ADTRAN® AHDSL2 Asynchronous H2TU-C Line Card for Alcatel Litespan® Channel Bank Assemblies Using Narrowband Pairs Installation and Maintenance Practice

CONTENTS

FIGURES

TABLES

1. GENERAL

The ADTRAN asynchronous Litespan HDSL2 Transceiver Unit for the Central Office (H2TU-C) P/N 1221002L2, is a DS1 interface unit that provides full T1 service over 2-wire interface facilities. The Litespan H2TU-C combines ADTRAN HDSL2 technology and Litespan technology to provide an HDSL2 interface to a Litespan system. ADTRAN's

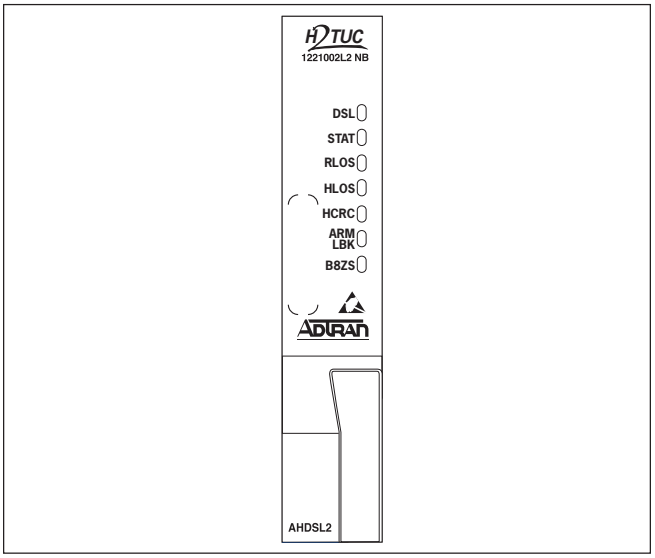

Figure 1. ADTRAN H2TU-C for Litespan

Litespan H2TU-C is certified by Alcatel® to safely operate in Litespan 2000, 2012 and Starspan systems. The unit is licensed under the Asynchronous High-bit-rate Digital Subscriber Line 2-wire T1 Interface Unit H2TU-C channel unit type. **Figure 1** is an illustration of the ADTRAN H2TU-C.

Revision History

This is the second release of this document. Additional footnotes have been added to Tables 6, 7, and A-1.

Features

- Lightning and power cross-protection, static discharge immunity, and local power bus fusing for line card safety and protection
- 1.552 kbps HDSL2 transmission over a single pair
- Front panel status LEDs
- Performance monitoring and alarm reporting
- Low power consumption
- Span powering for the H2TU-R
- Corrosion-preventive sealing current over a single twisted copper pair
- Troubleshooting functionality

Table 1 lists and defines the H2TU-C Front Panel LED indicators.

Each ADTRAN Litespan H2TU-C line card provides a 1.552 kbps data transport over one unconditioned CSA copper pair. These CSA loops can range up to 12 kft of 24-AWG twisted pair wire.

The Litespan H2TU-C can be used in Litespan 2000, Litespan 2012, and Litespan ONU channel bank assembly (CBA) systems containing Litespan system software versions of 11.0.0 or higher. Each H2TU-C works with the following multiple list versions of the HDSL2 unit remote end (H2TU-R):

Part Number	Description
1222024L6	T200 H2TU-R, Local Power
1223024L9	T200 H2TU-R, Local Power
1221026L6	T200 H2TU-R MON
1222026L6	T200 H2TU-R MON
1222026L9	T200 H2TU-R Q
1223026L9	T200 H2TU-R Q
122x024L7	T200 H2TU-R, Local Power
122x026L1	T200 H2TU-R
122x026L5	T200 H2TU-R B
122x026L7	T200 H2TU-R S

(where x = 1, 2 or 3)

The H2TU-C can be deployed in circuits consisting of one H2TU-C and one H2TU-R. Lightning and power cross-protection is provided at each twisted pair interface of the ADTRAN H2TU-C line card. Local power bus fusing is also used to protect the Litespan channel bank backplane, Litespan bank power supplies, and neighboring Litespan line cards in the event of catastrophic line card failure.

The Litespan H2TU-C uses a DC-to-DC converter to derive span powering voltage from the Litespan –48 VDC switched battery supply.

Simplex current of 30 mA of current may be coupled onto the HDSL2 loop span to power the H2TU-R (see **Figure 2**).

NOTE

Depending on the type of H2TU-R used in the circuit, different provisioning options will be available.

Table 1. LED Indicators

LED	Indication	Description
STAT	Off	Indicates loss of power to H2TU-C
	Green	Normal operation; H2TU-C is in sync with the H2TU-R
	Flashing Green	Acquiring HDSL2 synchronization with H2TU-R
	Red	Failure indication; unable to start/load firmware
HLOS	Off	HDSL2 signal achieved
	Red	HDSL2 loss of synchronization
	Flashing Red	DC continuity fault detected on HDSL2 loop
RLOS	Off	DS1 signal from the CPE is present at H2TU-R
	Red	DS1 signal from the CPE is absent at H2TU-R or Framing does not match
DSL	Green	HDSL2 SNR margin is optimum (6 dB or greater)
	Yellow	HDSL2 SNR margin is marginal (1 dB to 5 dB)
	Red	HDSL2 SNR margin is poor (0 dB)
	Flashing	HDSL2 pulse attenuation is > 30 dB
HCRC	Off	No HDSL2 CRC errors within the last 30 minutes
	Yellow	Four or more HDSL2 CRC errors in last 30 minutes
	Red	HDSL2 CRC errors are being detected
ARM/LBK	Off	The unit is not armed or in loopback
	Green	The unit is in loopback
	Yellow	The unit is armed but not in loopback
B8ZS	Green	The line code is B8ZS
	Off	The line code is AMI

