                     │
│   10 - Answer on ring = Enabled                                       │
│   11 - Modem Mode = UT-100                                             │
│   12 - Modem Baud Rate = 38400                                         │
│   13 - Hangup                                                          │
│                                                                        │
├──────────────────────────────────────────────────────────────────────┤
│ Enter selection >                                                      │
└──────────────────────────────────────────────────────────────────────┘
```

Figure 3-10. Dialup Options Menu

Primary and Secondary Phone Numbers

When the MX2800 STS-1 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 for redial attempts is reached; see
Maximum Redial Attempts below).

Initializing String

The AT command entered in this field is used to initialize the
modem. Normally, this field should be left at the default setting
(ATZ).

Dial String

The AT command entered in this field causes the modem to dial
out. Normally, this field should be left at the default setting
(ATDT).

Maximum Redial Attempts

The MX2800 STS-1 attempts to establish a call the number of times
entered in this field. If a successful call is not established after the
final attempt, the MX2800 STS-1 discards the trap messages.

Idle Timeout

After establishing a call and sending trap messages, the MX2800 STS-1 remains online for the amount of seconds entered in this field. If the field is set to 0, the unit hangs up as soon as the trap is sent.

Connection Timeout

The MX2800 STS-1 waits for a connection the amount of seconds entered in this field. Timing begins as soon as the dial command is issued. This field must be set for greater than 20 seconds.

Pause Between Calls

The MX2800 STS-1 waits between redial attempts the number of seconds entered in this field.

Dialout On Trap

Enable or disable the MX2800 STS-1's ability to dial out to report traps. **MODEM MODE** configured for **VT-100** 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 (see *System Management* on page 3-13)
*   A trap code indicating the error condition
*   A text description of the fault
*   The date and time when the error was logged

When **MODEM MODE** is configured for **PPP** or **SLIP**, the MX2800 STS-1 logs into the PPP/SLIP host and reports the error conditions to the hosts designated under **TRAP IP ADDRESSES** (see *Trap IP Addresses* on page 3-25).

Answer on Ring

Enable or disable the MX2800 STS-1's ability to accept incoming calls. If enabled, incoming calls are automatically answered by the MX2800 STS-1, allowing you to remotely perform management functions.

Modem Mode

Select the **Modem** port function for your application (**VT-100**, **PPP**, or **SLIP**). The **Modem** port, located on the rear panel of the MX2800 STS-1, provides a telephone line (POTS) for connection to the internal V.34 modem. This setting applies only if the **MANAGEMENT PORT** (see *Management Port* on page 3-14) is set to **MODEM**.

Modem Baud Rate

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

Hangup

Selecting this option forces the MX2800 STS-1 to end an established call.

Last Modem Response

This status field displays the last modem response to the MX2800 STS-1. Possible responses include **OK**, **CONNECT**, **BUSY**, **ERROR**, **NO DIALTONE**, and **NO CARRIER**.

Alarm Relays

Alarm Relay Configuration

Enables audible and visible alarms for specific error conditions (see Figure 3-11). 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.

```
 A                        Alarm Relay Configuration

    1 - STS-1 Alarms
    2 - VT/Port Alarms
    3 - System Alarms
    4 - Power Supply Alarms











    Enter selection > █
```

Figure 3-11. Alarm Relay Configuration Menu

STS-1 Alarms

Alarm	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.

Alarm	Description
SLM-P	(Path Signal Level Mismatch) A received signal label is mismatched if it does not equal the locally provisioned value or the value "equipped non-specific".
UEQ-P	(Path Unequipped) The path is unequipped if it is not provisioned. Byte C2 of the STS path overhead is set to zero.
XCV	(Excessive Code Violations) The controller is receiving excessive code violations exceeding the threshold set by the user (see *XCV Threshold* on page 3-12).
TLOS	(Transmit Loss of Signal) The transmitter has failed.
JTRACE	(STS Receive Path Trace) Received in the J1 path overhead byte. This byte is used to repetitively transmit a 64 byte (last two bytes are a fixed CR/LF) string so the receiving terminal in a path can verify its continued connection to the intended transmitter.

VT/Port Alarms

Alarm	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 set by the user (see *XCV Threshold* on page 3-12).
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.

Alarm	Description
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 it does not equal the locally provisioned value or the value "equipped non-specific".
VT-UEQ	(VT Path Unequipped) The VT path is not provisioned. Byte V5 of the STS path overhead is set to zero.

System Alarms

Alarm	Description
Protection Switching	
Card Failure	A controller card has failed. This is a critical alarm only when the back-up card is not installed or is not working properly.
Protection Switch	All data has been routed from the primary card to the stand-by card.
Communication Fail	Communication between controller cards A and B has failed.
System Timing	
Clock Status	When enabled, an abnormal clock status condition will cause the CRITICAL relay to be thrown.The alarm will remain active until the condition clears or the alarm is acknowledged by the user.
Clock Source Change	When enabled, a change in the clock source will cause the NON-CRITICAL relay to be thrown. The alarm will remain active until the condition clears or the alarm is acknowledged by the user.
PRI EXT Clock Status	When enabled, a fault condition (LOS/AIS or FAIL) on the PRImary or SEConday external clock will cause the NON-CRITICAL relay to be thrown. The alarm will remain active until the condition clears or the alarm is acknowledged by the user.
SEC EXT Clock Status	When enabled, a fault condition (LOS/AIS or FAIL) on the PRImary or SEConday external clock will cause the NON-CRITICAL relay to be thrown. The alarm will remain active until the condition clears or the alarm is acknowledged by the user.

Alarm	Description
Activity Loss Status	When enabled, the CRITICAL relay will be thrown if the Activity Loss Status indicates the failure of an internal clock. The alarm will remain active until the condition clears or the alarm is acknowledged by the user.

Power Supply Alarms

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's output level is abnormally low.
Power Fail	Power supply card's input power is lost.
Bat. 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.

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 (see Figure 3-12) to designate which error conditions will cause the unit to send trap messages.

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▐A▌                        TRAP Generation                             │
│                                                                        │
│     1 - STS-1 TRAPs                                                     │
│     2 - UT/Port TRAPs                                                   │
│     3 - System TRAPs                                                    │
│     4 - Power Supply TRAPs                                              │
│     5 - MIB II Standard TRAPs                                           │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│ Enter selection >                                                      │
└──────────────────────────────────────────────────────────────────────┘
```

Figure 3-12. Trap Generation Menu

STS-1 Active Alarm Traps

Trap	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.
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.

Trap	If enabled, the unit issues a trap when...
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 it does not equal the locally provisioned value or the value "equipped non-specific".
TX LOS	(Transmit Loss of Signal) The controller card's transmitter has failed.
XCV	(Excessive Code Violations) The controller is receiving excessive code violations exceeding the threshold set the user (see *XCV Threshold* on page 3-12).
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 (last two bytes are a fixed CR/LF) string so the receiving terminal in a path can verify its continued connection to the intended transmitter.

STS-1 Standby Alarm Traps

Trap	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.
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.

Trap	If enabled, the unit issues a trap when...
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 it does not equal the locally provisioned value or the value "equipped non-specific".
TX LOS	(Transmit Loss of Signal) The controller card's transmitter has failed.
XCV	(Excessive Code Violations) The controller is receiving excessive code violations exceeding the threshold set the user (see *XCV Threshold* on page 3-12).

VT/Port Traps

Trap	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 set by the user (see *XCV Threshold* on page 3-12).
Failure	
VT-LOP	(VT Path Loss of Pointer) When 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 it does not equal the locally provisioned value or the value "equipped non-specific".
VT-UEQ	(VT Path Unequipped) The controller card detects that the VT path is unequipped. The VT path is not provisioned. Byte V5 of the STS path overhead is set to zero.

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 stand-by card.
Card Removed	a controller card has been removed.
Card Failure	a controller card has failed. This is a critical alarm only when the back-up card is not installed or is not working properly.
Communication Fail	communication between controller cards A and B has failed.
Max Switches	the **MAX SWITCH THRESHOLD** is reached (see *Max. Switch Threshold* on page 3-6).

Trap	If enabled, the unit issues a trap when...
System Timing	
Clock Status	there is a change in clock status. The clock status can be any of the following values: **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.
Clock Source Change	there is a Clock Source Change event indicating that the unit has switched clock sources. The values for the clock source change alarm are: Loop PRI Ext SEC Ext Free-run Holdover
PRI EXT Clock Status	a failure condition is encountered on either the PRImary or SECondary clock sources (if configured). The possible values for this alarm are: **DISABLED** **NORMAL** **AVAILABLE** **LOS/AIS** **FAIL** **UNAVAILABLE**

Trap	If enabled, the unit issues a trap when...
SEC EXT Clock Status	a failure condition is encountered on either the PRImary or SECondary clock sources (if configured). The possible values for this alarm are: **DISABLED** **NORMAL** **AVAILABLE** **LOS/AIS** **FAIL** **UNAVAILABLE**
Activity Loss Status	there is a critical hardware failure in which a clock source has become inactive. The MX2800 STS-1 continually checks for activity on all of its internal clock sources as part of its status monitoring. If any clock source fails, the corresponding clock source will be displayed in the status menu and a TRAP/Syslog condition will be 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

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

Trap	If enabled, the unit issues a trap when...
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

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 attempt has been made by an unauthorized user 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

Password

Set the password required at login (up to 32 characters). The default password is **adtran** (all lower case).

Terminal Timeout

Set the amount of time the terminal or Telnet session remains inactive before automatically closing the session, requiring the user to log in again. 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** (see previous paragraph).

Date & 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

Equipment Identification

These fields allow you to store information that identifies the unit.

Unit ID

Provides a user-configurable text string for the name of the MX2800 STS-1. This name can help you distinguish between different installations. You can enter up to 32 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

ENABLE or **DISABLE** the transmission of log events to the external Syslog server. You must first define the host IP address.

Host IP Address

Specifies the IP address of the external server that is running the Syslog host daemon.

Severity Level

Specifies the lowest level of severity that causes messages to be logged to the Syslog server. The levels are listed in Table 3-1 on page 3-37, in order of decreasing severity. Any message at or above a selected severity level will be logged if a transmission is enabled.

Table 3-1. 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**.

TL1 Account Management

This menu allows for TL1 account management. Before any TL1 session can be initiated, the user must be authenticated. This user database provides access to the current list of TL1 users and their associated passwords and privileges. This information is used strictly for TL1 purposes.

Each row in the menu contains the associated information for a particular user. The username must be defined before an associated password or privilege can be assigned, and a privilege can only be defined after a password is assigned. All passwords are hidden for security purposes and are never shown in "clear text" form. Usernames and password entries are automatically converted to uppercase on entry. A user is prevented from deleting himself when editing the database over a TL1 session.

Currently, a user's privilege can be one of three values: **DISABLED**, **GUEST**, or **ADMIN**. A **DISABLED** account behaves as expected, and effectively disables all access while preserving account information. A **GUEST** account allows alarm database access and autonomous messages, but no user database access. An **ADMIN** account is a guest account with user database access.

