SHDSL 2-Wire/4-Wire LTU
Installation and Maintenance Practice

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Revision History

Revision	Date	Description
A	May 2005	Initial release
B	December 2006	Revise to include TSCAN feature, Firmware System Release v1.68

Conventions

The following typographical conventions are used in this document:

This font indicates a cross-reference link.

This font indicates screen menus, fields, and parameters.

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

This font indicates references to other documentation and is also used for emphasis.

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

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

This font indicates silk-screen labels or other system label items.

This font is used for strong emphasis.

NOTE

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

CAUTION

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

WARNING

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

Training

ADTRAN offers training courses on our products. These courses include overviews on product features and functions while covering applications of ADTRAN product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at customer sites.

For inquiries concerning training, contact ADTRAN:

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Contents

Figures

Tables

SHDSL 2-Wire/4-Wire Line Terminating Unit (LTU)

INTRODUCTION

This practice is an installation and maintenance guide for the ADTRAN® Model 6543 SHDSL 2-Wire/4-Wire Line Terminating Unit (LTU), P/N 1230011L1. Figure 1 shows the SHDSL 2-Wire/4-Wire LTU.

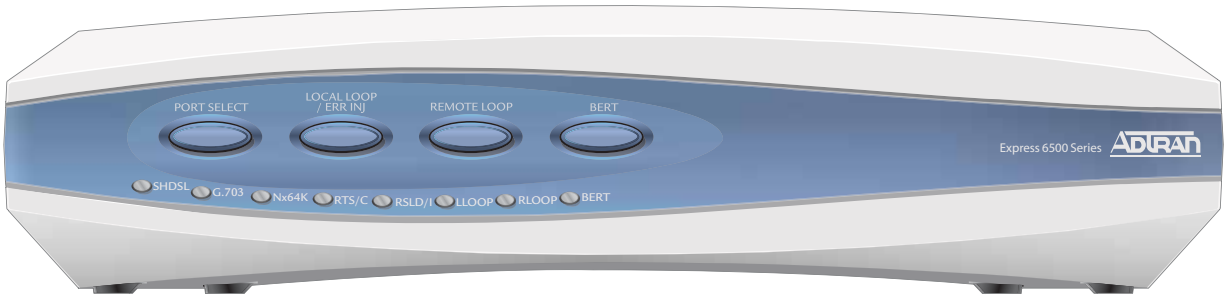


Figure 1. SHDSL 2-Wire/4-Wire LTU

Description

The SHDSL 2-Wire/4-Wire LTU provides an interface between the SHDSL network and the user Data Terminal Equipment (DTE), for applications such as LAN-to-LAN bridging, Frame Relay circuit, and PABX termination. The SHDSL 2-Wire/4-Wire LTU works with the SHDSL NTU in a point-to-point limited distance configuration (refer to Figure 2).

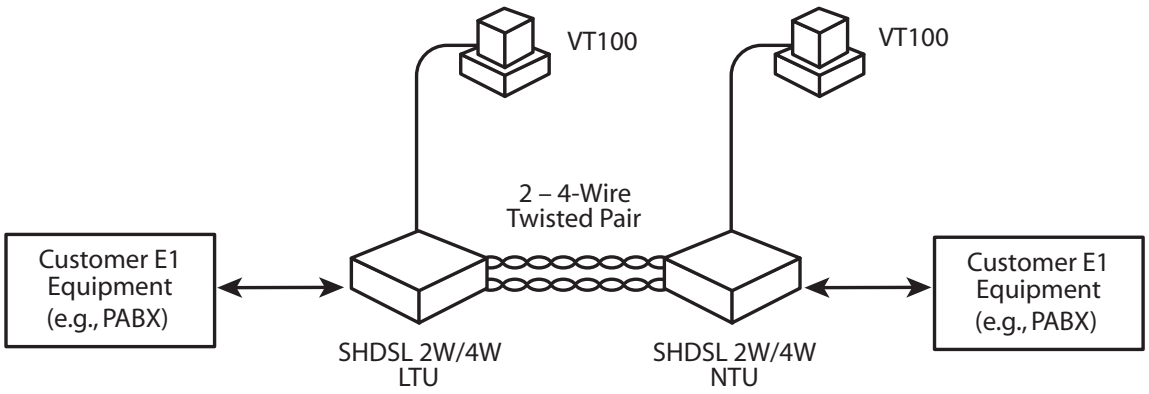


Figure 2. Typical System Application

Compatibility

The SHDSL 2-Wire/4-Wire LTU is compatible with the following NTU products:

Table 1. SHDSL 2-Wire/4-Wire NTU Products

Part Number	Product Name
1230001L1	6540 SHDSL 2-Wire/4-Wire NTU, AC Powered
1230002L1	6540 SHDSL 2-Wire/4-Wire NTU, DC Powered
1230007L1	6541 SHDSL 2-Wire/4-Wire NTU, AC Powered
1230008L1	6541 SHDSL 2-Wire/4-Wire NTU, DC Powered
1230009L1*	6542 SHDSL 2-Wire/4-Wire NTU, Span or DC Powered
1223135L1	T200 SHDSL NTU, 2-wire/4-Wire, Span or DC Powered

* Preferred compatible unit.

Note: The 6540 and 6541 model sets are separate AC or DC powered versions of the same base product (for example, P/Ns 1230001 and 1230002; 1230007 and 1230008).

SHDSL 2-Wire/4-Wire Mode, Line Rate

The SHDSL 2-Wire/4-Wire LTU supports multi-rate line operation (refer to Table 2).

Table 2. 2-Wire/4-Wire Multi-Rate Operation

Data Rate Type	2-Wire Mode	4-Wire Mode
SHDSL Line Aggregate Data Rate	200 kbps to 2.312 Mbps (N × 64 kbps + 8 kbps, where N = 3 to 36) In 2-wire mode, 8 kbps of bandwidth is required for overhead framing	400 kbps to 4.624 Mbps (N × 64 kbps + 16 kbps, where 2 x N = 3 to 36) In 4-wire mode, 16 kbps is required for overhead framing.
Payload Data Rate	192 kbps to 2.304 Mbps (N × 64 kbps, where N = 3 to 36)	384 kbps to 4.608 Mbps in 4-wire mode (2 x N × 64 kbps, where N = 3 to 36)
Service Data Rate	64 kbps to 2.304 Mbps (N × 64 kbps, where N = 1 to 36)	64 kbps to 4.608 Mbps (N × 64 kbps, where N = 1 to 72) This is the actual user data rate delivered to either the G.703 or Nx64 kbps ports.