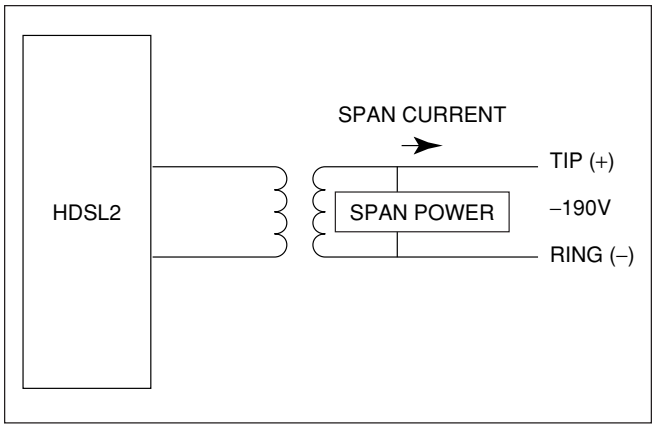

Figure 2. H2TU-C Span Powering Diagram

2. APPLICATIONS

The ADTRAN HDSL2 system provides a cost-effective alternative for deploying T1 service over metallic cable pairs. In contrast with traditional T1 service equipment, ADTRAN HDSL2 can be successfully deployed over one unconditioned, nonloaded, bridged-tapped copper pair CSA loop (see *Deployment Guidelines,* Section 4).

Litespan HDSL2 deployment is typically made from a Litespan 2000, Litespan 2012, or Litespan ONU channel bank assembly. **Figure 3** shows possible ADTRAN HDSL2 deployments from a Litespan channel bank assembly. ADTRAN HDSL2 systems can be deployed quickly without the use of expensive T1 repeater equipment on standard CSA loops while using the existing massive copper-fed twisted line pairs in use by the industry.

ADTRAN uses negative ground-referenced span powering voltage (–190 VDC) on HDSL2 loop. H2TU-R span powering can be disabled to allow locally powered H2TU-R applications, if desired.

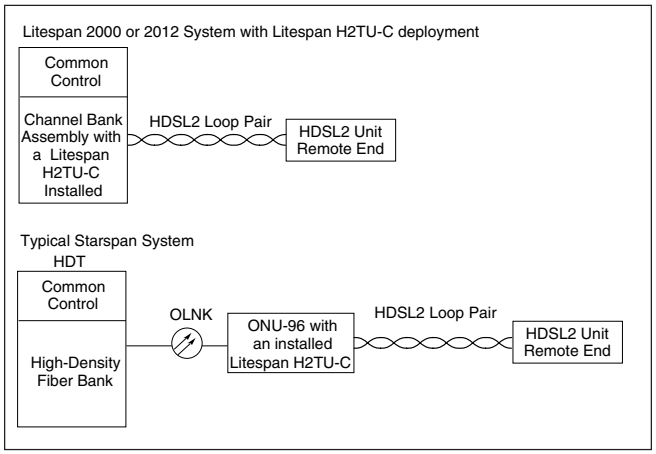

Figure 3. Deployment from a Litespan Channel Bank

3. INSTALLATION

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

After unpacking the unit, inspect it for damage. If damage is noted, file a claim with the carrier, then contact ADTRAN. Refer to *Warranty and Customer Service.*

The Litespan H2TU-C plugs directly into a Litespan channel bank assembly channel unit slot. Litespan system software must be version 11.0.0 or higher. The tip and ring connections from the H2TU-C to the shelf are made through the following card edge pins:

- Narrowband Tip – Pin A3
- Narrowband Ring – Pin A4

CAUTION

Do not deploy the Litespan H2TU-C into any Litespan channel bank assembly slot that has ADSL Power Distribution Fuse and Alarm (PDFA) connections to the wideband pairs of the channel bank assembly.

This unit supports narrowband cabling only on the Litespan RT shelf. For more information regarding cabling, reference Alcatel document *Mechanical Unit Descriptions*, OSP 363-405-270.

Upon insertion of an H2TU-C into an unprovisioned slot, the STAT LED should turn *red* immediately. The STAT LED will remain *red* until the Litespan bank recognizes the insertion of the card and downloads the AHDSL2 channel unit type code into the line card. Typically, the STAT LED will remain *red* for approximately 15 to 20 seconds (time may vary). Approximately 3 to 4 seconds after the STAT LED turns *off*, the HLOS LED will turn *red* and remain so until the H2TU-C and H2TU-R units synchronize with each other over the HDSL2 loop. The STAT LED will turn *green* after synchronization of the HDSL2 loop.

CAUTION

Prior to installing or removing the Litespan H2TU-C, observe the following warning: If the Litespan H2TU-C is removed from a line card slot, wait at least 15 seconds before reinsertion. If connected to the MTI craft interface terminal, wait until the message "AID:MJ,UEQ." appears (where "AID" is the access identifier). This informs the Litespan common control assembly that the H2TU-C has been removed from its slot, after which the common control assembly begins looking for the reinsertion of the line card. Reinsertion any earlier than this may temporarily lock the H2TU-C into a nonfunctional state because the common control assembly will not send the AHDSL2 equipment type code to the H2TU-C line card.

Compliance

This product is intended for installation in restricted access locations only and in equipment with a Type "B" or "E" enclosure.

WARNING

Up to –200 VDC may be present on telecommunications wiring. The DSX-1 interface is intended for connection to intra-building wiring only. Ensure chassis ground is properly connected.

This product provides span powering voltage (negative only with respect to ground, –190 VDC nominal, GFI protection < 5 mA) and meets all requirements of Bellcore GR-1089-CORE (Class A2) and ANSI T1.418-2002. This product is NRTL listed to the applicable UL standards.

Table 2 shows the compliance codes for this product.