Any time the MX2800 STS-1 configuration is saved to FLASH, the TL1 user database is saved as well. The user database is also saved (as required) when any TL1 session is close (i.e., via a TL1 'CANC-USER' request).

Save on Logout

ENABLE this function to save the configuration when you logout. **DISABLE** if you do not want to save the configuration.

Craft baud rate

Possible baud rate settings for the front panel **CRAFT** port. Choices are: **AUTO**, **9600**, **19200**, **38400**, and **57600**.

UTILITIES

The **UTILITIES** menu (see Figure 3-13) allows you to view MX2800 STS-1 system information for both controller cards (including self-test results), revert to default configuration settings, flash-load a new version of software, transfer configuration information to and from a TFTP server, and reset the system. Possible results for the self-test are listed in the chart following Figure 3-13 on page 3-39.

```
┌──────────────────────────────────────────────────────────────────┐
│ ▣                        System Utilities                          │
├──────────────────────────────────────────────────────────────────┤
│                                                                    │
│   Card A                              Card B                       │
│   MAC Address = 00:A0:C8:00:8F:F6     MAC Address = N/A            │
│   Serial Number = N/A                 Serial Number = N/A          │
│                                                                    │
│   Code Version = 0.00A                Code Version = N/A           │
│   Code Checksum = 3C54                Code Checksum = N/A          │
│   Boot Version = 0.00A                Boot Version = N/A           │
│   Boot Checksum = B4F9                Boot Checksum = N/A          │
│                                                                    │
│   Self Test = PASS                    Self Test = N/A              │
│                                                                    │
│   1 - Load default settings                                        │
│   2 - Update FLASH Software                                        │
│   3 - Config Transfer                                              │
│   4 - System Reset                                                │
│                                                                    │
├──────────────────────────────────────────────────────────────────┤
│ Enter selection >                                                  │
└──────────────────────────────────────────────────────────────────┘
```

Figure 3-13. System Utilities Menu

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. See the front section of this manual for more information.
CONFIGURATION CORRUPT	select **SAVE CONFIGURATION** from the main **CONFIGURATION** menu. If condition persists, contact ADTRAN Technical Support.

Load Default Settings

WARNING   *Loading the default settings will disable all STS-1 ports.*

Select **LOAD DEFAULT SETTINGS** from the **UTILITIES** menu. The screen will display **!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 will not be reset when default settings are loaded.*

Update FLASH Software

Select **UPDATE FLASH SOFTWARE** from the **UTILITIES** menu to update software using either XMODEM protocol or Trivial File Transfer Protocol (TFTP).

Update Via XMODEM

Select **UPDATE VIA XMODEM** from the **UPDATE FLASH SOFTWARE** menu; then select **1-START** to begin the transfer. Once you select **1-START** from this menu, start the XMODEM transfer from your terminal menu program (the XMODEM utility is available under most terminal programs). If you wish to cancel a transfer in progress, press **Ctrl-X** three times.

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

Update via TFTP Server

Select **UPDATE VIA TFTP SERVER** from the **UTILITIES** menu. A new menu displays, allowing you to enter the IP address and file name of the file you want to download to the unit. Once this information is entered, select **START/STOP TRANSFER**.

Config Transfer

Select **CONFIG TRANSFER** from the **UTILITIES** menu to transfer files to and from a TFTP server. The **CONFIG TRANSFER** option also lets you save the MX2800 STS-1 configuration as a backup file, so you can use the same configuration with multiple MX2800 STS-1 units. Only one configuration transfer session (upload or download) can be active at a time.

> *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.*
>
> **NOTE**

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.

    If you are using the ADTRAN TFTP server, the IP address displays in the **SERVER IP ADDRESS** field. For other TFTP servers, please 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.

> **NOTE**
> *Some TFTP servers constrain the format of the filename depending on the operating system of 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**.

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.

   If you are using the ADTRAN TFTP server, the IP address displays in the **SERVER IP ADDRESS** field. For other TFTP servers, please refer to the program's 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.

> **WARNING**
> *Configuration changes will not be implemented until all Telnet sessions are closed. Loading a new configuration may disrupt data traffic.*

3. Select **LOAD AND USE CONFIG**.

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 will begin uploading the code to the stand-by controller. This will be indicated on the menu and the STATUS LED on the stand-by card will display solid yellow.

WARNING

The stand-by card must remain in place until the process is complete and the STATUS LED is no longer solid yellow. Removing the stand-by card during the uploading process will corrupt the software.

Once the upload is complete, the stand-by card will self-reset and begin running the new code. However, the active card does not reset automatically. The unit must be reset through the **IMMEDIATE RESET** or **SCHEDULED RESET TIME** functions.

SAVE CONFIGURATION

Commits the current configuration changes to nonvolatile memory. If this option is not selected after making changes to the configuration, the unit reverts to its previous configuration when powered down.

MX2800 STS-1 User Manual

Chapter 4   Status

View MX2800 STS-1 status information by selecting **STATUS** from the **MAIN MENU** (see Figure 4-1). The information for the STS-1, VT/Port lines, power supplies, and controller cards is provided.

```
┌─────────────────────────────────────────────────────────────────┐
│ ▣                             Status                             │
├─────────────────────────────────────────────────────────────────┤
│                                                                 │
│   STS-1 State                                                   │
│   Card A Normal ; Card B Normal                                 │
│   Card A Alarms = None                                          │
│   Card B Alarms = None                                          │
│   Card A->Port A ; Card B->Port A                               │
│                                                                 │
│   Power Supply State              Timing Status                 │
│   Card A (AC) = Normal            Clock Status   = Normal        │
│   Card B = Not installed          Current Source = Free-run      │
│                                   PRI Ext. Clock = Unavailable   │
│   System State                    SEC Ext. CLock = Unavailable   │
│   Alarm  = None                                                 │
│   Card A = Stand-by                                             │
│   Card B = Active                 1 - VT/Port State             │
│   Protection = Circuit                                          │
│   Card Comm. = OK                 2 - Acknowledge Alarms (ACO)   │
│                                                                 │
├─────────────────────────────────────────────────────────────────┤
│   Enter selection >                                             │
└─────────────────────────────────────────────────────────────────┘
```

Figure 4-1. Status Menu

STS-1 STATE

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

Card A

Displays the current condition of the network. Possible conditions are listed in the following chart:

Condition	Description
Normal	The MX2800 STS-1 is ready to pass data.
Alarm	The unit is currently receiving an alarm indication. Alarm types are discussed in the following section, *Card A/Card B Alarms*.
In Test	The unit is currently in test mode. See Chapter 6, *Diagnostics* for information on the test type.

Card A/Card B Alarms

This field displays the current alarm condition of the MX2800 STS-1. Possible conditions are given in the following chart:

Condition	Description
Normal	No alarms are currently being received.
LOS	(Loss of Signal) The controller card has lost the network receive signal.
LOF	(Loss of Framing) The controller card detects a framing loss from the network.
LOP	(Loss of Pointer) The controller card is unable to detect a valid pointer in the receive signal.

Condition	Description
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. The Section Terminating Equipment generates AIS-L after detecting LOS or LOF.
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) lasts for 2.5 +/- 0.5 seconds.
RFI-P	(Path Remote Failure Indication) The controller card is receivinga 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 Lavel Mismatch) The controller card is detecting a signal label mismatch. A received signal label is mismatched if it does not equal the locally provisioned value or the value "equipped non-specific".
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.

Condition	Description
XCV	(Excessive Code Violations) The controller is receiving excessive code violations exceeding the threshold set by the user (see *XCV Threshold* on page 3-12).
TLOS	(Transmit Loss of Signal) The contoller card's transmitter has failed.

Network Port Mapping

This entry contains a description of the mapping between network ports and controller cards. In a redundant system with circuit protection the following is displayed:

Card A ⟶ Port A | Card B ⟶ Port A

In a redundant system with network protection the following is displayed:

Card A ⟶ Port A | Card B ⟶ Port B

OR

Card A ⟶ Port B | Card B ⟶ Port A

POWER SUPPLY STATE

This field indicates which types of power supplies are installed (AC or DC) in Card A and Card B and gives their current 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 it will soon shut off completely.

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 what type (if any) of system alarm is currently recognized by the unit. The condition is displayed until it clears up,

with the exception of the **SWITCHED** condition (which is cleared manually).

To clear the **SWITCHED** condition, select **ACKNOWLEDGE ALARMS (ACO)** or push the **ACO** button on the front panel. See the sections *ACO Buttons* on page 2-12 and *Acknowledge Alarms (ACO)* on page 4-12 for more information. Possible alarm types are listed in the following chart:

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. See *Max. Switch Threshold* on page 3-6.
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 the following chart:

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 the following chart:

Condition	Description
Network	Both controller cards are installed and everything is functioning properly. The unit is in full Network Protection Mode.
Circuit	Unit is in Circuit Protection Mode and everything is functioning properly, *or* 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, see Chapter 7, Circuit and Network 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. If there is only one card installed, **NON-REDUNDANT** is displayed.

TIMING STATUS

The following entries describe the state of the transmit timing subsystem, including the status of the selected reference clock(s), availability and status of the external clock sources, timing acquisition status, and 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:

- **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

Indicates the source of the clock. The values for the clock source are:

- **LOOP** – indicates that timing is currently being derived from the STS-1 receive signal.
- **PRI EXT** – indicates that timing is currently being derived from the source assigned to the primary external clock source.
- **SEC EXT** – indicates that timing is currently being derived from the source assigned to the secondary external clock source.
- **FREE-RUN** – indicates that transmit timing is currently being derived from an internal +/-20 ppm (Stratum 4) SONET minimum clock source.

- **HOLDOVER** – indicates that a failure in the selected clock sourc 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:

- **DISABLED** – indicates that the selected clock has been disabled by the user and will not be used.
- **NORMAL** – indicates that the clock source is currently being used a the timing reference.
- **AVAILABLE** – indicates that the clock source is available to be used as a timing source if a failure of the current source occurs.
- **LOS/AIS** – indicates that the clock source is not valid due to an LOS or AIS condition.
- **FAIL** – indicates that an internal hardware failure on the unit prevents the clock source from being used.
- **UNAVAILABLE** – indicates that 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:

- **DISABLED** – indicates that the selected clock has been disabled by the user and will not be used.
- **NORMAL** – indicates that the clock source is currently being used a the timing reference.
- **AVAILABLE** – indicates that the clock source is available to be used as a timing source if a failure of the current source occurs.

- **LOS/AIS** – indicates that the clock source is not valid due to an LOS or AIS condition.
- **FAIL** – indicates that an internal hardware failure on the unit prevents the clock source from being used.
- **UNAVAILABLE** – indicates that the user has specified a T1/E1 port to be used as an external clock source, but the port has not been enabled.

VT/PORT STATE

This field displays the current alarm condition of the VTs/ports. Possible conditions are given in the following chart:

VT/Port State

Alarm	Description
OFF	VT in 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 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 set by the user (see *XCV Threshold* on page 3-12).

Alarm	Description (cont'd)
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 it does not equal the locally provisioned value or the value "equipped non-specific".
VT-UEQ	(VT Path Unequipped) The VT path is not provisioned. Byte V5 of the STS path overhead is set to zero.
TST	The VT/Port is in test mode.