Features

Table 3 lists the product features of the SHDSL 2-Wire/4-Wire LTU.

Table 3. Product Feature Set

SHDSL 2-Wire/4-Wire LTU Feature Set		
Physical Description		
Net Housing: 5.3 cm (2.1 in.) H x 23.6 cm (9.3 in.) W x 16.8 cm (6.6 in.) D Front Panel Recessed Pushbuttons (4 total) PORT SELECT LOCAL LOOP/ERR INJ REMOTE LOOP BERT		
Front Panel Tri-Color LED Indicators (Always Eight Total)		
Left to Right Order	**Label**	**Function**
LED 1	**PWR**	Indicates that power is available to unit*
LED 2	**SHDSL**	SHDSL Port Status, Test Select, Alarms
LED 3	**G.703**	G.703 Port Status, Test Select, Alarms
LED 4	**NTU PR**	Indicates that an NTU is present
LED 5	**PRGM**	Firmware Programming Status
LED 6	**LLOOP**	Local loopback test status for selected port
LED 7	**RLOOP**	Remote loopback test status for selected port
LED 8	**BERT**	BERT for selected port/service
Rear Panel		
SHDSL Port (RJ-45 135 ohms, TNV-3 rated)		
G.703 E1 Port (RJ-45 120 ohms, SELV rated)		
Local Management Port (DB-9 female, SELV; V.28 electrical)		
DC Power (5.08 mm (0.2 inc.) 4-pin terminal block shrouded male (MOLEX/BEAU 861904 or equivalent)		
* PWR LED illumination is not necessarily an indication that 48 VDC, 250 mA is available to the unit.		

Compliance

The SHDSL 2-Wire/4-Wire LTU complies with the following international standards:

- EN 300 386-2
- IEC 60950/EN 60950/AS NZS60950
- S016
- S043.2
- ITU K.21 Enhanced
- Telstra 1555

Figure 3 shows the compliance code label for the SHDSL 2-Wire/4-Wire LTU.

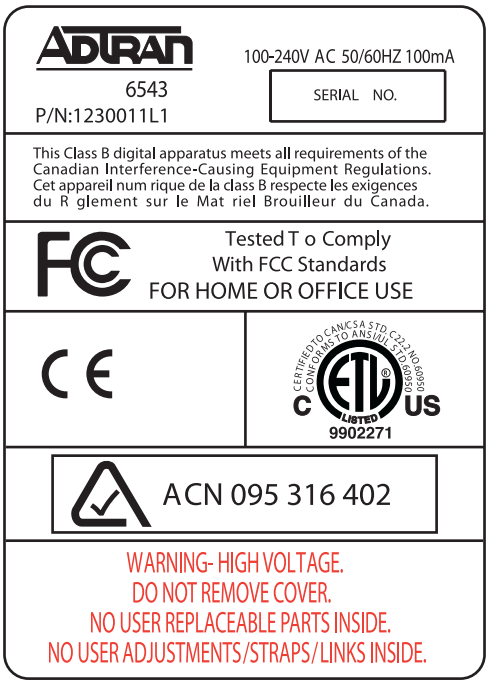


Figure 3. Compliance Label

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.

INSTALLATION

After unpacking the SHDSL 2-Wire/4-Wire LTU, inspect it for damage. If damage has occurred, file a claim with the carrier, then contact ADTRAN Customer Service. Refer to "Appendix A, Warranty" for further information. If possible, keep the original shipping container for returning the unit for repair or for verification of shipping damage.

Shipping Contents

The contents include the following items:

- SHDSL 2-Wire/4-Wire LTU
- Mating quick-connect terminal screw block (DC models only)
- SHDSL 2-Wire/4-Wire LTU Job Aid (product specific)

Front Panel Pushbuttons

There are four pushbuttons on the SHDSL 2-Wire/4-Wire LTU front panel (refer to Table 4). The pushbuttons are recessed to avoid accidental actuation and can be disabled, either individually or as a group, using the management interface.

Table 4. Pushbutton Functionality

Pushbutton	Description
PORT SELECT	Press the **PORT SELECT** button to select the active port. Selection choices cycle through the following order: No Port, Nx64k, G.703, SHDSL.
LOCAL LOOP / ERR INJ	If a port is selected, and a Bit Error Rate Test (BERT) is not in progress, press the **LOCAL LOOP/ERR INJ** button to initiate or terminate a local loop on the selected port. If a BERT is in progress, press the button to inject a single bit error.
REMOTE LOOP	If the SHDSL port is selected, press the **REMOTE LOOP** button to either place or remove a remote loop on the port by sending a EOC request message to the LTU (or NTU in campus mode). If the Nx64K port or G.703 port (with only one service defined) is selected, press this button to place or remove a remote loop on the selected port's single data service by sending respective inband loop up or loop down patterns to the far end (in the associated data service timeslots).
BERT	If a port is selected and there are no local loops, press the **BERT** button to start or stop a BERT on the selected port.

Front Panel LEDs

The front panel has LED status indicators that match the specific feature set of the model. Table 5 on page 8 details LED functionality.

Figure 4 illustrates the location of each LED on the front panel.

