

T200 SHDSL T1/E1 Network Terminating Unit Installation and Maintenance Practice

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1. GENERAL

This document is an installation and maintenance practice for the ADTRAN Total Access® SHDSL T1/E1 Network Terminating Unit (NTU). **Figure 1** illustrates the SHDSL T1/E1 NTU front panel, P/N 1225236L1. The SHDSL T1/E1 NTU is a network terminating module using Single-Pair High Speed Digital Subscriber Line (SHDSL) technology to transport data over a single copper loop.

Revision History

This is the initial issue of this practice. Future changes to this documentation will be explained in this subsection.

2. DESCRIPTION

The SHDSL T1/E1 NTU was designed for use as a remote unit to the Total Access 3000. The Total Access SHDSL T1/E1 NTU provides an interface between the SHDSL network and the customer's Data Terminal Equipment (DTE) for applications such as LAN to LAN bridging, Frame Relay circuit, and PABX termination.

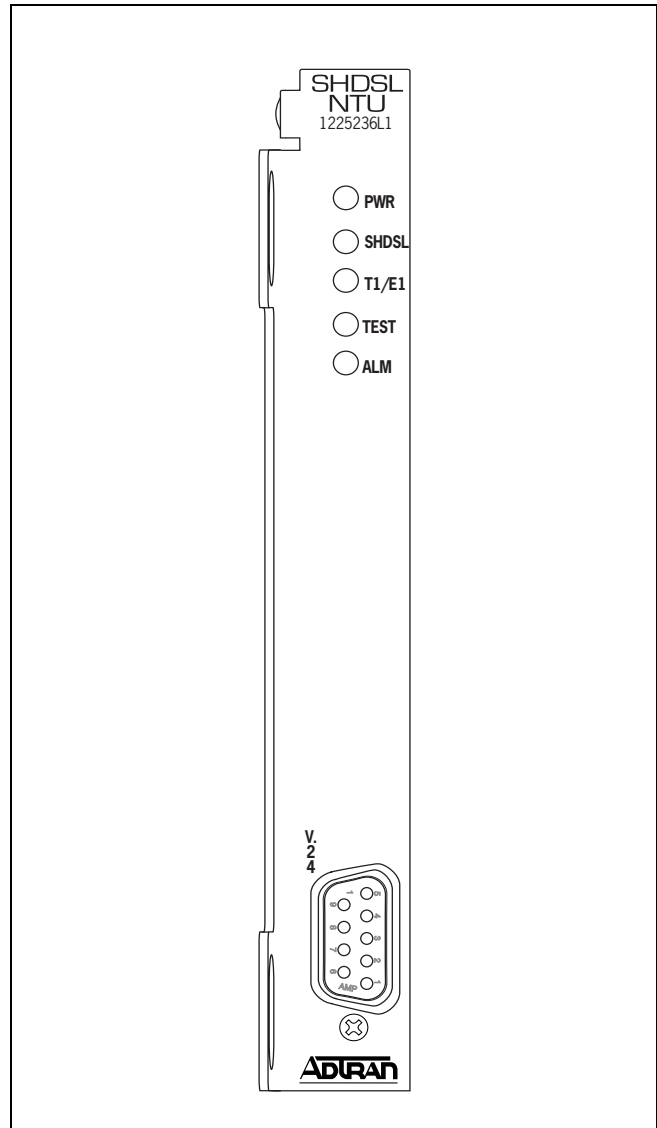


Figure 1. SHDSL T1/E1 NTU Front Panel

The SHDSL T1/E1 NTU is span powered with local DC power auto-switchover. No adjustments, strapping, or configuration changes are necessary to power the module. The SHDSL T1/E1 NTU configuration, testing, and performance monitoring is managed by the VT100 local management screen menus, remotely by an EOC terminal session, or also remotely by EOC message protocol initiated by the Total Access SHDSL T1/E1 LTU.