ACKNOWLEDGE ALARMS (ACO)

This selection allows you to remotely turn off an active alarm. It is the software equivalent of the **ACO** button (described in the section *ACO Buttons* on page 2-12).

Chapter 5   Statistics

Select **STATISTICS** from the **MAIN MENU** to access **STATISTICS** menus (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 the following time periods: the current 15-minute interval, a 24-hour history (divided into 96 15-minute intervals), and the totals for the previous 24 hours. Also, a cumulative alarm count is given. This count continues indefinitely until reset by the user.

```
┌─────────────────────────────────────────────────────────────┐
│ ▐A▌                        Statistics                        │
├─────────────────────────────────────────────────────────────┤
│                                                              │
│   Local                                                      │
│     1 - STS-1 Statistics                                     │
│     2 - VT Statistics                                        │
│     3 - Port Statistics                                      │
│                                                              │
│   Far End                                                    │
│     4 - STS-1 Statistics                                     │
│     5 - VT Statistics                                        │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
├─────────────────────────────────────────────────────────────┤
│   Enter selection > ▐                                        │
└─────────────────────────────────────────────────────────────┘
```

Figure 5-1. Statistics Menu

STS-1 STATISTICS

This menu provides submenus for alarm history and performance parameters (see Figure 5-2).

```
 ■          STS-1 Statistics

24 Hour Alarm History
  1 - Current 15 Minute Interval
  2 - 24 Hour History
  3 - 24 Hour Totals
  4 - Cumulative Count

Performance Parameters
  5 - Current 15 Minute Interval
  6 - 24 Hour History
  7 - 24 Hour Totals




 Enter selection >
```
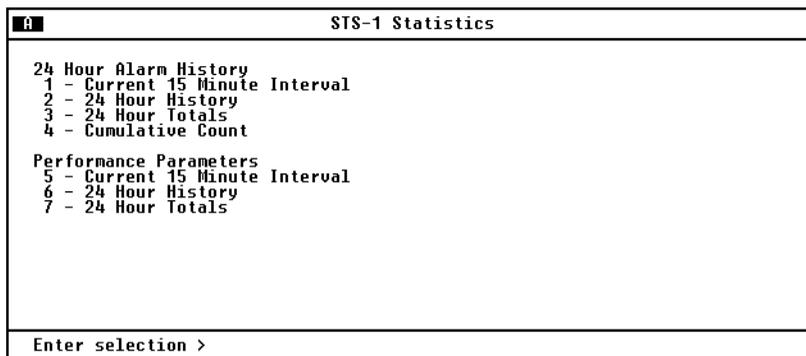
Figure 5-2. Local STS-1 Statistics Menu

24 Hour Alarm History

The MX2800 STS-1 keeps track of alarms for both the near and far ends of the network. You can 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. See Figure 5-3 and Figure 5-4 on page 5-5 for examples of alarm screens.

The following alarm counts are provided in this menu:

Condition	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.

Condition	Description
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 it does not equal the locally provisioned value or the value "equipped non-specific".
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).*

```
┌─────────────────────────────────────────────────────────┐
│ ▪A▪              Current 15 Minute Interval              │
│                                                          │
│   LOS                    0                               │
│   LOF                    0                               │
│   LOP                    0                               │
│   LOMF                   0                               │
│   AIS-L                  0                               │
│   RDI-L                  0                               │
│   RFI-L                  0                               │
│   AIS-P                  0                               │
│   RDI-P                  0                               │
│   RFI-P                  0                               │
│   UEQ-P                  0                               │
│   SLM-P                  0                               │
│                                                          │
│    1 - Clear ALL STS-1 alarm counts                      │
│                                                          │
│                                                          │
│                                                          │
│   Enter selection >                                      │
└─────────────────────────────────────────────────────────┘
```

Figure 5-3. Local STS-1 Current Alarm Count Screen

```
┌──────────────────────────────────────────────────────────────────────┐
│ ■A■                          24 Hour History                       ▶  │
│                                                                        │
│   Interval starting   23:24   23:08   22:52   22:36   22:21   22:05    │
│   LOS                    0       0       0       0       0       0     │
│   LOF                    0       0       0       0       0       0     │
│   LOP                    0       0       0       0       0       0     │
│   LOMF                   0       0       0       0       0       0     │
│   AIS-L                  0       0       0       0       0       0     │
│   RDI-L                  0       0       0       0       0       0     │
│   RFI-L                  0       0       0       0       0       0     │
│   AIS-P                  0       0       0       0       0       0     │
│   RDI-P                  0       0       0       0       0       0     │
│   RFI-P                  0       0       0       0       0       0     │
│   UEQ-P                  0       0       0       0       0       0     │
│   SLM-P                  0       0       0       0       0       0     │
│                                                                        │
│     1 - Clear ALL STS-1 alarm counts                                   │
│ ─────────────────────────────────────────────────────────────────────│
│   Enter selection >                                                    │
└──────────────────────────────────────────────────────────────────────┘
```

Figure 5-4. Local STS-1 24-Hour Alarm History Screen

> **NOTE**
> *When a > or < symbol appears in an upper corner of the screen, you can use the arrow keys on your keyboard to scroll right or left to view additional information. See the upper right-hand corner of Figure 5-4.*

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 5-5, Figure 5-6, and Figure 5-7 on page 5-7 for examples of the performance parameter screens.

Descriptions of the fields in each screen follows.

```
 B                      Current 15 Minute Interval

 Severely Errored Frame Sec(SEFS)              0
 Section Coding Violations (SCV)               0
 Line Coding Violations (LCV)                  0
 Path Coding Violations (PCV)                  0
 Section Errored Seconds (SES)                 0
 Line Errored Seconds (LES)                    0
 Path Errored Seconds (PES)                    0
 Section Severely Errored Sec (SSES)           0
 Line Severely Errored Sec (LSES)              0
 Path Severely Errored Sec (PSES)              0
 Line Unavailable Sec (LUAS)                   0
 Path Unavailable Sec (PUAS)                   0

   1 - Clear ALL local STS-1 statistics



 Enter selection >
```

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

```
 B                        24 Hour History
                                                                   >
 Interval starting at:          03:45   03:30   03:15   03:00

 Severely Errored Frame Sec(SEFS)   0       0       0       0
 Section Coding Violations (SCV)    0       0       0       0
 Line Coding Violations (LCV)       0       0       0       0
 Path Coding Violations (PCV)       0       0       0       0
 Section Errored Seconds (SES)      0       0       0       0
 Line Errored Seconds (LES)         0       0       0       0
 Path Errored Seconds (PES)         0       0       0       0
 Section Severely Errored Sec (SSES)0       0       0       0
 Line Severely Errored Sec (LSES)   0       0       0       0
 Path Severely Errored Sec (PSES)   0       0       0       0
 Line Unavailable Sec (LUAS)        0       0       0       0
 Path Unavailable Sec (PUAS)        0       0       0       0

   1 - Clear ALL local STS-1 statistics

 Enter selection >
```

Figure 5-6. Local STS-1 Performance Parameters (24 Hour History)

```
┌──────────────────────────────────────────────────────────┐
│ ■■■                      24 Hour Totals                   │
├──────────────────────────────────────────────────────────┤
│                                                          │
│  Severely Errored Frame Sec(SEFS)            0           │
│  Section Coding Violations (SCV)            13           │
│  Line Coding Violations (LCV)                8           │
│  Path Coding Violations (PCV)               27           │
│  Section Errored Seconds (SES)               2           │
│  Line Errored Seconds (LES)                  1           │
│  Path Errored Seconds (PES)                  2           │
│  Section Severely Errored Sec (SSES)         0           │
│  Line Severely Errored Sec (LSES)            0           │
│  Path Severely Errored Sec (PSES)            0           │
│  Line Unavailable Sec (LUAS)                 0           │
│  Path Unavailable Sec (PUAS)                 0           │
│                                                          │
│    1 - Clear ALL local STS-1 statistics                  │
│                                                          │
│                                                          │
├──────────────────────────────────────────────────────────┤
│  Enter selection >                                       │
└──────────────────────────────────────────────────────────┘
```

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

Interval starting at:

> 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 5-6 on page 5-6).

Severely Errored Framing Seconds (SEFS)

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

Section Coding Violations (SCV)

> Number of coding violations encountered at the Section layer.

Line Coding Violations (LCV)

> Number of coding violations encountered at the Line layer.

Path Coding Violations (PCV)

> Number of coding violations encountered at the Path layer.

Section Errored Seconds (SES)

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)

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)

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)

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)

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)

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)

>   Time in seconds that the Line layer has been unavailable for data delivery.

Path Unavailable Seconds (PUAS)

>   Time in seconds that the Path layer has been unavailable for data delivery.

Clear All Local STS-1 Statistics

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

LOCAL VT STATISTICS

>   This menu provides submenus for alarm history and performance parameters (see Figure 5-8).


```
 ■A              VT Local Statistics

                    ***Alarm History***
 Current Interval  24 Hour History   24 Hour Totals      Cumulative Count
    1 - LOP           7 - LOP           13 - LOP             19 - LOP
    2 - AIS           8 - AIS           14 - AIS             20 - AIS
    3 - RDI           9 - RDI           15 - RDI             21 - RDI
    4 - RFI          10 - RFI           16 - RFI             22 - RFI
    5 - SLM          11 - SLM           17 - SLM             23 - SLM
    6 - UEQ          12 - UEQ           18 - UEQ             24 - UEQ


                 ***Performance Parameters***
 Current Interval  24 Hour History   24 Hour Totals
   25 - CU          29 - CU           33 - CU
   26 - ES          30 - ES           34 - ES
   27 - SES         31 - SES          35 - SES
   28 - UAS         32 - UAS          36 - UAS

 Enter selection > ■
```

Figure 5-8. Local VT Statistics

Alarm History

The MX2800 STS-1 keeps track of 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 5-9 and Figure 5-10 on page 5-12 for examples of alarm screens.