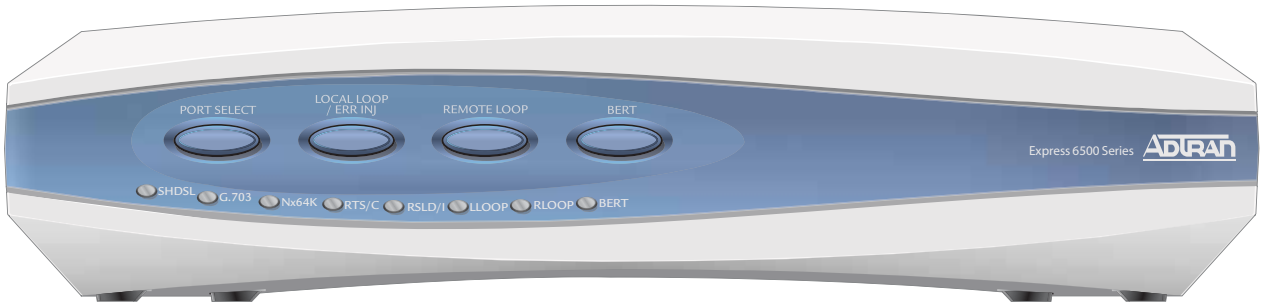


Figure 4. SHDSL 2-Wire/4-Wire LTU Front Panel

Table 5. LED Indicator Functionality

Label	Status		Description
PWR	○	Off	Unit is not powered
	●	Green	Unit is powered
SHDSL	○	Off	Unit is powered off
	●	Green	Port is trained; no active alarms
	●	Yellow	Port is trained with a minor active alarm (1)
	●	Red	Port is attempting to or is trained with a major alarm (2)
G.703	○	Off	Port is not active
	●	Green	Active Port with no active alarm
	●	Yellow	Active Port with a minor alarm (3)
	●	Red	Active Port with a major alarm (4)
NTU PR	○	Off	NTU is not present
	●	Green	NTU is present
PRGM	○	Off	Firmware is not being programmed
	●	Green	Local unit firmware is being locally programmed
	●	Yellow	Remote unit firmware is being locally programmed
	●	Red	Local unit firmware is being remotely programmed
LLOOP	○	Off	Local Loop is not active
	●	Yellow	Active Local Loopback on the selected port
	●	Red	Active Local Loop on one or more ports or services (when no port is selected)
RLOOP	○	Off	Remote Loop is not active
	●	Yellow	Active Remote Loopback on the selected port (when determined through established EOC)
	●	Red	Active Remote Loop on one or more ports or services (when no port is selected)
BERT	○	Off	BERT is not active
	●	Green	Active BERT and the test pattern detector is synchronized with no received bit errors
	●	Yellow	Active BERT and one or more test pattern bit errors have been received
	●	Red	Active BERT but the test pattern detector is not synchronized
SPN PWR	○	Off	Unit is not SHDSL span powered
	●	Green	Unit is SHDSL span powered
DC PWR	○	Off	Unit is not DC powered
	●	Green	Unit is DC powered
PRGM	○	Off	Firmware is not being programmed
	●	Green	Local unit firmware is being locally programmed
	●	Yellow	Remote unit firmware is being locally programmed
	●	Red	Local unit firmware is being remotely programmed

1. Minor SHDSL port alarms: CRC errors, Loop Attenuation Threshold Alarm, SNR Margin Threshold Alarm, Segment Anomaly, and any ES, SES, UAS, CVC, and LOSWS 15-Minute Threshold Alarm
2. Major SHDSL port alarms: LOS, LOSW, or Segment Defect
3. Minor G.703 port alarms: Rx RAI, Frame Slip, CRC-4 errors, LBER, and any ES, SES, UAS, and CVC 15-Minute Threshold Alarm
4. Major G.703 port alarms: LOS, LOF, LOMF, Rx AIS, or HBER

Pushbutton and LED Indicator Interaction

The following is a further explanation of the required interaction between the front panel pushbuttons and LEDs.

When no port is selected, (no flashing port LEDs) only the **PORT SELECT** pushbutton is enabled, and the **LLOOP**, **RLOOP**, and **BERT** LEDs indicate the status (refer to Table 6).

Table 6. LED Indication - No Port Selected

Test	Description
SHDSL, G.703, or Nx64k interface test condition active	LED is on
No interface test condition active	LED is off

When the **PORT SELECT** pushbutton is first pressed, the **G.703** LED flashes (if the model has an active G.703 port) to indicate that the G.703 port has been selected. The **LLOOP**, **RLOOP**, and **BERT** LEDs indicate the state of tests only on the G.703 port.

When the **PORT SELECT** pushbutton is pressed again, the **SHDSL** LED flashes (if the SHDSL port pushbutton option is enabled) to indicate that the SHDSL port has been selected. The **LLOOP**, **RLOOP**, and **BERT** LEDs indicate the state of tests on the SHDSL payload.

CONNECTIONS

Rear Panel

The SHDSL 2-Wire/4-Wire LTU does not have a power switch. A rear panel is designed with connections and labeling (refer to Table 7). Figure 5 illustrates the SHDSL 2-Wire/4-Wire LTU rear panel.

Table 7. Rear Panel Connectors

Rear Panel		
Description	**Connectors**	**Label**
SHDSL Port	RJ-45 (135 ohm; 2-wire or 4-wire)	**SHDSL**
G.703 Port	RJ-45 (120 ohm)	**G.703**
Management	DB-9 Female (V.28)	**Control V.28**
Power	Terminal Block (Span or DC)	**42-56 VDC, 250 mA**

Figure 5. SHDSL 2-Wire/4-Wire LTU Rear Panel

Power Supply

The SHDSL 2-Wire/4-Wire LTU supports Terminal Block, Span or DC powering.

DC Powering

Physical connection for DC operation is made on a 4-pin terminal block, shrouded male receptacle. The DC model operates over a DC input range of ±42 VDC to ±56 VDC (–48 VDC nominal), with a power rating not to exceed ten watts. A detachable mating terminal-screw block is supplied separately.

Span Powering

When span powered, the SHDSL 2-Wire/4-Wire LTU adheres to sections ITU-T G.991.2 Annex B.5.3 as it applies to LTUs.

SHDSL Pinout

The SHDSL port uses a TNV-3 rated, 135W impedance, RJ-45 connection with signals and pinouts (refer to Table 8).