Features

The features of the SHDSL T1/E1 NTU, P/N 1225236L1, include the following:

- Responds to an Embedded Operations Channel (EOC) inventory response message
- Timing source is derived from the received SHDSL network signal
- Local management access via VT100 menus
- Remote management access via EOC message
- Operates in T1 mode with a data rate of 200 kbps to 1.544 Mbps and E1 mode with a data rate of 192 kbps to 2.048 Mbps
- Non-volatile memory configuration
- Factory default restoration via VT100 menu screens or EOC messages
- Firmware upgrade using local management port or remotely via EOC messages
- Password protection for local management access and firmware upgrade

See [Figure 2](#) for a typical configuration setup.

Compliance

[Table 1](#) shows the compliance codes for the SHDSL T1/E1 NTU. The SHDSL T1/E1 NTU is NRTL listed to the applicable UL standards. The SHDSL T1/E1 NTU is to be installed in a restricted access location and in a Type “B” or “E” enclosure only.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user’s authority to operate this equipment.

Table 1. Compliance Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	X
Installation Code (IC)	A	–

3. INSTALLATION



After unpacking the SHDSL T1/E1 NTU, inspect it for damage. If damage has occurred, file a claim with the carrier, then contact ADTRAN Customer Service. Refer to the [Warranty and Customer Service](#) section for further information. If possible, keep the original shipping container for returning the SHDSL T1/E1 NTU for repair or for verification of shipping damage.

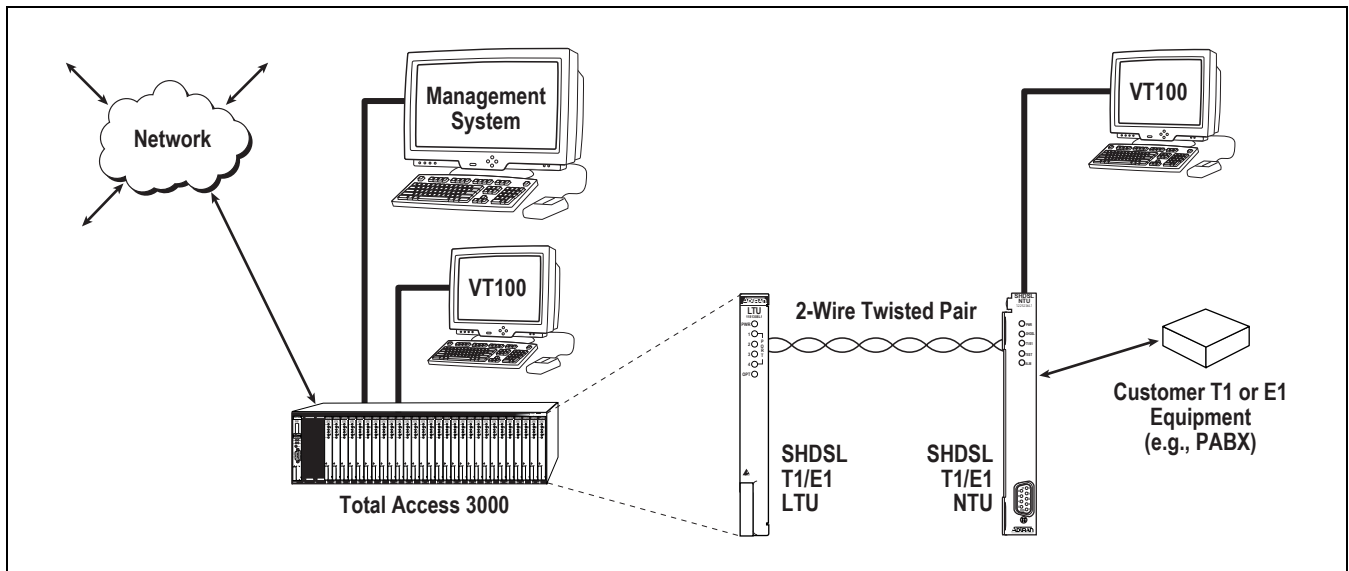


Figure 2. Typical System Application

Shipping Contents

The contents include the following items:

- SHDSL T1/E1 NTU
- SHDSL T1/E1 NTU Installation and Maintenance Practice

CAUTION

Electronic modules can be damaged by ESD. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

Instructions for Installing the Module

All connections of the SHDSL T1/E1 NTU are made through card edge connectors. The module operates in a standalone chassis, or the ADTRAN HR12 HDSL chassis.