The following alarm counts are provided in this menu:

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	Number of times the unit has detected a SLM alarm condition from the VT path. A received signal label is mismatched if it does not equal the locally provisioned value or the value "equipped non-specific".
UEQ	Number of times the unit has detected a UEQ alarm condition from the VT path. The VT path is not provisioned. Byte V5 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).

```
┌─────────────────────────────────────────────────────────────────────┐
│ ▐A▌                     Current 15 Minute VT-LOP Count                │
│                                                                       │
│    #1        0                         #15       0                    │
│    #2        0                         #16       0                    │
│    #3        0                         #17       0                    │
│    #4        0                         #18       0                    │
│    #5        0                         #19       0                    │
│    #6        0                         #20       0                    │
│    #7        0                         #21       0                    │
│    #8        0                         #22       0                    │
│    #9        0                         #23       0                    │
│    #10       0                         #24       0                    │
│    #11       0                         #25       0                    │
│    #12       0                         #26       0                    │
│    #13       0                         #27       0                    │
│    #14       0                         #28       0                    │
│                                                                       │
│    1 - Clear ALL VT alarm counts                                      │
│                                                                       │
├─────────────────────────────────────────────────────────────────────┤
│    Enter selection >                                                  │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 5-9. Local VT-LOP Alarm Count Screen (Current 15 Minutes)

```
┌─────────────────────────────────────────────────────────────────────┐
│ ▐A▌                    24 Hour VT-LOP Alarm History            ▐›▌   │
│         N/A    N/A    N/A    N/A              N/A    N/A    N/A    N/A │
│    #1    0      0      0      0       #15      0      0      0      0  │
│    #2    0      0      0      0       #16      0      0      0      0  │
│    #3    0      0      0      0       #17      0      0      0      0  │
│    #4    0      0      0      0       #18      0      0      0      0  │
│    #5    0      0      0      0       #19      0      0      0      0  │
│    #6    0      0      0      0       #20      0      0      0      0  │
│    #7    0      0      0      0       #21      0      0      0      0  │
│    #8    0      0      0      0       #22      0      0      0      0  │
│    #9    0      0      0      0       #23      0      0      0      0  │
│    #10   0      0      0      0       #24      0      0      0      0  │
│    #11   0      0      0      0       #25      0      0      0      0  │
│    #12   0      0      0      0       #26      0      0      0      0  │
│    #13   0      0      0      0       #27      0      0      0      0  │
│    #14   0      0      0      0       #28      0      0      0      0  │
│     1 - Clear ALL VT alarm counts                                     │
├─────────────────────────────────────────────────────────────────────┤
│    Enter selection >                                                  │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 5-10. Local VT-LOP Alarm Count Screen (24 Hour History)

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 5-11 and

Figure 5-12 on page 5-14 for examples of the VT performance parameter screens.

Condition	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).*

```
┌─────────────────────────────────────────────────────────────────────┐
│ ■A■              Current 15 Minute VT-CV Interval                     │
│                                                                       │
│    #1      0                          #15     0                       │
│    #2      0                          #16     0                       │
│    #3      0                          #17     0                       │
│    #4      0                          #18     0                       │
│    #5      0                          #19     0                       │
│    #6      0                          #20     0                       │
│    #7      0                          #21     0                       │
│    #8      0                          #22     0                       │
│    #9      0                          #23     0                       │
│    #10     0                          #24     0                       │
│    #11     0                          #25     0                       │
│    #12     0                          #26     0                       │
│    #13     0                          #27     0                       │
│    #14     0                          #28     0                       │
│                                                                       │
│    1 - Clear ALL VT Statistics counts                                 │
│                                                                       │
├─────────────────────────────────────────────────────────────────────┤
│    Enter selection >                                                  │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 5-11. Local VT-CV Performance Parameters (Current 15 Minutes)

```
┌─────────────────────────────────────────────────────────────────────┐
│ ■A■                  24 Hour VT-CV History                        ►   │
│                                                                       │
│         N/A    N/A    N/A    N/A            N/A    N/A    N/A    N/A   │
│    #1    0      0      0      0       #15    0      0      0      0    │
│    #2    0      0      0      0       #16    0      0      0      0    │
│    #3    0      0      0      0       #17    0      0      0      0    │
│    #4    0      0      0      0       #18    0      0      0      0    │
│    #5    0      0      0      0       #19    0      0      0      0    │
│    #6    0      0      0      0       #20    0      0      0      0    │
│    #7    0      0      0      0       #21    0      0      0      0    │
│    #8    0      0      0      0       #22    0      0      0      0    │
│    #9    0      0      0      0       #23    0      0      0      0    │
│    #10   0      0      0      0       #24    0      0      0      0    │
│    #11   0      0      0      0       #25    0      0      0      0    │
│    #12   0      0      0      0       #26    0      0      0      0    │
│    #13   0      0      0      0       #27    0      0      0      0    │
│    #14   0      0      0      0       #28    0      0      0      0    │
│     1 - Clear ALL VT Statistics counts                                │
├─────────────────────────────────────────────────────────────────────┤
│    Enter selection > █                                                │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 5-12. Local VT-CV Performance Parameters (24 Hour History)

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.

```
 ▐A▌                     Port Statistics

Loss of Signal Alarms                   AIS Loop Alarms
  1 - Current 15 Minute Interval          9 - Current 15 Minute Interval
  2 - 24 Hour Alarm History              10 - 24 Hour Alarm History
  3 - 24 Hour Totals                     11 - 24 Hour Totals
  4 - Cumulative Count                   12 - Cumulative Count

Bipolar Violation Counts                AIS Carrier Alarms
  5 - Current 15 Minute Interval         13 - Current 15 Minute Interval
  6 - 24 Hour Alarm History              14 - 24 Hour Alarm History
  7 - 24 Hour Totals                     15 - 24 Hour Totals
  8 - Cumulative Count                   16 - Cumulative Count




Enter selection > ▊
```

Figure 5-13. Local Port Statistics Menu

Loss of Signal Alarms

The number of times the unit has lost the receive signal on a T1/E1.

Bipolar Violation Counts

The number of times the unit has received a bipolar violation.

AIS Loop Alarms

The number of times the T1 has received all ones from the DSX-1 interface.

AIS Carrier Alarms

> The number of times the T1 has received all ones from the STS side of the network.

FAR END STS-1 STATISTICS

> This menu provides a submenu performance parameters (see Figure 5-14).

```
┌─────────────────────────────────────────────────────────────┐
│ ▌A▐                    STS-1 Far End Statistics              │
│─────────────────────────────────────────────────────────────│
│  Performance Parameters                                      │
│    1 - Current 15 Minute Interval                            │
│    2 - 24 Hour History                                       │
│    3 - 24 Hour Totals                                        │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│─────────────────────────────────────────────────────────────│
│  Enter selection > ▌                                         │
└─────────────────────────────────────────────────────────────┘
```
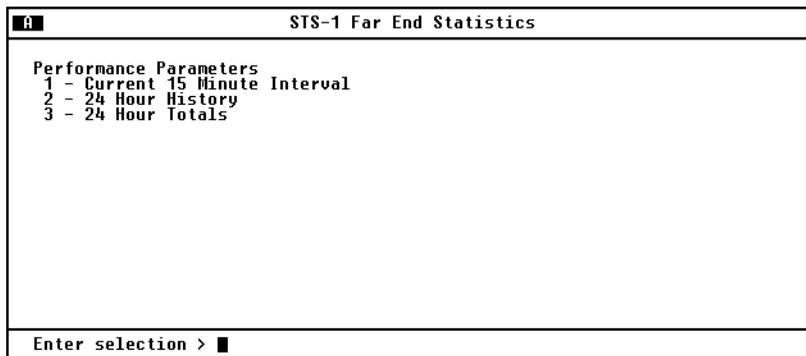
Figure 5-14. Far End STS-1 Statistics Menu

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. See Figure 5-15 and Figure 5-16 on page 5-17, and Figure 5-17 on page 5-18 for examples of the performance parameter screens.
>
> Descriptions of the individual performance parameters fields follow the screens.

```
┌────────────────────────────────────────────────────────────────────┐
│ ■A■            Current 15 Minute Interval                            │
│                                                                      │
│   Line Coding Violations (LCV)                    0                  │
│   Path Coding Violations (PCV)                    0                  │
│   Line Errored Seconds (LES)                      0                  │
│   P-Bit Errored Seconds (PES)                     0                  │
│   Line Severely Errored Sec (LSES)                0                  │
│   P-Bit Severely Errored Sec (PSES)               0                  │
│   Line Unavailable Sec (LUAS)                     0                  │
│   Path Unavailable Sec (PUAS)                     0                  │
│                                                                      │
│     1 - Refresh ALL remote statistics and alarms                    │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│  ──────────────────────────────────────────────────────────────    │
│   Enter selection > ■                                                │
└────────────────────────────────────────────────────────────────────┘
```

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

```
┌────────────────────────────────────────────────────────────────────┐
│ ■A■               24 Hour History                             ►►     │
│  ─────────────────────────────────────────────────────────────────  │
│   Interval starting at:         20:07    19:52   19:36   19:21       │
│                                                                      │
│   Line Coding Violations (LCV)      0        0       0       0       │
│   Path Coding Violations (PCV)      0        0       0       0       │
│   Line Errored Seconds (LES)        0        0       0       0       │
│   P-Bit Errored Seconds (PES)       0        0       0       0       │
│   Line Severely Errored Sec (LSES)  0        0       0       0       │
│   P-Bit Severely Errored Sec (PSES) 0        0       0       0       │
│   Line Unavailable Sec (LUAS)       0        0       0       0       │
│   Path Unavailable Sec (PUAS)       0        0       0       0       │
│                                                                      │
│     1 - Refresh ALL remote statistics and alarms                    │
│                                                                      │
│                                                                      │
│                                                                      │
│  ──────────────────────────────────────────────────────────────    │
│   Enter selection >                                                  │
└────────────────────────────────────────────────────────────────────┘
```

Figure 5-16. Far End STS-1 Performance Parameters (24 Hour History)

```
┌─────────────────────────────────────────────────────────────────┐
│ ■ A                           24 Hour Totals                     │
│                                                                   │
│   Line Coding Violations (LCV)               0                    │
│   Path Coding Violations (PCV)               0                    │
│   Line Errored Seconds (LES)                 0                    │
│   P-Bit Errored Seconds (PES)                0                    │
│   Line Severely Errored Sec (LSES)           0                    │
│   P-Bit Severely Errored Sec (PSES)          0                    │
│   Line Unavailable Sec (LUAS)                0                    │
│   Path Unavailable Sec (PUAS)                0                    │
│                                                                   │
│    1 - Refresh ALL remote statistics and alarms                  │
│                                                                   │
│                                                                   │
│                                                                   │
│                                                                   │
│                                                                   │
│ ───────────────────────────────────────────────────────────────│
│   Enter selection >                                               │
└─────────────────────────────────────────────────────────────────┘
```

Figure 5-17. Far End STS-1 Performance Parameters (24 Hour Totals)

Interval starting at:

> 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 5-6 on page 5-6).

Severely Errored Framing Seconds (SEFS)

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

Section Coding Violations (SCV)

> Number of coding violations encountered at the Section layer.

Line Coding Violations (LCV)

> Number of coding violations encountered at the Line layer.

Path Coding Violations (PCV)

> Number of coding violations encountered at the Path layer.

Section Errored Seconds (SES)

> 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)

> 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)

> 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)

> 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)

> 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)

> 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)

Time in seconds that the Line layer has been unavailable for data delivery.

Path Unavailable Seconds (PUAS)

Time in seconds that the Path layer has been unavailable for data delivery.

Clear All Far End STS-1 Statistics

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

Chapter 6 Diagnostics

The **DIAGNOSTICS** menu shown in Figure 6-1 allows you to initiate 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.