Table 8. SHDSL Port RJ-45 Pinout

Pin	Circuit	
	Name	Function
1	Tip 2	4-Wire Loop, 2 Pair Tip
2	Ring 2	4-Wire Loop, 2 Pair Ring
3	NC	Not Connected
4	Tip 1	2-Wire Pair Tip, 4-Wire Loop, 1 Pair Tip
5	Ring 1	2-Wire Pair Ring, 4-Wire Loop, 1 Pair Ring
6 - 8	NC	Not Connected

G.703 Pinout

The G.703 port is SELV rated with a rear panel connection of either a 120Ω balanced RJ-45 jack with signals and pinouts (refer to Table 9).

Table 9. G.703 Port RJ-45 Pinouts

Pin	Circuit	
	Name	Function
1	RX Ring	Receive Pair Ring
2	RX Tip	Receive Pair Transmit
3	RX Shield	Receive Pair Ground Shield
4	TX Ring	Transmit Pair Ring
5	TX Tip	Transmit Pair Tip
6	TX Shield	Transmit Pair Ground Shield
7, 8	NC	Not Connected

OPTIONING

Timeslot Cross-Connect Map

The SHDSL 2-Wire/4-Wire LTU supports the configuration of multiple services.

A service is comprised of an arbitrary collection of timeslots from the SHDSL interface that are configured through the management interface. These services are routed to the G.703 interface. When there is only a single service from the G.703 interface, then the number of timeslots in that service must be less than or equal to 32. The SHDSL timeslots that are not assigned to a service are considered idle, and contain a fixed bit pattern of All Ones. Idle G.704 framed timeslots contents are determined by a programmable pattern register.

The SHDSL 2-Wire/4-Wire LTU supports the following interfaces and operation:

- A G.703 interface with G.704 framing, with a single or multiple G.703 services with a data transmission rate from 64 kbps to 1.984 Mbps (N × 64 kbps, where N = 1 to 31). G.704 framing may be either passed through delivered to end devices, or generated and terminated locally at the NTU G.703 port. In the former case, G.704 framing must be assigned to SHDSL timeslot 0. In the latter case, no G.704 framing passes across the SHDSL line.
- A G.703 interface without framing, with a single 2.048 Mbps service (32 × 64 kbps), and therefore the only service configured.

Timeslot Allocation

The SHDSL timeslots are individually mapped to the required G.703/G.704 service timeslots on a one-to-one basis. Both contiguous and non-contiguous service allocations are allowed, as long as the chronological transmission ordering of timeslots is maintained.

Timing Sources

Transmit and receive clocking is controlled by a configurable option, Clk Source, which has the following settings:

- Internal Clock (derived from internal oscillator with better than 32 ppm tolerance)
- G.703 RX Clock (G.703 port derived receive clock)
- SHDSL RX Clock (SHDSL port derived receive clock)

When in NT mode, interface clock references are always derived from the received SHDSL network signal. When a loss of signal occurs, the transmit timing will be internally loop-timed with an frequency accuracy of ±32 ppm. Refer to Figure 6.

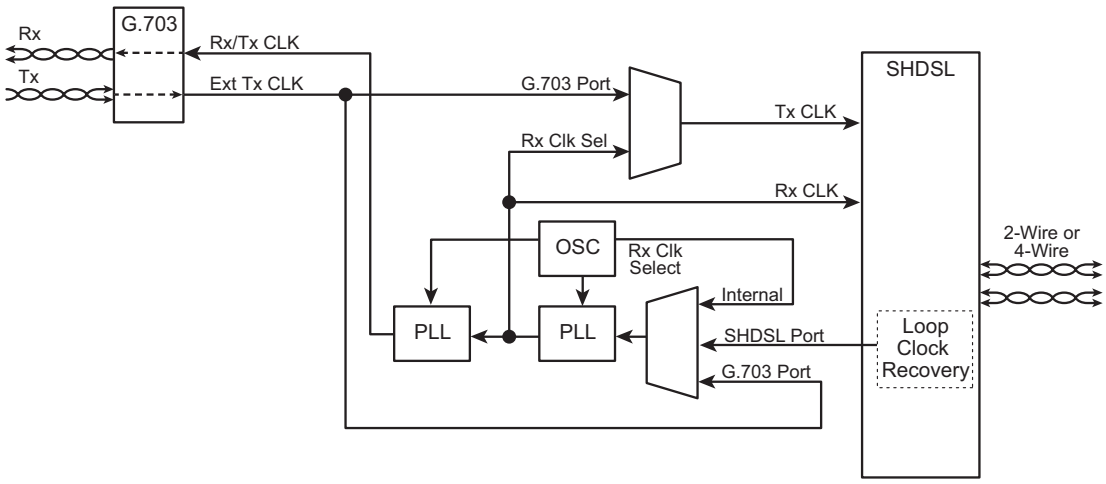


Figure 6. Timing Sources

Menu Tree

The User Interface for the SHDSL 2-Wire/4-Wire LTU consists of a number of menu screens designed to aid in maintenance and troubleshooting. The SHDSL 2-Wire/4-Wire LTU menu tree (see Figure 7) is a visual map that can be used to locate configuration information and provisioning options.