Table 2. Compliance Codes

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

Provisioning

Provisioning of the H2TU-C is through the craft interface on the Maintenance and Test Interface (MTI) card either via TL1 commands or the Litecraft Pro Graphical User Interface (GUI). Refer to the *Litecraft Pro Access Configuration Guide* (P/N 61221002L1-31) for detailed GUI information.

The provisioning and performance monitoring VT100 terminal screens may be viewed from the H2TU-R DB-9 RS-232 craft interface port. However, the provisioning options may not be changed or manipulated in any way from the H2TU-R.

NOTE

Please reference Alcatel document *TL1 Software Reference*, OSP 363-405-502 for detailed information regarding provisioning through the MTI craft interface.

The H2TU-C TL1/Litecraft commands are grouped as follows:

- Administration
- Cross-Connect Provisioning
- Maintenance
- HDSL Provisioning
- T1 Provisioning
- Testing

Administration Commands

Administration commands are used to remove or restore the H2TU-C to service, place equipment and facilities In-Service (IS) and Out-of-Service (OOS), and display system inventory. These commands are listed and defined in **Table 3**.

Cross-Connect Provisioning Commands

Cross-connect Provisioning commands are used to manage cross-connections. These commands are listed and defined in **Table 4**.

Maintenance Commands

Maintenance commands are use to clear and retrieve Performance Monitoring (PM) information and to display alarm Statistics. **Table 5** lists and defines the available
TL1/Litecraft Maintenance commands.

Provisioning Commands

Upon initial insertion of the Litespan H2TU-C into the Litespan system, configuration options are downloaded automatically to the line card and take precedence over the ADTRAN default provisioning options.

NOTE

The provisioning options stored in the shelf controller can be pre-configured by the user through the Litecraft Pro interface.

Table 6 and **Table 7** list and define the available HDSL provisioning commands. The H2TU-C should be pre-provisioned as indicated under "Pre-Configurable Value."

Table 3. Administration Commands

TL1 Commands	Description
RMV-HDSL	Removes the Litespan H2TU-C from service (OOS)
RST-HDSL	Restores the Litespan H2TU-C to service (IS)
ENT-EQPT	Enters or assigns a unit to a slot position
DLT-EQPT	Deletes or unassigns a unit to a slot position
ED-HDSL or ED-T1	Edits the equipment

Table 4. Cross-Connect Commands

TL1 Commands	Description
ENT-CRS-T1	Enters a cross-connection
DLT-CRS-T1	Deletes a cross-connection
RTRV-CRS-T1	Retrieves existing cross-connections

Table 5. Maintenance Commands

TL1 Commands	Description
INIT-REG-HDSL or INIT-REG-T1	Clears performance monitoring data and sets all values to zero (0)
RTRV-PM-HDSL or RTRV-PM-T1	Retrieves performance monitoring data
RTRV-ALM-HDSL	Retrieves alarms

Table 6. HDSL Provisioning Commands

TL1 Commands	Litecraft Parameters	H2TU-C Options	H2TU-C Available Settings	Corresponding Litecraft Settings	Pre-Configurable Value
ED-HDSL	NIDLPBK	NIU Loopback	Disabled Enabled	NO YES	YES
ED-HDSL	LPBKTMO	Loopback Time Out[1]	0 20 Minutes 60 Minutes 120 Minutes	0 20 60 120	120
ED-HDSL	LPBKACTR	New England Loopback[2]	Disabled Enabled	0000000000000000 0000000000000001	0000000000000000
ED-HDSL	FT1MODE	Latching Loopback	T1 FT1	NO YES	NO
ED-HDSL	LP	Span Power	Disabled Enabled	SINK SOURCE	SOURCE
ED-HDSL	LPBKDEACTCDE	Customer Loss Indicator[3]	AIS AIS/CI Loopback	0000000000000000 0000000000000001 0000000000000010	0000000000000001
ED-HDSL	LPBKACTC	PRM setting[1,3]	None SPRM NPRM Auto (Both)	0000000000000000 0000000000000001 0000000000000010 0000000000000011	0000000000000001
ED-HDSL	NTWKKPALV	Network Keep Alive	Disabled Enabled	NO YES	NO
ED-GOS-HDSL	SNR	SNR Margin Alarm Threshold	0 to 15 dB	0 to 15	
ED-GOS-HDSL	LA	Loop Attenuation Alarm Threshold	0 to 40 dB	0 to 40	

[1]Some settings may not be available at the H2TU-R.
[2]This option is available only if the H2TU-R P/N 1221026L1, 1222026L1 or 1223026L1 is used in the circuit.
[3]This option is not available if the H2TU-R P/N 1221026L6, 1222026L6 or 1223026L1 is used in the circuit.

Table 7. T1 Provisioning Commands

TL1 Commands	Litecraft Parameters	H2TU-C Options	H2TU-C Available Settings	Corresponding Litecraft Settings	Pre-Configurable Value
ED-T1	LINECDE	Line Code	AMI B8ZS	AMI B8ZS	B8ZS
ED-T1	FMT	Framing[1]	SF ESF Unframed AUTO	SF ESF UNFR AUTO	AUTO
ED-T1	AT	DS1 TX Level[1]	0 dB −7.5 dB −15 dB	0.0 7.5 15.0	0.0

[1]Some settings may not be available at the H2TU-R.

Testing Commands

The H2TU-C testing commands are used to initiate and terminate loopbacks and disconnect for testing purposes. **Table 8** lists and defines the TL1/Litecraft testing commands.

NOTE

Before entering loopbacks, the user needs to remove the card from service. This can be done with the RMV-HDSL command. The card can then be restored to service with the RST-HDSL command.

NOTE

When entering access identification (AID), the user needs to specify whether a loopback command is for a C or an R. For example, AID=RT-1-21-C.