When the module is installed in any of the NTU enclosures, all connections are made through the enclosure backplanes. Ensure chassis ground is properly connected for either standalone or chassis-mounted applications.

The SHDSL T1/E1 NTU is designed for a T200 or T400 type form factor housing and inserts into the customer T1 or E1 T200 type equipment. Follow local practice for installation of the SHDSL T1/E1 NTU.

The front panel provides LED status indicators for data port, test, and alarm conditions.

The local management port is a DB-9 female connector and is labeled V.24, with pinout and interchange circuits per ITU-T V.24 standards. [Table 2](#) illustrates the local management port DB-9 pinouts.

LED Indicators

The front panel of the SHDSL T1/E1 NTU has five LED status indicators. [Table 3](#) lists the LED descriptions.

Table 2. DB-9 Connector Pin Descriptions

Pin	Interchange Circuit		
	No.	Name	Function
1	109	RLSD	Received Line Signal Detect - Internally connected to DTR and DSR
2	104	RD	Receive Data from DCE
3	103	TD	Transmit Data to DCE
4	108/2	DTR	Data Terminal Ready - Internally connected to RLSD and DSR
5	102	SGND	Signal Ground
6	107	DSR	Data Set Ready - Internally connected to RLSD and DTR
7	105	RTS	Ready to Send - Internally connected to CTS
8	106	CTS	Clear to Send - Internally connected to RTS
9	---	NC	Not Connected

Table 3. Front Panel LEDs

LED	Indication	Description
PWR	Off Green	The module is powered off The module is In Service
SHDSL	Green Yellow Red	SHDSL loop is trained with good signal quality SHDSL loop is trained with poor signal quality SHDSL loop is not trained
T1/E1	Off Green	Port is active with alarms Port is active with no alarms
TEST	Off Green Yellow Red	Module is not in loopback or BERT Local loopback is active or BERT is running with no errors BERT is running with bit errors BERT is running with no pattern sync
ALM	Off Yellow Red	No alarm condition detected Alarm condition detected remotely Alarm condition detected locally

4. PROVISIONING

The SHDSL T1/E1 NTU menus are accessed via the DB-9 front panel female connector which supports VT100 emulation by PC based application programs or by a virtual terminal session over the EOC.

The parameters of the VT100 terminal should be set as follows:

- 9600 Baud
- No parity
- 8 Data bits
- 1 Stop bits
- No Flow Control

Once these steps have been completed, the following options will appear in the SHDSL T1/E1 NTU Main Menu:

1. Unit Information
2. Provisioning
3. Status
4. Test
5. Performance History

Windows HyperTerminal

Windows HyperTerminal can be used as a VT100 terminal emulation program. Open HyperTerminal by selecting Programs/Accessories/HyperTerminal. Refer to the Help section of HyperTerminal for additional information.

NOTE

To ensure proper display background, select VT100 terminal emulation under Settings.

The menu tree in **Figure 3** illustrates the path to every provisioning, performance, and test access point in the SHDSL T1/E1 menu system.

Table 4 lists the complete set of configurable options with settings and factory default values.

NOTE

When the NTU is in T1 mode, all related E1 options will be non-applicable. A non-applicable option setting is still changeable, but will not take affect until the option become applicable.