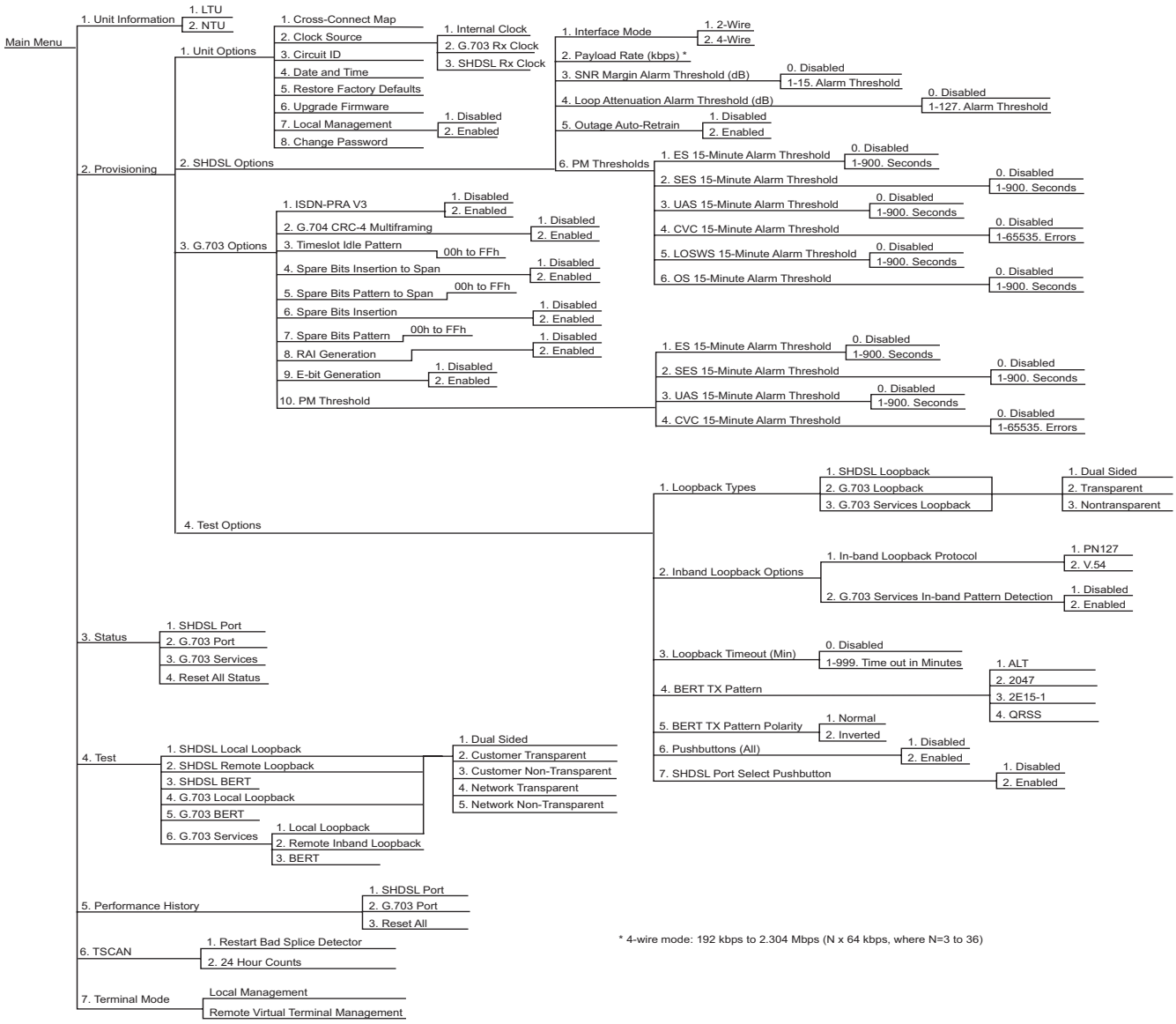


Figure 7. 6500 Series Menu Tree

TROUBLESHOOTING

Local and Remote Loopbacks for Ports and Services

For troubleshooting purposes, the SHDSL 2-Wire/4-Wire LTU provides five types of loopback tests for each interface port and each data service.

- Dual sided
- Network transparent
- Network non-transparent
- Customer transparent
- Customer non-transparent.

Loopback tests are initiated from EOC message commands, which are initiated as follows:

- The network management system (NMS)
- Local VT100 management screens
- Front panel pushbuttons
- The V.35/V.36 RL (Circuit 140) and LL (Circuit 141) control leads
- Received V3 command
- Generating and detecting in-band signaling

The SHDSL 2-Wire/4-Wire LTU provides an option register for each looping point. The default loopback type is dual-sided. Table 10 specifies the various looping points, originating sources, loopback types, and applicability of the Loopback Type option. VT100 screens and polled EOC status response messages indicate the active or inactive status of each looping point. If active, the type and originating source of the loopback test displays.

The direction of transparent and non-transparent loopbacks depends on the direction of test initiation. For example, if an in-band signal is detected on a particular G.703 service having the loopback type option set to transparent, then the received G.703 service data is looped back to the SHDSL port and also passed through to the G.703 port.

The initiation or removal of any loopback test will not cause a clock glitch on any interface. Loopbacks may be set by one source and removed by another source. If the SHDSL line is dropped, or if the NTU is power-cycled, all active loopback tests are released. Refer to Table 10 for loopback test summary information, and Table 11 on page 19 for a key to the symbols used in Table 10.

Table 10. Loopback Test Summary

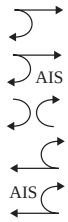
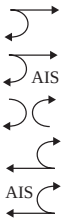
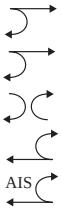
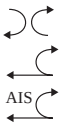
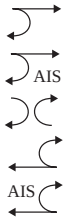
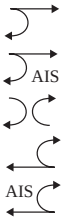
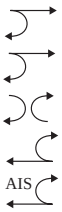
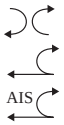
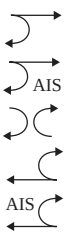
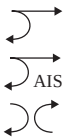
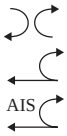
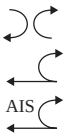
Initiating Source	SHDSL Port	G.703 Port	G.703 Service
NMS			
Proprietary EOC Local Loopback Request Message ACTIVATE (Initiates one of five loopback types, regardless of the associated Loopback Type Option setting.)			
Proprietary EOC Local Loopback Request Message DEACTIVATE			
Proprietary EOC Remote Inband Request Message ACTIVATE (Initiates a Remote Loopback per the remote unit's associated port/service Loopback Type option setting, if supported, and in the direction of signal origination.)	N/A	N/A	Sends Inband Signal 
Proprietary EOC Remote Inband Request Message **DEACTIVATE**	N/A	N/A	
VT100 Test Screen			
VT100 Local Loopback ON (Initiates one of five loopback types, regardless of the associated Loopback Type Option setting.)			
VT100 Local Loopback OFF			
VT100 Remote In-band Loopback ON [1] (Initiates a Remote Loopback per the remote unit's associated port/service Loopback Type option setting, if supported, and in the direction of signal origination.)	N/A	N/A	Sends In-band Signal 
VT100 Remote Inband Loopback OFF	N/A	N/A	
VT100 Remote Loopback ON[1] (Initiates a Remote Loopback using proprietary EOC request messages, regardless of remote unit's associated Loopback Type Option setting.) [2]	Single proprietary ECO request message 	N/A	N/A