Alarms

The selectable alarm threshold crossing alerts are as follows:

- SNR margin threshold
- HDSL2 and DS1 15-minute ES, SES, UAS thresholds
- HDSL2 and DS1 daily ES, SES, UAS thresholds
- HDSL2 loop attenuation threshold
- DS1 15-minute CV-L, B8ZSS-L, and PDVS-L thresholds
- DS1 daily CV-L, B8ZSS-L, and PDVS-L thresholds

The following additional alarm conditions are provided by the H2TU-C:

- HDSL2 LOSW alarm
- HDSL2 unit failure alarm
- HDSL2 loop continuity alarms
- HDSL2 circuit reset
- DS1 LOS alarm
- H2TU-R AIS, RAI, INCRAI-CI

Power Requirements

When deploying any Litespan H2TU-C, the power requirements for the application should also be considered for product mix calculations and maximum number of Litespan H2TU-Cs within a channel bank assembly. Use Worksheet PW-1 in the "Engineering and Planning" section of Alcatel practice, *OSP TL1 Software Documentation*, release 7.1 or higher, to determine whether a particular combination of channel units is within power-drain specifications.

Table 8. Testing Commands

TL1 Commands	Litecraft Parameters	H2TU-C Options	H2TU-C Available Settings	Corresponding Litecraft Settings
OPR-LPBK-HDSL	LOCN (AID-C)	H2TU-C Network Loopback	Loop Up	NEND
RLS-LPBK-HDSL	LOCN (AID-C)	H2TU-C Network Loopback	Loop Down	NEND
OPR-LPBK-HDSL	LOCN (AID-C)	H2TU-C Customer Loopback	Loop Up	FEND
RLS-LPBK-HDSL	LOCN (AID-C)	H2TU-C Customer Loopback	Loop Down	FEND
OPR-LPBK-HDSL	LOCN (AID-R)	H2TU-R Network Loopback	Loop Up	NEND
RLS-LPBK-HDSL	LOCN (AID-R)	H2TU-R Network Loopback	Loop Down	NEND
OPR-LPBK-HDSL	LOCN (AID-R)	H2TU-R Customer Loopback	Loop Up	FEND
RLS-LPBK-HDSL	LOCN (AID-R)	H2TU-R Customer Loopback	Loop Down	FEND

Table 9 lists the ADTRAN Litespan H2TU-C and H2TU-R factors needed to calculate channel bank power using Worksheet PW-1.

The Table 9 power factors are derived from the power parameters listed in **Table 10**.

4. DEPLOYMENT GUIDELINES

The ADTRAN HDSL2 system is designed to provide DS1-based services over loops designed to comply with carrier service area (CSA) guidelines. CSA deployment guidelines are given below.

1. All loops are nonloaded only.
2. For loops with 26-AWG cable, the maximum loop length including bridged tap lengths is 9 kft.
3. For loops with 24-AWG cable, the maximum loop length including bridged tap lengths is 12 kft.
4. Any single bridged tap is limited to 2 kft.
5. Total bridged tap length is limited to 2.5 kft.
6. The total length of multigauge cable containing 26-AWG cable must not exceed the following:
   $12 - \{(3*L_{26})/(9 - L_{BTAP}\}$ (in kft.)
   L_{26} = total length of 26-AWG cable excluding bridged taps (in kft.)
   L_{BTAP} = total length of all bridged taps (in kft.)
7. Recommended loop resistance for circuit deployment is ≤ 750 Ω (9 kft. of 26 AWG).

This deployment criteria is summarized in the chart shown in **Figure 4**.

Table 10. Power Parameters

Power Bus	ADTRAN Litespan H2TU-C and AH2TU-R
+5 V	324 mA
-48 V Switch battery	125 mA
Power consumption	6 W
Power dissipation	3 W

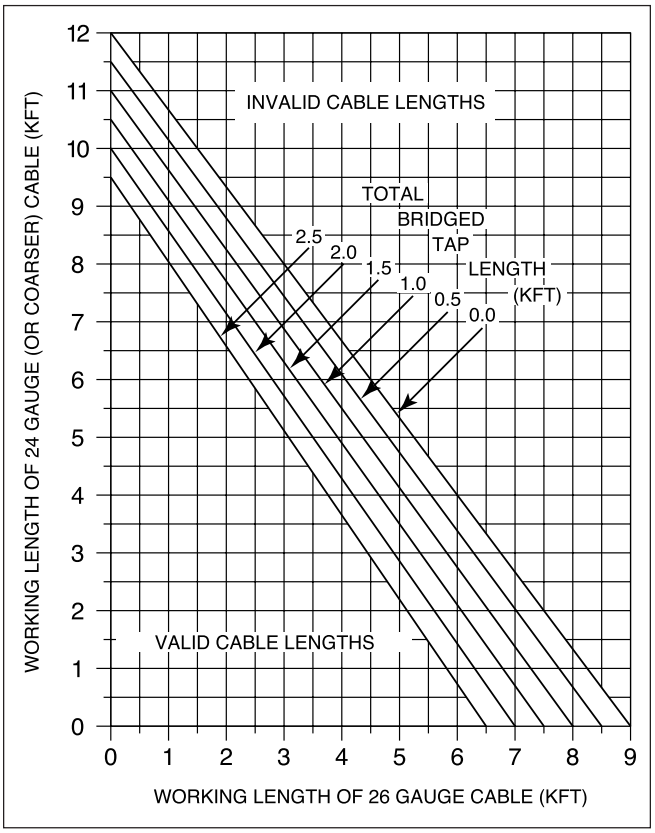

Figure 4. Deployment Guidelines

Table 9. Worksheet PW-1 Factors

Configuration	A Column Factor	B Column Factor	C Column Factor	D Column Factor
ADTRAN Litespan H2TU-R	0.324	NA	NA	0.125

Loop loss per kft for other wire is summarized in **Table 11**.