5. OPERATION

Test Capabilities

The SHDSL T1/E1 NTU has the following test capabilities:

- Self diagnostics
- Local loopbacks
- EOC initiated remote loopbacks
- Inband remote loopback detection (E1 mode only)
- Internal bit error rate tester (BERT)

Self Diagnostics

The SHDSL T1/E1 NTU performs self diagnostic tests of its Read Only Memory (ROM), Random Access Memory (RAM), LEDs, and non-volatile configuration setting upon power-up.

Local and Remote Loopbacks

For troubleshooting purposes, the SHDSL T1/E1 NTU provides three types of loopback tests.

1. Dual sided
2. Network
3. Customer

Inband Loopback Detection

Inband remote loopback response is supported on the E1 port. The SHDSL T1/E1 NTU supports V.54 and PN127 inband signalling protocols.

BERT

The SHDSL T1/E1 NTU contains a built-in Bit Error Rate Test (BERT). The BERT involves injecting and detecting a Pseudorandom Binary Sequence (PRBS) toward the network on the selected payload (i.e. G.703 or entire SHDSL payload). The PRBS used in the SHDSL T1/E1 NTU is PRS15 as defined in ITU-T 0.150 and 0.151. It is also known as $2e15 - 1$ pattern.

Customer Port

The SHDSL T1/E1 NTU operates in either E1 mode or T1 mode.

E1 Mode

In E1 mode the port features are as follows:

- Carries information at the rate of 2.048 Mbps
- Uses CCS framed format with or without CRC-4
- Operates in either Alternate Mark Inversion (AMI) or High-Density Bipolar 3 (HDB3) line code
- Provides programmable timeslot idle pattern
- Supports ISDN-PRA V3 service
- Displays additional status information via a local VT100 management screen

See [Table 5](#) for E1 port statistics definitions.

T1 Mode

In T1 mode the port features are as follows:

- Carries information at the rate of 1.544 Mbps
- Uses Superframe Format (SF) or Extended Superframe Format (ESF)
- Operates in either Alternate Mark Inversion (AMI) or Bipolar w/8-Zero Substitution (B8ZS) line code
- Provides programmable timeslot idle pattern
- Monitors the Facility Data Link (FDL) for loopback commands
- Displays additional status information via a local VT100 management screen

See [Table 6](#) for T1 port statistics definitions.