Table 10. Loopback Test Summary (Continued)

Initiating Source	SHDSL Port	G.703 Port	G.703 Service
VT100 Remote Loopback OFF		N/A	N/A
Front Panel Pushbuttons			
Local Loop Pushbutton ON (Initiates a Local Loopback per the associated port/service Loopback Type Option setting.)		N/A	 Single Service Only
Local Loop Pushbutton OFF		N/A	
Remote Loop Pushbutton ON (Initiates a SHDSL Port Dual Sided Remote Loopback; or a G.703 Single Service Remote Loopback per the remote unit's associated service Loopback Type option setting, if supported, and in the direction of signal origination.)	Sends Standard EOC Request Message 	N/A	Single Service Only, Sends In-band Signal 
Remote Loop Pushbutton OFF		N/A	
Receive Inband Termination Signal	N/A	N/A	N/A
ISDN PRA V3 Reception			
Receive V3 Loopback Bit ON (Initiates a Local Loopback per the G.703 Port Loopback Type option setting, and in the direction of V3 signal origination.)	N/A		N/A
Receive V3 Loopback Bit OFF	N/A		N/A

1. The reception of in-band patterns and EOC loopback request messages may be ignored or blocked on certain Total Access 3000s.
2. If connected to a remote unit that does not support the EOC proprietary message specification, then only the EOC standard Customer and Network Loopback request bits are used. When either the Customer or Network Loopback bit is set, the remote unit determines which loopback type that it implements (for example, transparent or non-transparent).

Table 11. KEY to Symbols used in Table 10

Directions		Loopbacks			
			No Loop		Dual Sided
LTU					
←	Customer (to NTU)		Customer Transparent		Network Transparent
→	Network (to LTU)		Customer Non-Transparent		Network Non-Transparent

Bit Error Rate Tester (BERT)

The SHDSL 2-Wire/4-Wire LTU provides an internal bit error rate tester (BERT) for the injection and observation of a pseudo-random bit sequence (PRBS) to and from the SHDSL interface on a per service basis.

The BERT runs only one test at a time. When the SHDSL 2-Wire/4-Wire LTU is injecting PRBS, all ones are transmitted to the applicable G.703 port. The LTU BERT provides the following ITU-T O.150 and O.151 compliant PRBS patterns:

- ALT
- 2047
- 2E15-1
- QRSS

The observation of data on a service under test commences automatically when a BERT test is started. The following statistics become available on the VT100 screens and by EOC response message when polled by NMS:

- Bit Error Rate (of format from 0.00x10E-0 to 9.99x10E-9)
- Bit Error Count (the number of bit errors during the test period)
- Pattern Sync Loss Count (the number of times a PRBS pattern sync has been lost during the test period)
- Errored Seconds (a second that contains one or more PRBS bit errors)
- Outage Seconds (a count of ten or more consecutive Error Seconds - No outage indicates one second occurs with no errors)
- Total Elapsed Time (of format DD:HH:MM:SS)
- BERT Status
  - On
  - Off

Searching for Pattern

The SHDSL 2-Wire/4-Wire LTU is able to reset the BERT counters when requested to do so by an NMS or VT100 test screen. Injection of a single bit error from the NMS, VT100 test screen, or front panel BERT pushbutton is also possible.

BERT Application

In a typical testing scenario, a remote loopback or remote BERT is active in conjunction with the locally active BERT (refer to Figure 8 and Figure 9).

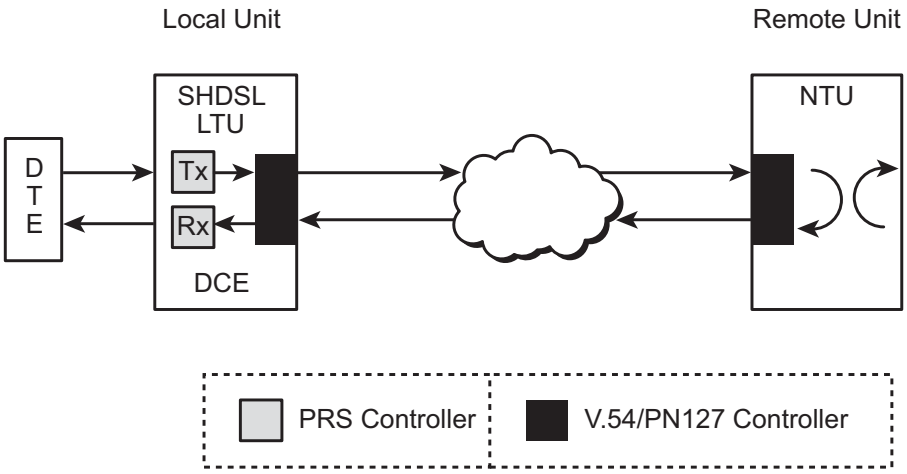


Figure 8. BERT and Remote Loopback

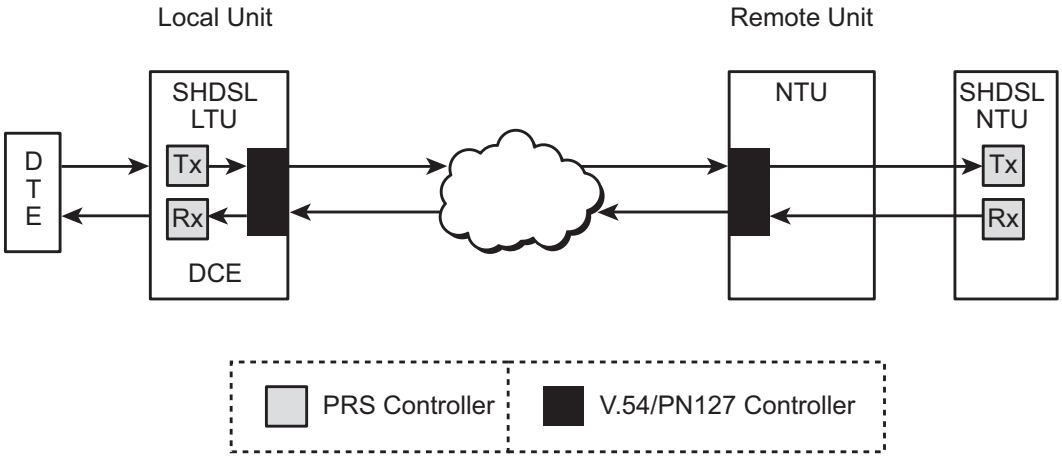


Figure 9. BERT with Remote BERT

Bad Splice Detection (TScan)