Table 11. HDSL2 Loss Values

Cable Gauge	Cable Type	Temperature (°F) 68°	90°	120°
26	PIC	3.902	4.051	4.253
26	Pulp	4.030	4.179	4.381
24	PIC	2.863	2.957	3.083
24	Pulp	3.159	3.257	3.391
22	PIC	2.198	2.255	2.333
22	Pulp	2.483	2.450	2.629
19	PIC	1.551	1.587	1.634
19	Pulp	1.817	1.856	1.909

Table 12 provides the recommended maximum local loop loss information for PIC cable at 70ºF, 135 ohms, resistive termination.

An approximation for the maximum amount of wideband noise on an HDSL2 local loop as measured by a 50 kb filter is ≤ 31 dBrn.

An approximation for the maximum level of impulse noise as measured using a 50 kb filter on an HDSL2 loop is ≤ 50 dBrn.

Table 12. Loop Insertion Loss Data

Frequency (Hz)	Maximum Loss (dB)
3,000	12.0
10,000	15.0
50,000	25.5
100,000	30.0
150,000	32.75
196,000	35.0
200,000	35.25
250,000	37.50
325,000	42.00

NOTE

These approximations are to be used as guidelines only and may vary slightly on different loops. Adhering to the guidelines should produce performance in excess of 10^{-7} BER.

For further information regarding deployment guidelines, and applications, reference ADTRAN's *Supplemental Deployment Information for HDSLx*, document P/N 61221HDSLL1-10.

5. MAINTENANCE

The ADTRAN Litespan H2TU-C requires no routine maintenance. ADTRAN does not recommend that repairs be performed in the field. Repair services may be obtained by returning the defective unit to the ADTRAN Customer and Product Service (CAPS) department.

6. TROUBLESHOOTING PROCEDURES

Table 13 is a troubleshooting guide for the Litespan H2TU-C.

7. PRODUCT SPECIFICATIONS

Product specifications for the ADTRAN H2TU-C are listed in **Table 14**.

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.

U.S. and Canada customers can also receive a copy of the warranty via ADTRAN's toll-free faxback server at 877-457-5007.

- Request Document 414 for the *U.S. and Canada Carrier Networks Equipment Warranty*.
- Request Document 901 for the *U.S. and Canada Enterprise Networks Equipment Warranty*.

Refer to the following subsections for sales, support, 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 Customer and Product Service (CAPS) prior to returning equipment to ADTRAN.

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

Table 13. Troubleshooting Guide

Condition	Solution
At power up, all front panel indicators are *OFF*	1. Verify that the channel bank or ONU BPS power LEDs are on. 2. Make sure that the unit is fully and correctly inserted into the channel bank or ONU. 3. If step 1 fails, contact Alcatel customer service (800-848-0333). If step 1 passes, but step 2 fails, replace the H2TU-C.
The STAT LED remains *RED.*	1. Verify that the channel bank or ONU BPS STAT LEDs are off. 2. Verify that the equipment type for the Litespan H2TU-C slot is AHDSL2. Using TL1, equipment type is shown with the command RTRV-EQPT::AID, where AID is the access identifier (i.e., COT-1-15). 3. If step 1 fails, contact Alcatel customer service (800-848-0333). If step 1 and step 2 pass, replace the H2TU-C. If step 1 passes but step 2 fails, delete the equipment record (i.e., DLT-EQPT::COT-1-15 with TL1) and reinsert the card, or equip the slot with the currently reserved equipment type.
The STAT LED is *OFF,* but the HLOS LED remains *RED*	1. Confirm that the HDSL2 loop is not open. 2. Confirm that the HDSL2 loop is not shorted. 3. Verify the loop conforms to CSA guidelines and is not too long. Loop loss at 200 kHz should be less than 35.25 dB. 4. Verify that the HDSL2 loop has acceptable noise limits (see Section 4). 5. Verify that tip and ring of the HDSL2 loop belong to the same twisted pair. 6. If steps 1 through 5 pass, but the HLOS LED remains red, replace the H2TU-C. 7. If step 6 fails, replace the H2TU-R.
The STAT LED is *OFF,* but the RLOS LED remains *RED.*	1. Check that the framing and line coding are set appropriately for T1 data at the H2TU-R and check for cross-connected T1 data coming to the H2TU-C. 2. Check that the RLOS LED at the H2TU-R is off. 3. If step 1 fails, change the appropriate framing and line coding. If step 1 passes but step 2 fails, a problem may exist at the H2TU-R T1 interface. If subsequent testing determines that the problem does not exist at the T1interface, replace the H2TU-C.

Table 14. ADTRAN H2TU-C Specifications

Loop Interface	
Modulation Type	16 TC PAM
Mode	Full duplex, partially overlapped echo canceling
Number of Pairs	One
Line Rate	1.552 mbps
Baud Rate	517.333 k baud
Service Range	Defined by CSA guidelines
Loop Loss	35 dB maximum @ 196 kHz
Bridged Taps	Single Taps < 2 kft., total taps ≤2.5 kft.
Performance	Compliant with T1.418-2000 (draft)
H2TU-C Transmit Power (Data) Level	16.6 ±0.5 dBm (0 to 450 kHz)
H2TU-C Transmit Power (Activation) Level	16.3 ±0.5 dBm (0 to 350 kHz)
Input Impedance	135 Ω
Maximum Loop Resistance	900 Ω per span
Return Loss	12 dB (50 to 200 kHz)
Power	
Power Consumption	+5 V: 1.7 watts typical; 48 V (includes H2TU-C and H2TU-R)
Span Power	–190 VDC internally generated from the –48 VDC switch battery
Fusing	–48 VDC (switch battery) is current-limited by a 500 mA Slo-Blo® subminiature surface-mount fuse. +5 VDC is current-limited by a 3 A quick-acting subminiature surface-mount fuse.
Clock	
Clock Sources	Internal, DSX-1 derived
Internal Clock Accuracy	± 25 ppm, (exceeds Stratum 4). Meets T1.101 timing requirements
Tests	
Diagnostics	Local loopback (H2TU-C), remote loopback (H2TU-R)
Physical	
Mounting	Litespan 2000 CBA, Litespan 2012 CBA, or an ONU CBA
Dimensions	4.42 in. high x 0.84 in. wide x 10.4 in. deep (11.22 cm x 2.13 cm x 26.4 cm)
Weight	Less than one pound
Environment	
Temperature	Operating (standard): –40°C to +70°C Storage: –40°C to 85°C
Humidity	Up to 95% noncondensing
Compliance	
Bellcore GR-1089-CORE (Class 2), ANSI T1.418-2002 NRTL listed to the applicable UL standards	
Part Number	
1221002L2	Asynchronous H2TU-C Line Card Unit (AHDSL2), Narrowband