Descriptions and testing diagrams of the loopback tests are provided in the following portions of this chapter:

VT/Port Loopbacks on page 6-2
STS-1 Loopbacks on page 6-8

```
┌──────────────────────────────────────────────────────────────────┐
│ ▣                          Diagnostics                            │
│                                                                    │
│ VT/Port Loopbacks          VT/Port Loopbacks      STS-1 Loopbacks  │
│   1 - Data Mode             15 - Data Mode        29 - STS-1 = Data Mode │
│   2 - Data Mode             16 - Data Mode                         │
│   3 - Data Mode             17 - Data Mode                         │
│   4 - Data Mode             18 - Data Mode                         │
│   5 - Data Mode             19 - Data Mode                         │
│   6 - Data Mode             20 - Data Mode                         │
│   7 - Data Mode             21 - Data Mode        30 - Reset ALL tests │
│   8 - Data Mode             22 - Data Mode                         │
│   9 - Data Mode             23 - Data Mode                         │
│  10 - Data Mode             24 - Data Mode                         │
│  11 - Data Mode             25 - Data Mode                         │
│  12 - Data Mode             26 - Data Mode                         │
│  13 - Data Mode             27 - Data Mode                         │
│  14 - Data Mode             28 - Data Mode                         │
│                                                                    │
│ Enter selection >                                                  │
└──────────────────────────────────────────────────────────────────┘
```

Figure 6-1. Diagnostics Menu

VT/PORT LOOPBACKS

After you select the number that corresponds with the line you want 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. The sections following the figure provide descriptions and illustrations of the testing options. Select **1-DATA MODE** to end a test in progress.

```
┌──────────────────────────────────────────────────────────────┐
│ ▣               Diagnostics                                   │
├──────────────────────────────────────────────────────────────┤
│                                                              │
│     1 - Data Mode                                            │
│     2 - Tributary                                            │
│     3 - Analog Network                                       │
│     4 - Digital Line/Net                                     │
│     5 - Codec Line/Net                                       │
│     6 - CSU Loopback                                         │
│     7 - CSU LB w/BERT                                        │
│     8 - VT BERT                                              │
│     9 - Line BERT                                            │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
├──────────────────────────────────────────────────────────────┤
│  New value >                                                 │
└──────────────────────────────────────────────────────────────┘
```
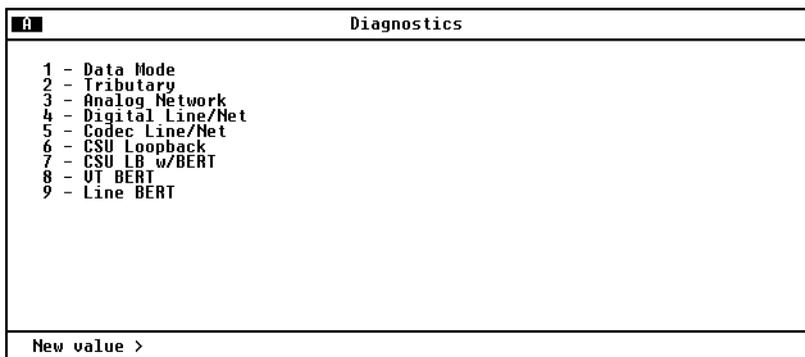
Figure 6-2. VT/Port Diagnostics Menu

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. See Figure 6-3 on page 6-3 for an illustration of this test.
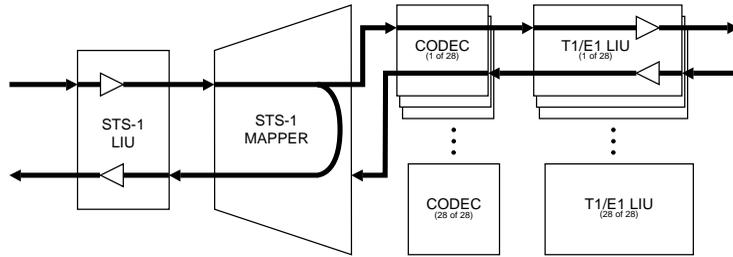
Figure 6-3. Tributary Loopback Test

Analog Network

An **ANALOG NETWORK** loopback test 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. See Figure 6-4 for an illustration of this test.
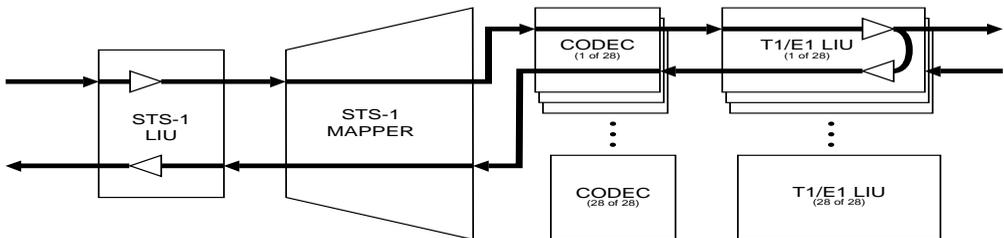
Figure 6-4. Analog Network Loopback

Digital Line/Net

A **DIGITAL LINE/NET** loopback 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. See Figure 6-5 for an illustration of this test.
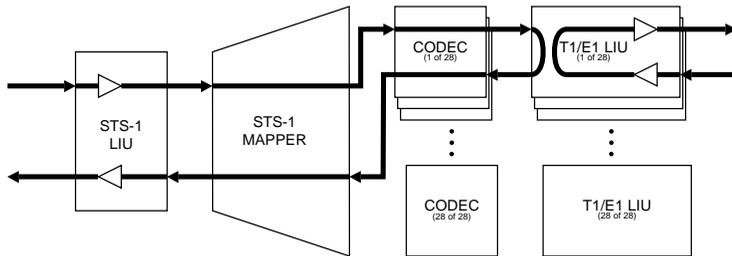
Figure 6-5. Digital Line/Network Loopback

Codec Line/Net

A **CODEC LINE/NET** loopback 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. See Figure 6-6 for an illustration of this test.
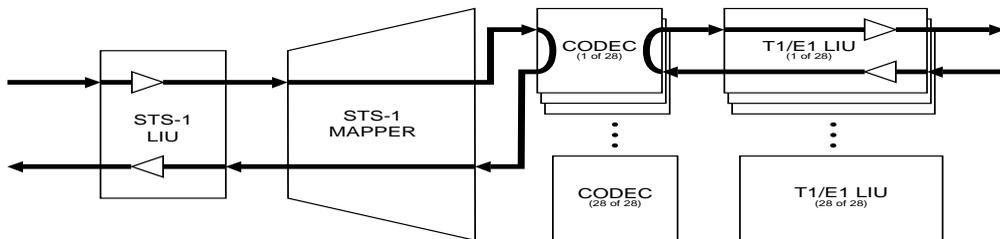
Figure 6-6. Codec Loopback

CSU Loopback

A **CSU LOOPBACK** enables the MX2800 STS-1 to generate a CSU loop-up pattern (001001…) towards the T1 CSU attached to the selected T1 line 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 responded to the CSU loop-up pattern, it will return all data back towards the network. A loop-down pattern (0000100001….) will be generated towards the CSU for six seconds when **DATA MODE** is selected.

> *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 being displayed.*

NOTE

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 towards the CSU attached to the selected T1 line similar to the **CSU LOOPBACK** test above. Six seconds after starting the CSU loop-up pattern, the MX2800 STS-1 will cease sending the CSU loop-up pattern and begin sending an unframed 511 pattern towards the CSU. If the CSU device responded to the CSU loop-up pattern, 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 on page 6-6). Selecting **DATA MODE** will cease the transmission of the QRSS pattern and start transmission of a loop-down pattern as previously described.

> *Only one T1 port may engage a* **CSU LOOPBACK***,* **CSU LOOPBACK W/BERT***, or a* **LINE BERT***. If a* **CSU LOOPBACK***,* **CSU LOOPBACK W/BERT***, or a* **LINE BERT** *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.*

```
┌─────────────────────────────────────────────────────────────┐
│ ▐A▌                    Diagnostics                           │
│                                                              │
│ T1/E1 Loopbacks        T1/E1 Loopbacks     DS3/DS2 Loopbacks │
│  1 - CSU LB w/BERT      15 - Data Mode     29 - DS3 = Data Mode │
│  2 - Data Mode          16 - Data Mode                       │
│  3 - Data Mode          17 - Data Mode     30 - DS2 #1 = Data Mode │
│  4 - Data Mode          18 - Data Mode     31 - DS2 #2 = Data Mode │
│  5 - Data Mode          19 - Data Mode     32 - DS2 #3 = Data Mode │
│  6 - Data Mode          20 - Data Mode     33 - DS2 #4 = Data Mode │
│  7 - Data Mode          21 - Data Mode     34 - DS2 #5 = Data Mode │
│  8 - Data Mode          22 - Data Mode     35 - DS2 #6 = Data Mode │
│  9 - Data Mode          23 - Data Mode     36 - DS2 #7 = Data Mode │
│ 10 - Data Mode          24 - Data Mode                       │
│ 11 - Data Mode          25 - Data Mode     37 - Reset ALL tests │
│ 12 - Data Mode          26 - Data Mode                       │
│ 13 - Data Mode          27 - Data Mode     38 - Clear BERR   │
│ 14 - Data Mode          28 - Data Mode          Pattern = ▐NO SYNC▌ │
│                                                 BERR = 1     │
│                                                              │
│ Enter selection > █                                          │
└─────────────────────────────────────────────────────────────┘
```

Figure 6-7. Diagnostics Menu with BERT Selected

VT BERT

A **VT BERT** enables the MX2800 STS-1 to perform a "head-to-head" **BERT** test towards the STS-1 network. Selecting **VT BERT** will replace all incoming T1/E1 traffic for the T1/E1 mapped to the selected VT with an *unframed* QRSS pattern towards the network. When **VT 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. See Figure 6-8 on page 6-7 for an illustration of this test.

> *When in* **VT BERT** *mode, only the* **DATA MODE** *option for the VT/Port under test may be selected. Selecting any other option will cause an error message to be displayed.*
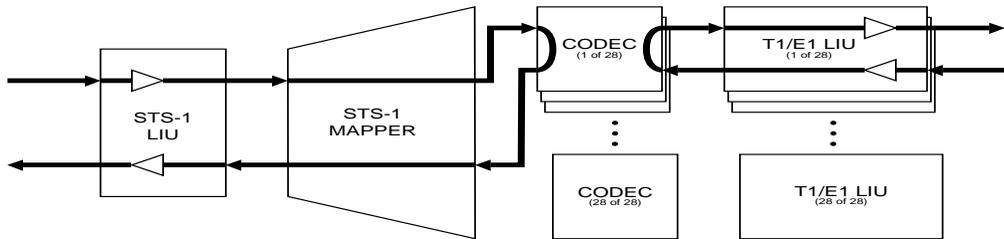
Figure 6-8. VT Bert Test

Line BERT

A **LINE BERT** enables the MX2800 STS-1 to perform a "head-to-head" **BERT** test towards 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. See Figure 6-8 for an illustration of this test.