The SHDSL 2-Wire/4-Wire LTU provides bad splice protection using the ADTRAN proprietary Runtime TScan™ 2.0 splice protection feature. TScan splice detection is a non-intrusive algorithm that enables the SHDSL 2-Wire/4-Wire LTU to detect anomalies (bad splices) in the copper pair. This feature can aid in troubleshooting the distribution plant.

Data transmission transceivers (especially echo-cancelled technologies) are subject to performance degradations and errors in the presence of bad splice connections. A splice may be benign for a period of time, allowing a circuit to behave appropriately for portions of the day. Over time the splice can oxidize and incur small, rapid changes in impedance. This inconsistency in behavior makes the problem difficult to locate. Additionally, an impedance change that is large enough to cause the transceiver trouble may still be small enough to be undetected by test equipment used on the copper pairs.

The splice detection algorithm is designed to detect bad splices in data mode. The detector runs periodically after a SHDSL 2-Wire/4-Wire LTU achieves synchronization. The SHDSL transceiver monitors the loop for impedance changes that are of a magnitude to degrade the received signal of the transceiver. When the transceiver detects a significant impedance change, the approximate distance from that transceiver to the anomaly is recorded on a menu screen, the Bad Splice Detection (TSCAN) 24 Hour Counts menu screen, by incrementing the appropriate counter. When enough counts are accumulated at a particular distance, this distance is reported on the Bad Splice Detection (TSCAN) menu screen.

NOTE

The Splice Detection Feature is included with this product as an aid to troubleshooting. Due to inconsistency in environmental conditions and their effect on telecommunications plant, ADTRAN cannot guarantee the accuracy of the measurements. Comparison to existing engineering drawings should provide exact locations of suspect splices indicated by ADTRAN algorithms.

Managing TScan

The VT100 local management port allows access to the splice detection menus through the TSCAN selection from the Main Menu (refer to Figure 7 on page 15). The SHDSL 2-Wire/4-Wire LTU Main Menus provide access to the module. The Main Menu options have several functions and submenus that identify and provide access to specific operations and parameters.

Bad Splice Detection (TSCAN) Menu

The Bad Splice Detection (TSCAN) menu displays a summary of the bad splice results (see Figure 10).

- If a SHDSL loop is in good condition, a “No Trouble Found” status appears in the results column.
- If a count register exceeds a certain threshold, a bad splice is predicted to exist at this distance and displays in the results column.

- If more than one count register exceeds the threshold, then the count that is larger displays as a bad splice.
- If two or more count register exceed the threshold and are of equal count, then the distance count closest to the unit displays as a bad splice because the detector is more accurate the closer the anomaly is to the unit.

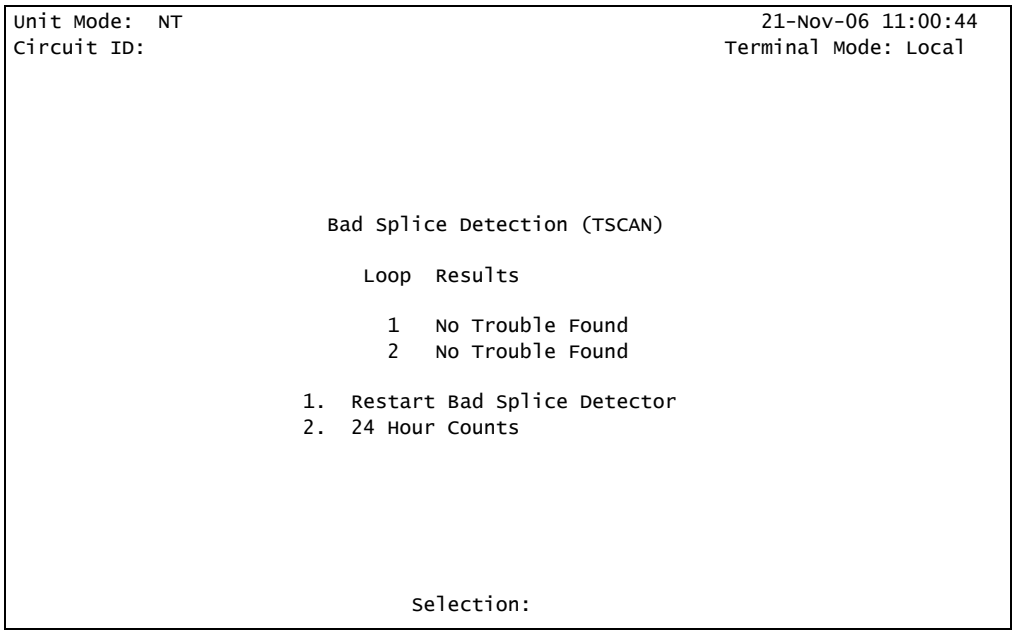


Figure 10. Bad Splice Detection (TSCAN) Menu

The Bad Splice Detection (TSCAN) menu options are shown in Table 12.

Table 12. Bad Splice Detection (TSCAN) Menu Options

Option	Description	Function
1	Restart Bad Splice Detector	Enables a reset of the entire count history. See "Restart Bad Splice Detector Screen" on page 23.
2	24 Hour Counts	Displays the register history. See "Bad Splice Detection (TSCAN) 24 Hour Counts Screen" on page 24.