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Appendix A
HDSL2 Loopbacks

HDSL MAINTENANCE MODES

This appendix describes operation of the HDSL2 system with regard to detection of in-band and ESF facility data link loopback codes.

Upon deactivation of a loopback, the HDSL2 system will synchronize automatically.

Loopback Process Description

In general, the loopback process for the HDSL2 system elements is modeled on the corresponding DS1 system process. Specifically, the H2TU-C loopback is similar to an Intelligent Office Repeater loopback and the H2TU-R loopbacks are similar to a T1 NIU.

The unit can detect the loopback activation or deactivation code sequence *only* if an error rate of $1E^{-03}$ or greater is present.

Loopback Control Codes

A summary of control sequences is given in **Table A-1**.

NOTE

In all control code sequences presented, the in-band codes are shown left-most bit transmitted first, and the ESF data link codes with right-most bit transmitted first.

Table A-1. In-Band Addressable Loopback Codes

Function	Code	Response
1 in 3[1]	100	Loop down everything.
1 in 6[1]	100000	Loopback at the H2TU-R toward the network; must be armed before initiated.
4 in 7	1111000	Loopback data from network toward network in the H2TU-C.
6 in 7	1111110	Loopback data from customer toward customer in H2TU-C.
FF1E	1111 1111 0001 1110	Loopback data from network toward network at H2TU-C.
3F1E	0011 1111 0001 1110	Loopback data from customer toward customer at H2TU-C.
Arm[1] (also known as 2-in-5 pattern)	11000	If the pattern is sent from the network, the units will arm and the H2TU-R will loop up toward the network. No AIS or errors will be sent as a result of this loopback. If the pattern is sent from the customer, all units will arm.
Arm (ESF Data Link)	FF48 1111 1111 0100 1000	If the pattern is sent from the network, the units will arm and an H2TU-R network loopback will be activated. This code has no functionality when sent from the customer.
Disarm[1] (in-band) (also known as 3-in-5 pattern)	11100	When sent from the network or customer, all units are removed from the armed state and loopbacks will be released. If any of the units are in loopback when the 11100 pattern is received, they will loop down. The LBK LEDs will turn off on all units.
Disarm[1] (ESF Data Link)	FF24 1111 1111 0010 0100	When sent from the network or customer, all units are removed from the armed state and loopbacks will be released.
H2TU-C Network Loop Up[1, 2]	D3D3 1101 0011 1101 0011	If the units have been armed and no units are in loopback*, the H2TU-C will loop up, 2 seconds of AIS (all ones) will be transmitted, the looped data will be sent for 5 seconds, and then a burst of 231 logic errors will be injected. The burst of 231 logic errors will continue every 20 seconds as long as the D3D3 pattern is detected. When the pattern is removed, the unit will remain in loopback. If the pattern is re-instated, the injection of 231 logic errors will continue every 20 seconds. If the pattern is sent from the network, the loop up and error injection will be toward the network. If the pattern is sent from the customer, the loopback and error injection will be toward the customer.
H2TU-R Address 20 for extended demarc[1]	C754 1100 0111 0101 0100	When sent from the customer, an H2TU-R network loopback is activated and a 200-bit error confirmation is sent. Two seconds of AIS (all ones) will be sent, 5 seconds of data will pass, and then 200 bit errors will be injected into the DSX-1 signal. As long as the pattern continues to be sent, 200 errors will be injected every 20 seconds. The HDSL2 office unit will not block transmission of far end NIU loopback from the customer premise (H2TU-R).

Note: All codes listed above must be sent for a minimum of 5 seconds in order for them to be detected and acted upon.
* If NIU is enabled, then the H2TU-R can be in network loopback when the H2TU-C loop up codes are sent.

[1] The H2TU-C and H2TU-R individually detect and act upon in-band loopback control codes. Depending on which list number of H2TU-R is used with the Litespan H2TU-C, some of these control codes may not cause action (such as loop up, error injection, etc.) at the H2TU-R. Refer to the H2TU-R documentation for supported control codes.
[2] Units must be armed with 11000b or FF48h before this code will work
[3] In order to behave like a NIU, the H2TU-R will not loop down from the network side with 9393h.
[4] This code will be detected only if the units are armed *OR if any* loopbacks are active.