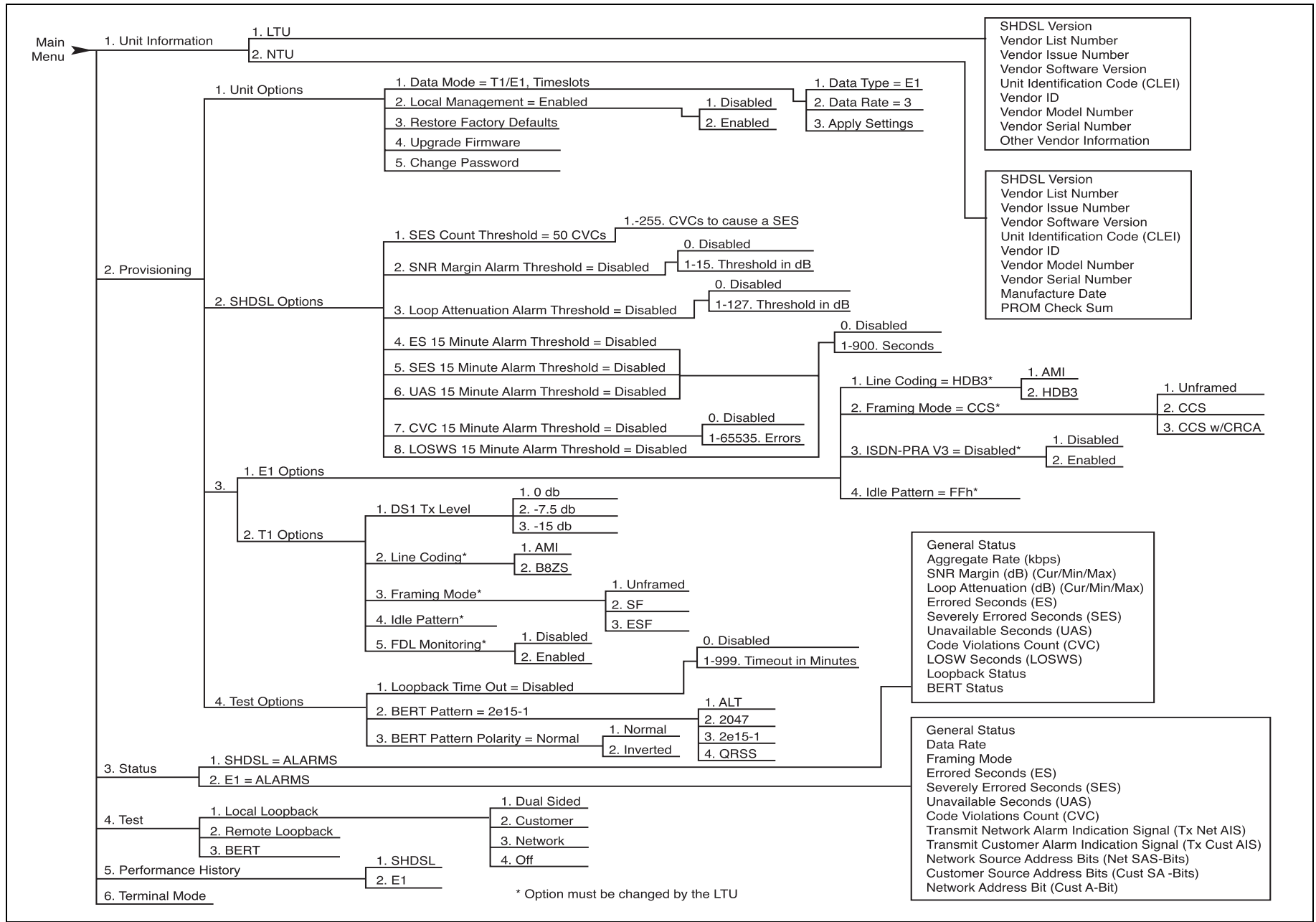


Figure 3. SHDSL T1/E1 NTU Menu Tree

Table 4. Configuration Options List

Category	Option	Setting	Default
Unit Options	Data Mode	For Data Type = T1, Data Rate can be from 3 to 24 time slots (i.e. 200 kbps to 1.544 Mbps) For Data Type = E1, Data Rate can be from 3 to 32 time slots (i.e., 192 kbps to 2.048 Mbps)	Data Type = T1 Data Rate = 24
	Local Management	1 = Disabled 2 = Enabled	Enabled
	Restore Factory Defaults		
	Firmware Upgrade		
	Change Password		
SHDSL Options	SES CVC Threshold	0 to 255 CVC's	50
	SNR Margin Alarm Threshold	0 = Disabled 1 to 15db = Alarm Threshold	Disabled
	Loop Attenuation Alarm Threshold	0 = Disabled 1 to 127db = Alarm Threshold	Disabled
	ES 15 Minute Alarm Threshold	0 = Disabled 1 to 900 Seconds = Alarm Threshold	Disabled
	SES 15 Minute Alarm Threshold	0 = Disabled 1 to 900 Seconds = Alarm Threshold	Disabled
	UAS 15 Minute Alarm Threshold	0 = Disabled 1 to 900 Seconds = Alarm Threshold	Disabled
	CVC 15 Minute Alarm Threshold	0 = Disabled 1 to 65535 Errors = Alarm threshold	Disabled
	LOSWS 15 Minute Alarm Threshold	0 = Disabled 1 to 900 Seconds = Alarm Threshold	Disabled
T1 Options (T1 Mode Only)	Line Coding	1 = AMI 2 = B8ZS	B8ZS
	Framing Mode	1 = Unframed 2 = SF 3 = ESF	ESF
	Idle Pattern	00h to FFh	7Fh
	FDL Monitoring (ESF Mode Only)	1 = Disabled 2 = Enabled	Disabled