Restart Bad Splice Detector Screen

The **Restart Bad Splice Detector** screen (Figure 11) enables a reset of the 24 hour count history.

NOTE

The SHDSL 2-Wire/4-Wire LTU also clears the count history automatically on power-up.

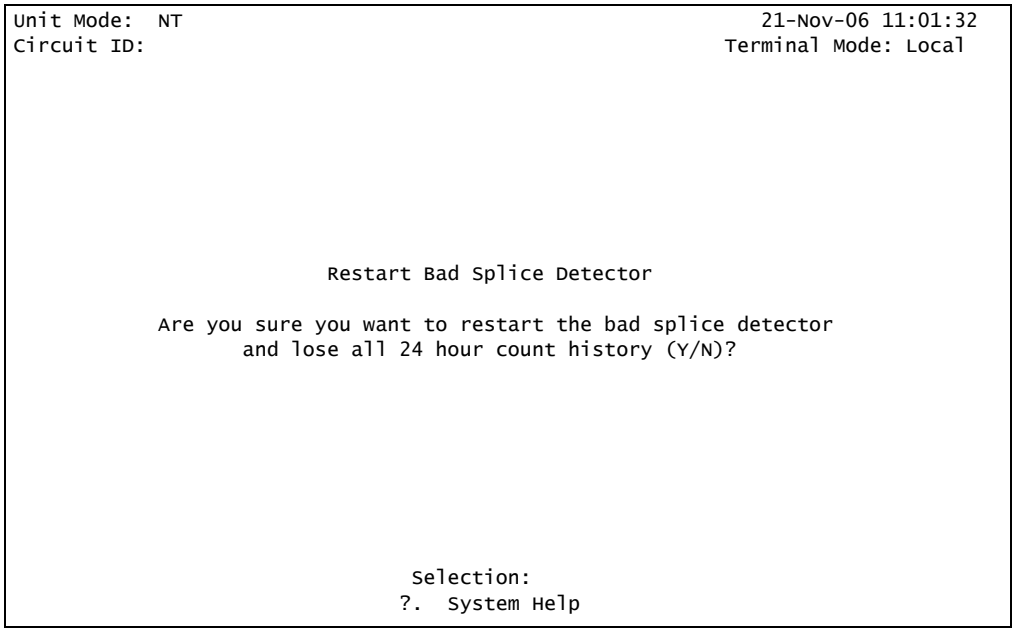


Figure 11. Restart Bad Splice Detector Screen

The **Restart Bad Splice Detector** screen fields are shown in Table 13.

Table 13. Restart Bad Splice Detector Screen Options

Field	Description
(Y)	Restart the bad splice detector. This erases the 24 hour count history.
(N)	Do not restart the bad splice detector. The 24 hour count history is retained.

Bad Splice Detection (TSCAN) 24 Hour Counts Screen

The Bad Splice (TSCAN) 24 Hour Counts screen displays the history register.

If the unit is handshaking or training, the splice loop rates and count registers do not update. If the unit is trained, it updates the splice current day data registers. But, if there was just a change in trained rate, it updates the loop rates and re-initializes to zero the current day data registers. The distance resolution, and therefore the number of count registers displayed, is loop rate dependent. Up to seven days of count history is maintained.

```
Unit Mode:  NT                                              21-Nov-06 11:44:30
Circuit ID:                                               Terminal Mode: Local

                 Bad Splice Detection (TSCAN) 24 Hour Counts

                     Ref Point: NTU          Day: CURRENT
   Loop 1 (Rate N=16; 4W, Trained)        Loop 2 (Rate N=16; 4W, Trained)
   Meters Cnt Meters Cnt                  Meters Cnt Meters Cnt

    0000  000  1072  000                   0000  000  1072  000
    0067  000  1139  000                   0067  000  1139  000
    0134  000  1206  000                   0134  000  1206  000
    0201  000  1273  000                   0201  000  1273  000
    0268  000  1340  000                   0268  000  1340  000
    0335  000  1407  000                   0335  000  1407  000
    0402  000  1474  000                   0402  000  1474  000
    0469  000  1541  000                   0469  000  1541  000
    0536  000  1608  000                   0536  000  1608  000
    0603  000  1675  000                   0603  000  1675  000
    0670  000  1742  000                   0670  000  1742  000
    0737  000  1809  000                   0737  000  1809  000
    0804  000  1876  000                   0804  000  1876  000
    0871  000  1943  000                   0871  000  1943  000
    0938  000                             0938  000
    1005  000                             1005  000
                              ?.  System Help           D.  Day
```

Figure 12. Bad Splice Detection (TSCAN) 24 Hour Counts Screen

SPECIFICATIONS

Table 14 lists the specifications for the SHDSL 2-Wire/4-Wire Line Terminating Unit (LTU)

Table 14. SHDSL 2-Wire/4-Wire Line Terminating Unit (LTU) Specifications

Specification	Description
Environmental	
Operating Temperature:	–5°C to +55°C
Storage Temperature:	–25°C to +70°C
Relative Humidity:	90 percent maximum @ 50°C, noncondensing
Maximum Current Draw:	250 mA @ – 48 VDC
Maximum Heat Consumption:	10.0 watts
Physical	
Dimensions:	Height: 3.125 inches Width: 1.14 inches Depth: 10.1 inches
Weight:	Less than 1 pound
Part Numbers	
Model 6543 SHDSL 2-Wire/4-Wire Line Terminating Unit (LTU):	1230011L1

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Appendix A
Warranty

WARRANTY AND CUSTOMER SERVICE

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

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

ADTRAN Sales

Pricing/Availability:

800-827-0807

ADTRAN Technical Support

Pre-Sales Applications/Post-Sales Technical Assistance:

800-726-8663

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

ADTRAN Repair/CAPS

Return for Repair/Upgrade:

(256) 963-8722

Repair and Return Address

Contact CAPS prior to returning equipment to ADTRAN.

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

Carrier Networks Division
901 Explorer Blvd.
Huntsville, AL 35806