Table A-1. In-Band Addressable Loopback Codes (Continued)

Function	Code	Response
Loop down[1, 3]	9393 1001 0011 1001 0011	When sent from the network or customer, all units currently in loopback will loop down. Armed units will not disarm. In order to behave like a smartjack, the H2TU-R will not loop down from a network loopback in response to the 9393 pattern if NIU Loopback is enabled.
Query Loopback[1, 2]	D5D5 1101 0101 1101 0101	When the pattern is sent from the network, logic errors will be injected towards the network to indicate a loopback is present toward the network. When the pattern is sent from the customer, logic errors will be injected towards the customer to indicate a loopback is present toward the customer. The number of errors injected is determined by the nearest unit that is in loopback. As long as the pattern continues to be sent, errors are injected again every 20 seconds (H2TU-C = 231 errors), (H2TU-R = 20 errors).
Query Loop Parameters[2]	DBDB 1101 1011 1101 1011	If the H2TU-C is in network loopback and armed, logic errors are injected towards the network upon detection of the DBDB pattern from the network. As long as the pattern continues to be sent, errors are injected again every 20 seconds. The number of errors injected each time depends on the current status of signal margin and pulse attenuation parameters on each loop. If all HDSL2 receiver points (H2TU-C and H2TU-R) indicate pulse attenuation ≤ 30 dB and signal quality (margin) ≥ 6 dB, 111 errors are injected every 20 seconds; otherwise, 11 errors are injected every 20 seconds. This pattern has no functionality when sent from the customer.
Loopback Time Out Override[1, 2, 4]	D5D6 1101 0101 1101 0110	If the units are armed or a unit is currently in loopback when this pattern is sent from the network or customer, the loopback time out override feature will automatically disable loopback time out. In other words, the loopback will not time out due to the current loopback time out option setting. As long as the units remain armed, the time out will remain disabled. When the units are disarmed, the loopback time out will revert to the previous loopback time out setting.
Span Power Disable[1, 2, 4]	6767 0110 0111 0110 0111	If the units are armed and 6767 is sent from the network or customer, the H2TU-C will disable span power, turning off the H2TU-R. If the pattern is sent from the network, the span power will be disabled as long 6767 pattern is detected. Once the pattern is no longer received, the H2TU-C will reactivate span power. All units will then retrain and return to the disarmed and unlooped state. If the pattern is sent from the customer, the span power will only be disabled momentarily.

Note: All codes listed above must be sent for a minimum of 5 seconds in order for them to be detected and acted upon.
* If NIU is enabled, then the H2TU-R can be in network loopback when the H2TU-C loop up codes are sent.

[1] The H2TU-C and H2TU-R individually detect and act upon in-band loopback control codes. Depending on which list number of H2TU-R is used with the Litespan H2TU-C, some of these control codes may not cause action (such as loop up, error injection, etc.) at the H2TU-R. Refer to the H2TU-R documentation for supported control codes.
[2] Units must be armed with 11000b or FF48h before this code will work.
[3] In order to behave like a NIU, the H2TU-R will not loop down from the network side with 9393h.
[4] This code will be detected only if the units are armed *OR if any* loopbacks are active.

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Appendix B
TL1 H2TU-C Tutorial

GENERAL

This appendix is intended to highlight the necessary menus/commands needed to provision the ADTRAN H2TU-C card. A more detailed explanation of shelf specific items may be found in the Alcatel TL1 Reference Practice, OSP-363-205-502.

Logging into the TL1 command screens is accomplished by entering the following:

```
ACT-USER::<userid>:::<password>
```

If the login is successful, the following complied message will display:

```
M     0     COMPLD
```

NOTE

To view the help file, enter "?" (question mark) at any time.

NOTE

Commands may be entered at any point by typing them in directly, without having to navigate to sub-menus.

After first logging in, enter "?" to display the Main Menu. The Main Menu will display the following available sub-menus:

MAIN MENU

1. Administration Menu
2. **Maintenance Menu**
3. **Provisioning Menu**
4. **Testing Menu**
5. LOGOFF

NOTE

Items in bold text indicate menu items of interest for AHDSL2.

MAINTENANCE MENU AND ASSOCIATED SUB-MENUS

From the Main Menu, enter "2" to display the Maintenance Menu as shown below.

Maintenance Menu

1. ADSL Maintenance Menu
2. ATM Maintenance Menu
3. EC1 Maintenance Menu
4. Equipment Maintenance Menu
5. External Controls Menu
6. **HDSL Maintenance Menu** ← **Item of interest for the H2TU-C**
7. Interface Group Maintenance Menu
8. LINK Maintenance Menu
9. OPR-ACO-COM
10. OSI Maintenance Menu
11. RTRV-ALM-ALL
12. RTRV-COND-ALL
13. RTRV-LOG-ALM
14. RTRV-ROUTE-T0
15. SHDSL Maintenance Menu
16. SONET Maintenance Menu
17. STARSPAN Maintenance Menu
18. T0 Maintenance Menu
19. T0TS Maintenance Menu
20. **T1 Maintenance Menu** ← **Item of interest for the H2TU-C**
21. T3 Maintenance Menu
22. Timing Maintenance Menu
23. X25 Maintenance Menu

B. Main Menu

M. Main Menu

HDSL MAINTENANCE MENU

From the Maintenance Menu, enter "6" to display the HDSL Maintenance Menu as shown below.

HDSL Maintenance Menu
1. ALW-MSG-HDSL
2. INH-MSG-HDSL
3. RMV-HDSL
4. RST-HDSL
5. **RTRV-ALM-HDSL** ← **Retrieve existing HDSL alarms for the H2TU-C**
6. RTRV-ATTR-HDSL
7. RTRV-COND-HDSL
8. SET-ATTR-HDSL

B. Maintenance Menu

M. Main Menu

RTRV-ALM-HDSL Command

Input Format

The RTRV-ALM-HDSL command is used to retrieve existing HDSL alarms for the H2TU-C card.

<RTRV-ALM-HDSL
AID[ALL]= RT-1-21
NTFCNCDE[ALL]= CR, MJ, MN, NR ← Severity of alarm to retrieve
CONDTYPE[ALL]= MSGLOST, LOSW, DCCONT,
T-SNRL, INCRAI-CI, T-LA ← Alarms available to retrieve
SRVEFF[ALL]= NSA, SA ← Can choose between non-service affecting NSA and service affecting SA

Additional HDSL Maintenance Commands

The following commands are not listed in the Maintenance Menu, but are available for execution.

INIT-REG-HDSL Command

Input Format

The INIT-REG-HDSL command is used to clear the HDSL PM data for the H2TU-C card.