> *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.*
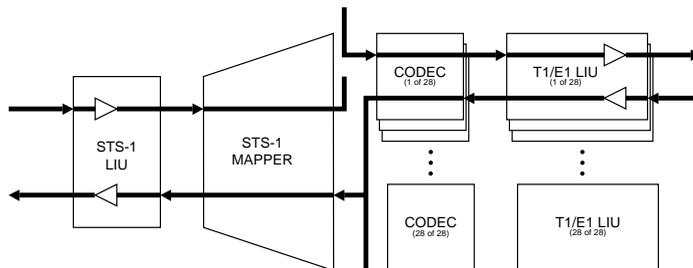
Figure 6-9. Line Bert Test

STS-1 LOOPBACKS

After you select **STS-1 LOOPBACK**, the menu in Figure 6-10 appears. The sections following the figure provide descriptions and illustrations of the testing options. Select **1=DATA MODE** to end a test in progress.

```
┌─────────────────────────────────────────────────────────────┐
│ ▐A▌                           DS3                            │
│                                                              │
│     1 - Data Mode                                            │
│     2 - Line Loopback                                        │
│     3 - Digital Diagnostic                                   │
│     4 - Metallic Diagnostic                                  │
│     5 - Remote Loopback                                      │
│     6 - Remote ALL T1/E1                                     │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│                                                              │
│  Enter new value > ▮                                         │
└─────────────────────────────────────────────────────────────┘
```
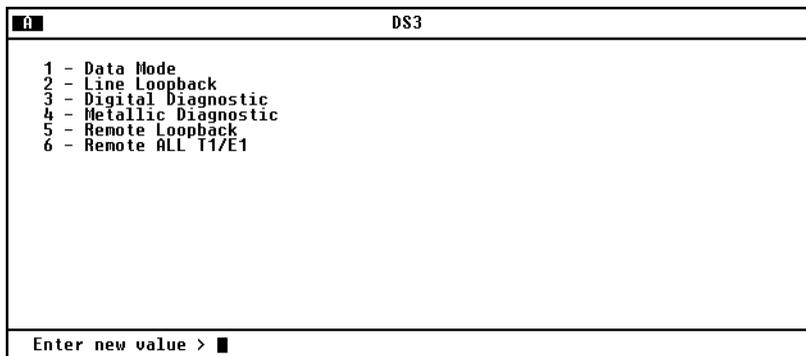
Figure 6-10. STS-1 Diagnostics Menu

Line Network

LINE NETWORK performs a loop of the STS-1 back to the network. 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. See Figure 6-11 on page 6-9 for an illustration of this text.

> **NOTE**
>
> *If a* **LINE NETWORK** *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.*
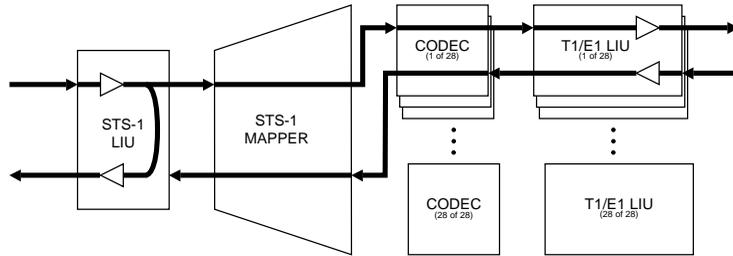
Figure 6-11. Line Network Test

Analog Loopback

An **ANALOG LOOPBACK** 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. This test is illustrated in Figure 6-12.
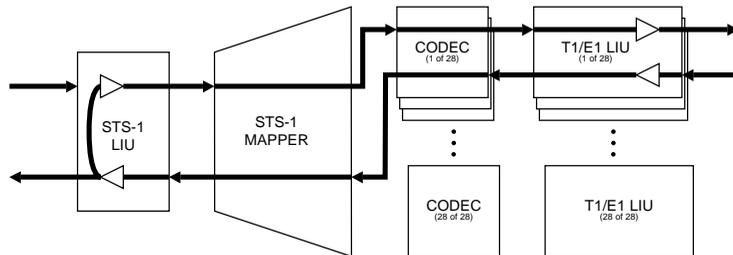
Figure 6-12. Analog Loopback

Digital Loopback

A **DIGITAL LOOPBACK** 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 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. This data will be processed through the "Transmit Clock Duty Cycle Adjust" PLL and the "HDB3/B3ZS Encoder" block. At this point, the data will be looped back to the "HDB3/B3ZS Encoder" block. This test is illustrated in Figure 6-13.
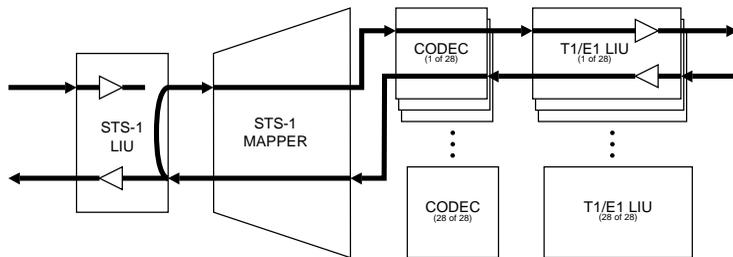
Figure 6-13. Digital Loopback

Metallic Diagnostics

A **METALLIC DIAGNOSTIC** loopback 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. See Figure 6-14 for an illustration of this test.
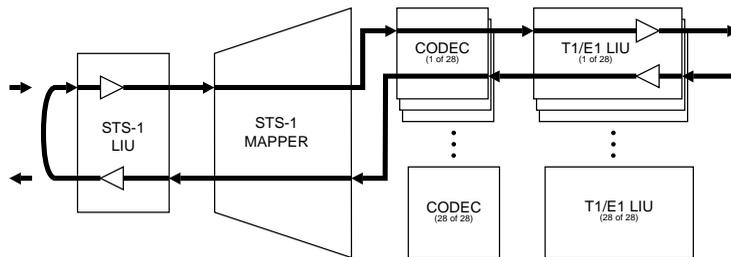
Figure 6-14. Metallic Diagnostics Loopback Test

MX2800 STS-1 User Manual

Chapter 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:

- *Non-Redundant Mode*, which offers no backup protection, is described on page 7-2.
- *Circuit Failure Recovery Mode*, which offers backup protection in the event of controller card failure, is described on page 7-3.
- *Circuit and Network Failure Recovery Mode*, which offers a complete backup system for both card and network failure, is described on page 7-4.

The descriptions given include illustrations and suggested configuration settings. Please note that the settings may need modification based on your network configuration.

NON-REDUNDANT MODE

In Non-Redundant Mode, the MX2800 STS-1 houses only one controller card and only one network connection is available. There is no failure protection. In the event of a failure, an alarm is initiated and the front panel LEDs reflect the condition. See Figure 7-1 for an illustration.
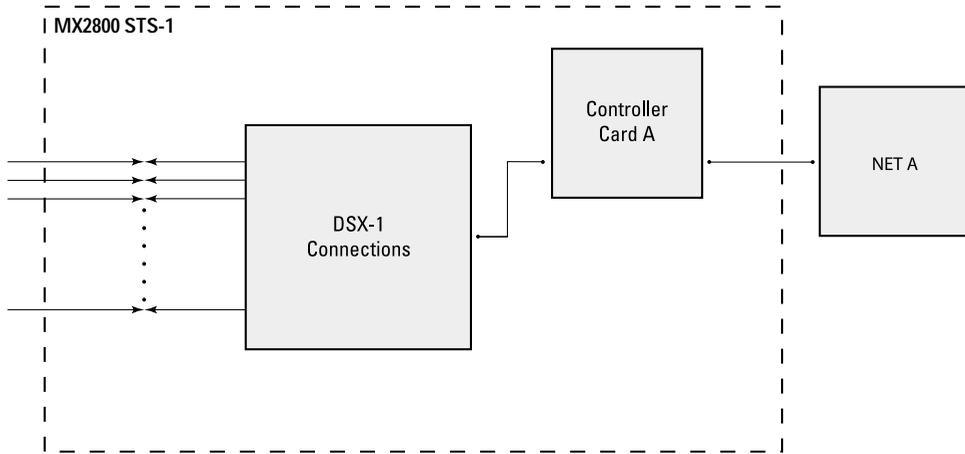
Figure 7-1. Non-Redundant Mode

> ✎ **NOTE** *In this mode, the STS-1 must be connected to the **IN** and **OUT** jacks for **NET A**.*

CIRCUIT FAILURE RECOVERY MODE

In Circuit Failure Recovery Mode, two controller cards are installed and a single STS-1 line is coming in (see Figure 7-2). In this mode, the MX2800 STS-1 can continue operating in the event of a controller card failure. When both cards are healthy, the primary card actively processes data while the secondary card stands by ready to take over if the first fails. The secondary card continuously monitors the line and remains framed to the incoming signal.

See Table 7-1 on page 7-4 for a list of this mode's configuration requirements.

> *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 signal at all times, it is a minimal interruption.*
>
> NOTE
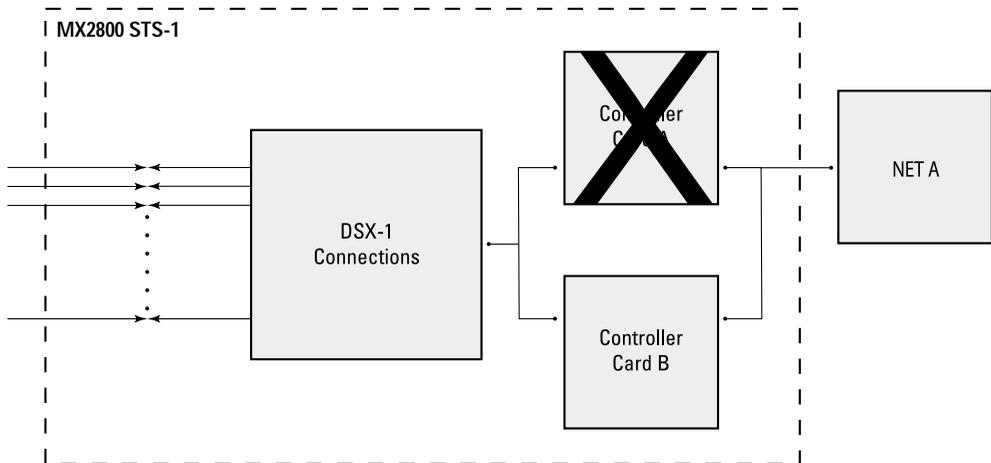
Figure 7-2. Circuit Failure Recovery Mode

Table 7-1. 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 all or select the T1/E1s that redundant switching should occur on.
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.

CIRCUIT AND NETWORK FAILURE RECOVERY MODE

In this mode, two controller cards are installed and connected to two individual STS-1 lines. This is, of course, the most complete mode of 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 other card and line stand by ready to take over if the first card and line fail. For example, if **CARD A** fails, then control switches to **CARD B** and **NET B**.

An important feature of the MX2800 STS-1 is its ability to internally re-route the network connection if a controller card and the *opposite* network connection fail. For example, in the illustration given in Figure 7-3, failed **NET A** is connected to healthy **CARD A**; and healthy **NET B** is connected to failed **CARD B**.

In a case like this, the MX2800 STS-1 is able to automatically re-route **NET B** to **CARD A**.