Table 4. Configuration Options List (Continued)

Category	Option	Setting	Default
E1 Options (E1 Mode Only)	Line Coding	1 = AMI 2 = HDB3	HDB3
	Framing Mode	1 = Unframed 2 = CCS 3 = CCS w/CRC-4	CCS
	Idle Pattern	00h to FFh	FFh
	ISDN - PRA V3 (CCS or CCS w/CRC-4 Mode Only)	1 = Disabled 2 = Enabled	Disabled
Test options	Loopback Timeout	0 = Disabled 1 to 999 Minutes = Timeout	Disabled
	BERT Pattern	1 = ALT 2 = 2047 3 = 2e15 - 1 4 = QRSS	2e15 - 1
	BERT Pattern Polarity	1 = Normal 2 = Inverted	Normal
	Inband Loopback Protocol	1 = PN127 2 = V.54	PN127
	Inband Loopback Detection	1 = Disabled 2 = Enabled	Disabled

Table 5. E1 Port Statistics Definitions

Statistic	Framing Mode	Definition
Errored Seconds (ES)	Unframed	LOS condition or BPV's > 0
	CCS	LOS or LOF condition, or if BPV's > or FE's > 0
	CCS w/CRC-4	LOS, LOF, or LOMFA condition, or if FE's > 0 or CRC-4 errors > 0
Severely Errored Seconds (SES)	Unframed	LOS condition
	CCS	LOS or LOF condition or if FE's > 4
	CCS w/CRC-4	LOS, LOF, or LOMFA condition, or if FE's > 4 or CRC-4 errors ≥ 300
Unavailable Seconds (UAS)	N/A	If 10 continuous SES's, then UAS If 10 continuous seconds with no SES's, then no UAS
Code Violations Count (CVC)	Unframed	If BPV's > 0
	CCS	If BPV's > 0, or FE's > 0
	CCS w/CRC-4	If FE's > 0 or CRC-4 errors > 0

Table 6. T1 Port Statistics Definitions

Statistic	Framing Mode	Definition
Errored Seconds (ES)	Unframed	LOS condition or BPV's > 0
	SF	LOS or LOF condition, or if BPV's > 0 or FE's > 0
	ESF	LOS or LOF condition, or if BPV's > 0 or FE's > 0
Severely Errored Seconds (SES)	Unframed	LOS condition or BPV's > 1544
	SF	LOS or LOF condition, or if BPV's > 1544 or if FE's > 8
	ESF	LOS or LOF condition, or if BPV's > 1544 or if FE's > 8
Unavailable Seconds (UAS)	N/A	If 10 continuous SES's, then UAS If 10 continuous seconds with no SES's, then no UAS
Code Violations Count (CVC)	Unframed	If BPV's > 0
	SF	If BPV's > 0 or FE's > 0
	ESF	If BPV's > 0 or FE's > 0

6. MAINTENANCE

The SHDSL T1/E1 NTU requires no routine maintenance for normal operation.

ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the *Warranty and Customer Service* section for further information.

7. SPECIFICATIONS

Specifications for the SHDSL T1/E1 NTU are detailed in [Table 7](#).

8. WARRANTY AND CUSTOMER SERVICE

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

Table 7. SHDSL T1/E1 NTU Specifications

Environmental	
Operating Temperature:	-0°C to 55°C
Storage Temperature:	-40°C to 85°C
Relative Humidity:	90 percent maximum @ 50°C, noncondensing
Maximum Current Draw:	0.074 A maximum @ -48 VDC
Maximum Heat Dissipation:	3.55 watts
Physical	
Dimensions:	5.625 in. H x .625 in. W x 6.0 in. D
Weight:	< 1 lb.
Part Number	
SHDSL T1/E1 NTU Module:	1225236L1