The configuration requirements for this mode are the same as the ones given for Circuit Failure Recovery Mode (see Table 7-1 on page 7-4) *except* for the **NETWORK PROTECTION** setting, which must be set to **ENABLE**.
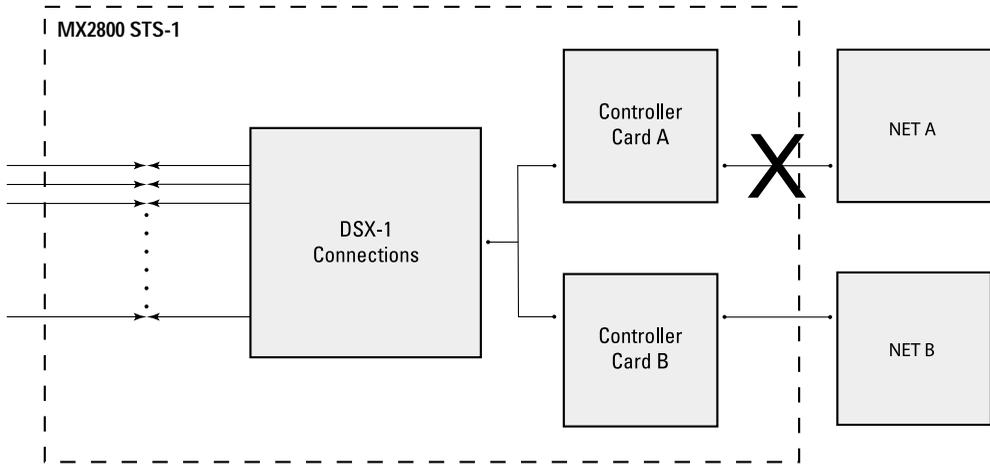
Figure 7-3. Circuit and Network Failure Recovery Mode

Chapter 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:

- *Non-Redundant Power Mode*, which offers no backup protection, is described on page 8-2.
- *Power Supply Recovery Mode*, which offers backup protection in the event of power supply card failure, is described on page 8-3.
- *Power Supply and Source Recovery Mode*, which offers a backup system for both card and source failure, is described on page 8-4.
- *Battery Backup Mode*, which offers battery backup in the event of a power outage, is described on page 8-5.

NON-REDUNDANT POWER MODE

In Non-Redundant Power Mode, the MX2800 STS-1 houses only one power supply card and only one power source is available. There is no power failure protection. If a power supply card fails, then the unit is inoperable until the card is repaired or replaced. See Figure 8-1 for an illustration.
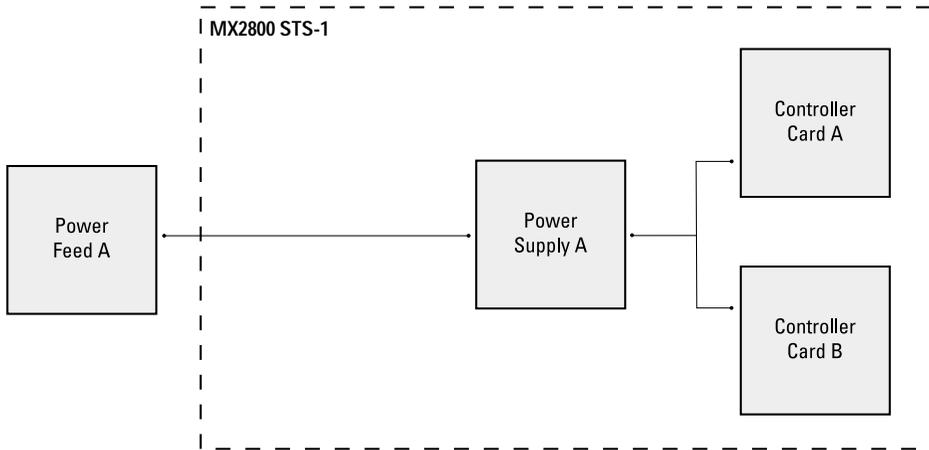
Figure 8-1. Non-Redundant Power Mode

NOTE   *Power supplies are hot-swappable.*

POWER SUPPLY RECOVERY MODE

In Power Supply Recovery Mode, two power supply cards are installed and connected to a single power source (see Figure 8-2). In this mode, the MX2800 STS-1 can continue to operate during a power supply failure, without interrupting service. 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.*
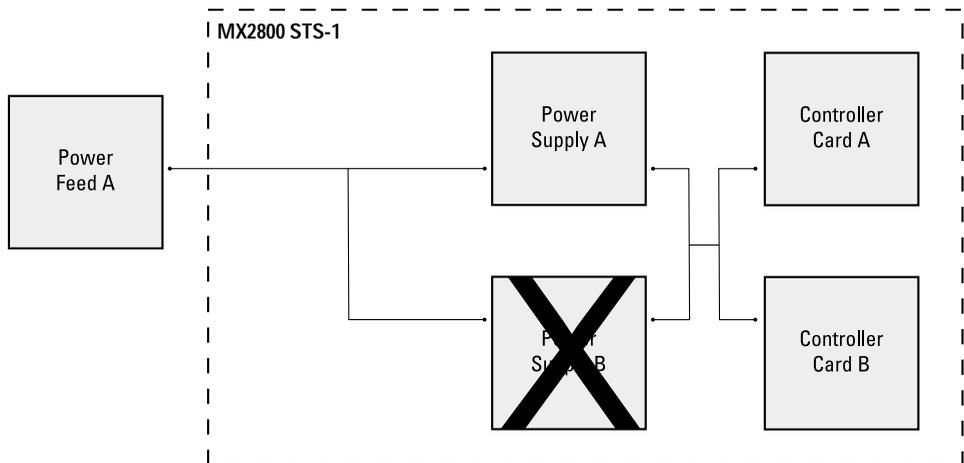
Figure 8-2. Power Supply Failure Recovery Mode

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 power source or power supply failure.

Much like the backup design for the controller cards, the MX2800 STS-1 is able to internally re-route 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.*
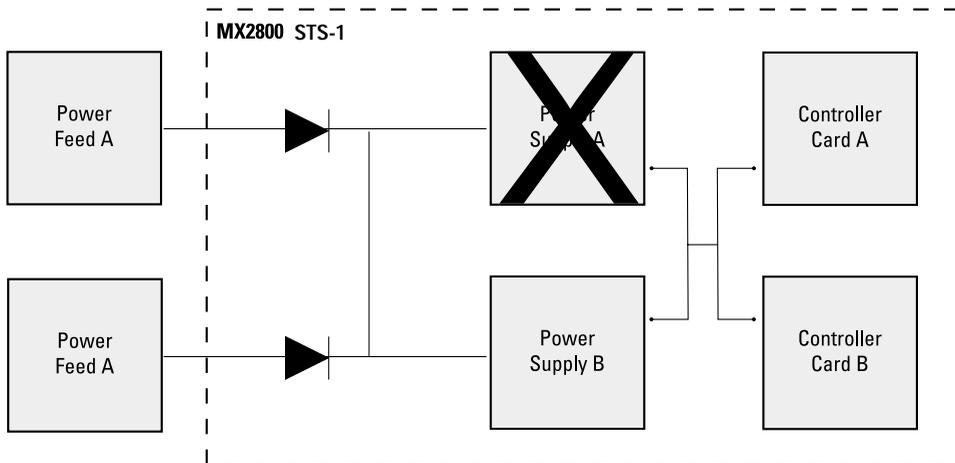
Figure 8-3. Power Supply and Source Failure Recovery Mode

BATTERY BACKUP MODE

With the installation of the ADTRAN Power Supply/Battery Charger (PS/BC) and backup battery pack, the MX2800 STS-1 is able to continue operation without service interruption during a power outage. This PS/BC (P/N 4175043L2) provides -48 VDC to the MX2800 STS-1. It receives 115 VAC through a standard plug and wall socket.

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 interrupting service. When AC power returns, the unit switches back to AC power and recharges the battery. For installation instructions, refer to the guide provided with the PS/BC. See Figure 8-4 for an illustration of this setup.
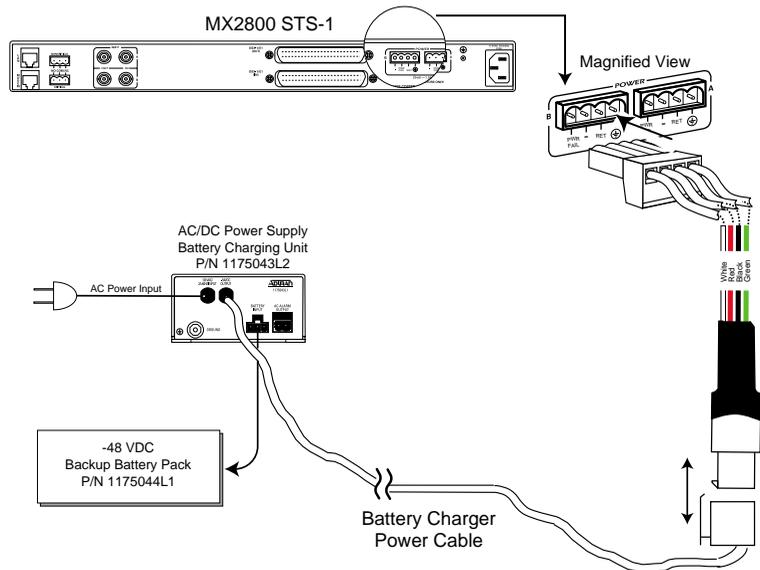
Figure 8-4. Battery Backup System

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

MX2800 STS-1 User Manual

Chapter 9   Transaction Language 1 (TL1)

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.

OVERVIEW

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.

Currently, up to eight simultaneous TL1 Telnet connections can be active. To manually bring up a TL1 Telnet connection, a Telnet client is used to request a connection on (TCP) port 3116. A successful connection will require that the MX2800 STS-1 be properly configured to operate via the LAN or modem. For example, in the LAN case, the MX2800 STS-1 must have the LAN

management port enabled, a valid IP and gateway address, and a valid subnet mask.

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 will be denied (autonomous messaging is also disabled). Authentication involves the successful entry of a **username/password** pair. A table of usernames and associated passwords and privileges is kept for TL1 authentication. This table is maintained by an administrator through the VT-100 menus or through a TL1 session. For information on using the Act-User command to initiate a TL1 session, see the section *TL1 Commands* on page 9-5.

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>]:[GB](:<PARAMx>(,<PARAMx>)*)*;

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) and 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>
    <SID> <YR>-<MO>-<DAY> <HR>:<MIN>:<SEC><CR><LF>
M   <CTAG> <COMPLETION CODE><CR><LF>
    (<UNQUOTED LINE>|<QUOTED LINE>|<COMMENT><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. See the section *TL1 Error Codes* on page 9-13 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 9-2 on page 9-10 (*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>
    <SID> <YR>-<MO>-<DAY> <HR>:<MIN>:<SEC><CR><LF>
<ALARM CODE> <ATAG> <VERB>[ <MOD1>[ <MOD2>]]<CR><LF>
(<UNQUOTED LINE>|<QUOTED LINE>|<COMMENT><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 9-2 on page 9-10 and Table 9-3 on page 9-12, respectively.

See the section *TL1 Autonomous Messages* on page 9-10 for a list of autonomous messages currently supported by the MX2800 STS-1.

TL1 COMMANDS

As stated in *TL1 Messages* on page 9-2, the general format for a TL1 command is:

<VERB>[-<MOD1>[-<MOD2>]]:[<TID>]:[<AID>]:[<CTAG>]:[GB](:<PARAMx>(,<PARAMx>)*)*;

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

Table 9-1. TL1 Commands

ACT-USER::<username>:::<password>;	
Description	Initiates a TL1 session
TID*	Circuit ID/Unit ID
AID	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)
PARAM1	Password for associated username
ALW-MSG-{EQPT|rr|ALL};	
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*	Circuit ID/Unit 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*	Circuit ID/Unit ID
AID*	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)

An asterisk indicates optional command blocks.

Table 9-1. TL1 Commands (Continued)

ED-USER-SECU::<username>:::,<password>,,<privileges>;	
Description	Edits the requested TL1 user's account
TID*	Circuit ID/Unit ID
AID	Username (must be present in TL1 user table)
CTAG*	Transaction Number (integer)
PARAM2	User's new password

PARAM4	User's new privileges:
	    0 .... disabled
	    1 .... guest
	    3 .... admin

ENT-USER-SECU::<username>:::<password>,,<privileges>;	
Description	Adds the requested user to the TL1 user table
TID*	Circuit ID/Unit ID
AID	Username
CTAG*	Transaction Number (integer)
PARAM1	User's password

PARAM3	User's privileges:
	    0 .... disabled
	    1 .... guest
	    3 .... admin

DLT-USER-SECU::<user>;	
Description	Removes the requested user from the TL1 user table
TID*	Circuit ID/Unit 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)

* An asterisk indicates optional command blocks.

Table 9-1. TL1 Commands (Continued)

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*	Circuit ID/Unit ID
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to inhibit: MN ....minor MJ........major CR ....critical ALL........all notification codes
RTRV-HDR;	
Description	Replies with a normal "COMPLD" response
TID*	Circuit ID/Unit ID
CTAG*	Transaction Number (integer)
RTRV-USER-SECU;	
Description	Retrieves the current list of users from the TL1 users table
TID*	Circuit ID/Unit 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*	Circuit ID/Unit ID

An asterisk indicates optional command blocks.

Table 9-1. 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
	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
	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

* An asterisk indicates optional command blocks.

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.

REPT-ALM indicates an alarm event. Table 9-2 lists possible autonomous messages for alarm events.

Table 9-2. MX2800 STS-1 Alarm Events

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM T1	101-128	MN	TSA	SA	NEND	DS1 In-test
	101-128	CR	LOS	SA	NEND	Loss Of Signal
	101-128	MN	BPV	SA	NEND	Bipolar Violation
	101-128	MJ	FACTERM	NSA	NEND	T1 Failure
	101-128	MN	AIS	SA	FEND	Alarm Indication Signal
	101-128	MN	AIS	SA	FEND	STS-1 Unframed Ones Alarm
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	SMLF	NSA	FEND	VT path Signal Label Mismatch
	201-228	MN	UNEQ-V	NSA	FEND	VT path Unequipped
REPT ALM STS-1	301	MN	TSA	SA	NEND	STS-1 In-test

Table 9-2. MX2800 STS-1 Alarm Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM EQPT	401 (General)	TC	RCVRY	SA	FEND	Protection Switch Alarm
	401 (General)	TC	ESW	NSA	NEND	Excessive Protection Switches
	402 (Ctrl A) 403 (Ctrl B)	TC	PROTNA	NSA	NEND	Controller Card Removed
	402 (Ctrl A) 403 (Ctrl B)	CR	CONTEQPT	NSA	NEND	Control Card Failure
	402 (Ctrl A) 403 (Ctrl B)	CR	LOS	SA	NEND	STS-1 Loss of Signal
	402 (Ctrl A) 403 (Ctrl B)	CR	LOF	SA	NEND	STS-1 Loss of Frame
	402 (Ctrl A) 403 (Ctrl B)	CR	EXT	SA	NEND	STS-1 Loss of H4 Multi-frame
	402 (Ctrl A) 403 (Ctrl B)	CR	LOP-P	SA	NEND	STS-1 Loss of Pointer
	402 (Ctrl A) 403 (Ctrl B)	CR	AIS-L	SA	FEND	STS-1 Line Alarm Signal Indication
	402 (Ctrl A) 403 (Ctrl B)	CR	AIS-P	SA	FEND	STS-1 Path Alarm Signal Indication
	402 (Ctrl A) 403 (Ctrl B)	MN	RFI-L	SA	FEND	STS-1 Line Remote Failure Indication
	402 (Ctrl A) 403 (Ctrl B)	MN	RFI-P	SA	FEND	STS-1 Path Remote Failure Indication
	402 (Ctrl A) 403 (Ctrl B)	MN	UNEQ-P	NSA	FEND	STS-1 Path Unequipped
	402 (Ctrl A) 403 (Ctrl B)	MN	SLMF	NSA	FEND	STS-1 Path Signal Label Mismatch
	402 (Ctrl A) 403 (Ctrl B)	CR	TRMT	SA	NEND	STS-1 Transmit Loss of Signal
	402 (Ctrl A) 403 (Ctrl B)	MN	BPV	SA	NEND	STS-1 Excessive Code Violations
	404 (PS A) 405 (PS B)	TC	PROTNA	NSA	NEND	Power Card Removed

Table 9-2. MX2800 STS-1 Alarm Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM EQPT (cont'd)	404 (PS A) 405 (PS B)	MJ	PWR	NSA	NEND	Power Supply Failure
	404 (PS A) 405 (PS B)	MJ	PWR	NSA	NEND	Power Supply Communication Failure
	404 (PS A) 405 (PS B)	MJ	PWR	NSA	NEND	Power Supply Low
	404 (PS A) 405 (PS B)	MJ	PWR	NSA	NEND	Power Supply Charger Fail
	404 (PS A) 405 (PS B)	CR	PWR	NSA	NEND	Power Supply Battery Low
	404 (PS A) 405 (PS B)	MJ	PWR	NSA	NEND	Power Supply Temp High
	404 (PS A) 405 (PS B)	CR	PWR	NSA	NEND	Power Supply Temp Critical

REPT-EVT indicates an informational event. Table 9-3 lists possible autonomous messages for informational events.

Table 9-3. MX2800 STS-1 Informational Events

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT EVT EQPT	501	TC	TIM-P	SA	NEND	STS-1 Receive J-Trace Event
	502 (Ctrl A) 503 (Ctrl B)	TC	NORMAL	NSA	NEND	Controller Card Inserted
	502 (Ctrl A) 503 (Ctrl B)	TC	SYNCSTAT CHNG	SA	NEND	STS-1 Clock Status Event
	502 (Ctrl A) 503 (Ctrl B)	TC	RCVRY	SA	NEND	STS-1 Clock Source Event
	502 (Ctrl A) 503 (Ctrl B)	TC	SYNCPRI	SA	NEND	STS-1 PRI. Ext. Clock Event
	502 (Ctrl A) 503 (Ctrl B)	TC	SYNCSEC	SA	NEND	STS-1 SEC. Ext. Clock Event

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

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT EVT EQPT (cont'd)	502 (Ctrl A) 503 (Ctrl B)	TC	INT	SA	NEND	STS-1 Clock Loss of Activity
	502 (Ctrl A) 503 (Ctrl B)	TC	NORMAL	NSA	NEND	Power Card Inserted

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 9-4 lists possible error codes.

Table 9-4. TL1 Error Codes

Error Code	Description
ICNV	Input, Command Not Valid
IITA	Input, Invalid Target Identifier
IPNV	Input, Parameter Not Valid
PIVI	Privilege, Illegal User Identity
PLNA	Privilege, Login Not Active
SSRE	Status, System Resources Exceeded

MX2800 STS-1 User Manual

Appendix A Pinouts

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

Table A-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 A-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 A-3. Modem Port Pin Assignments

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

NOTE

The modem port pin assignments only apply to units equipped with an internal modem (4200659L1, L2, L3, and L4).

Table A-4. Amp 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 A-4 applies to both the **IN** *and* **OUT** **DSX-1/E1** *Amp connectors.*

Appendix B   Specifications Summary

SPECIFICATIONS AND FEATURES

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

DSX-3 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 Amp connectors

Clocking

Network: receive from DS3 network
Local: internally generated

Diagnostics

>   **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 10BaseT 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 W
DC version: 48 VDC, 30W

Physical

Dimensions: 7.86"D x 17.0"W x 1.7"H
Weight: 5.5 lbs. (redundant); 4.5 lbs. (non-redundant)

MX2800 STS-1 User Manual

Appendix C Acronyms/Abbreviations

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

BERT .... bit error rate test

bps .... bits per second

BPV .... bipolar violation

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

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

ES .... errored seconds

Eq .... equipment

Eqpt .... equipment

EXZ .... excessive zeros

FBE .... F-bit errors

FCC .... Federal Communications Commission

FDL .... facility datalink

FEAC .... far-end alarm and control

FEBE............... far end block error

HSSI............... high-speed serial interface

IP.................... internet protocol

KA................... keep alive

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

MBE............... M-bit errors

Mbps............... megabits per second

MIB................ management information base

ms................... millisecond

NC................... normally closed

NI.................... network interface

NMS............... network management system

NO................... normally open

NRZ............... non-return to zero

NSA................ non service affecting

OCU............... office channel unit

OOF............... out of frame

OOS................ out of service

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
RD	receive data
RDL	remote digital loopback
RL	remote loopback
RMA	return material authorization
RS...................	request to send
RTS	request to send
Rx....................	receive
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
TA...................	terminal equipment available
TD	transmit data
TDM...............	time division multiplexing
TM	test mode

TR.................... data terminal ready

Tx..................... transmit

UAS .... unavailable seconds

WAN................ wide area network

XCV................. excessive coding violations

Appendix D Glossary

10BaseT

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

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.

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 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.

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.

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.

C-bit

An overhead bit in the DS3 string not used for framing, parity, or alarm indication.

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.

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 end-point 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.

DS1

Digital signal level one. Twenty-four DS0 channels make up one DS1 (total bandwidth is 1.544 Mbps).

DS3

Digital signal level three. Equivalent of 28 DS1s and 672 DS0s (total bandwidth is 44.736 Mbps).

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.

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.

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.

gateway

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

host computer

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

idle code

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

in-band

> Signaling (dialing, diagnostics, 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.

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.

M13

> DS1/DS3 multiplexer that combines up to 28 DS1 channels into one DS3 channel. Uses two-stage, bit synchronous TDM.

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.

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.

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.

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.

red alarm

    Unframed all ones signal (keep alive signal). A red alarm is declared on detection of LOS or OOF not caused by an alarm indication signal (AIS) that persists for more than two seconds.

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).

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.

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*.

T3

Transmission rates of 44.736 Mbps are available on T3 communication lines. Also referred to as digital signal level 3 (DS-3).

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.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.

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.

yellow alarm

A T3 yellow alarm is an indication sent back toward the source of a failed transmit circuit in a DS3 two-way transmission path. The X-bits (X1 and X2) are set to zero.

Index

Numerics

A

B