<INIT-REG-HDSL
AID[ALL]= RT-1-21 ← Slot of interest
MONTYPE[ALL]= ES, SES, UAS, MS, LA, SNRMIN ← PM parameters that can be cleared
LOCN[]= NEND, FEND, ← Location to clear
TMPER[]= 1-DAY, 15-MIN, ← Time periods available to clear

RTRV-PM-HDSL Command

Input Format

The RTRV-PM-HDSL command is used to retrieve HDSL PM data for the H2TU-C card.

<RTRV-PM-HDSL
AID[ALL]= RT-1-21 ← Slot of interest
MONTYPE[ALL]= ES, SES, UAS, MS, LA, SNRMIN ← PM parameter to retrieve
LOCN[]= NEND, FEND, ← Location to retrieve
TMPER[]= 1-DAY, 15-MIN, ← Time periods available to retrieve

T1 MAINTENANCE MENU

From the Maintenance Menu, enter “20” to display the T1 Maintenance Menu as shown below.

T1 Maintenance Menu
1. ALW-MSG-T1
2. ALW-SW-T1
3. CONN-JACK-T1
4. DISC-JACK-T1
5. **INIT-REG-T1** ← **Clears the T1 PM data for the H2TU-C**
6. INH-MSG-T1
7. INH-SW-T1
8. OPR-PROTNSW-T1
9. RLS-PROTNSW-T1
10. RMV-T1
11. RST-T1
12. RTRV-ALM-T1
13. RTRV-ATTR-T1
14. RTRV-COND-T1
15. **RTRV-PM-T1** ← **Retrieve T1 PM data for the H2TU-C**
16. SET-ATTR-T1

B. Maintenance Menu

M. Main Menu

INIT-REG-T1 Command

Input Format

The INIT-REG-T1 command is used to clear T1 PM data for the H2TU-C card.

<INIT-REG-T1
AID[ALL]= RT-1-21 ← Slot of interest
MONTYPE[ALL]= MS, CVL, ESL, SESL, UASL, B8ZSSL, PDVSL
LOCN[]= NEND, FEND, ← Location to clear
TMPER[]= 1-DAY, 1-HR, ← Time periods available to clear

RTRV-PM-T1 Command

Input Format

The RTRV-PM-T1 command is used to retrieve T1 PM data for the H2TU-C card.

<RTRV-PM-T1
AID[ALL]= RT-1-21 ← Slot of interest
MONTYPE[ALL]= MS, CVL, ESL, SESL, UASL, B8ZSSL, PDVSL
TMPER[]= 1-DAY, 1-HR, ← Time periods available to retrieve
MONDAT[]= Up to 2/8 days of PM data history depending upon facility. MM-DD && MD
MONTM[]= Up to 8/24 hours of PM data history depending upon facility. HH-MM && M

PROVISIONING MENU

From the Main Menu, enter "3" to display the Provisioning Menu as shown below.

Provisioning Menu

1. ADSL Provisioning Menu
2. **Cross-Connection Menu** ← **Item of interest for the H2TU-C**
3. EC1 Provisioning Menu
4. Equipment Provisioning Menu
5. Ethernet Provisioning Menu
6. **HDSL Provisioning Menu** ← **Item of interest for the H2TU-C**
7. Interface Group Provisioning Menu
8. Link Provisioning Menu
9. OSI Provisioning Menu
10. SHDSL Provisioning Menu
11. SONET Provisioning Menu
12. STARSPAN Provisioning Menu
13. T0 Provisioning Menu
14. T0TS Provisioning Menu
15. **T1 Provisioning Menu** ← **Item of interest for the H2TU-C**
16. T3 Provisioning Menu
17. Timing Source Provisioning Menu
18. X25 Provisioning Menu

B. Main Menu

M. Main Menu

CROSS-CONNECTION MENU

From the Provisioning Menu, enter “2” to display the Cross-Connection Menu as shown below.

Cross-Connection Menu

1. DLT-CRS-STS1
2. DLT-CRS-T0
3. **DLT-CRS-T1** ← **Delete an existing cross-connect**
4. DLT-CRS-T3
5. DLT-CRS-VC
6. DLT-CRS-VP
7. ED-CRS-STS1
8. ED-CRS-T0
9. ED-CRS-T3
10. ENT-CRS-STS1
11. ENT-CRS-T0
12. **ENT-CRS-T1** ← **Enter a cross-connect**
13. ENT-CRS-T3
14. ENT-CRS-VC
15. ENT-CRS-VP
16. RTRV-CRS-STS1
17. RTRV-CRS-T0
18. **RTRV-CRS-T1** ← **Retrieve existing cross-connects**
19. RTRV-CRS-T3
20. RTRV-CRS-VC
21. RTRV-CRS-VP

B. Provisioning Menu

M. Main Menu

DLT-CRS-T1 Command

Input Format

The deletion of any existing cross-connects may be accomplished by selecting “3” from the Cross-Connection Menu or by entering the command directly as shown below.

```
<DLT-CRS-T1
FROM[]= RT-1-1
TO[]= RT-1-21;
```

or

```
<DLT-CRS-T1::RT-1-1,RT-1-21;
```

Response Format

If the cross-connect is successfully removed, the user will receive an indication as shown below.

```
   Litespan2000  02-02-20 14:10:00
M  0 COMPLD
   /* 1 T1 Cross-Connection Deleted */
;
<
```

ENT-CRS-T1 Command

Input Format

The choice to enter cross-connects may be accomplished either by selecting “12” from the Cross-Connection Menu or by entering the command directly as shown in the example below where a cross-connect is initiated between slot 1 and slot 21.

```
<ENT-CRS-T1
FROM[]= RT-1-1
TO[]= RT-1-21.
```

or

```
<ENT-CRS-T1::RT-1-1,RT-1-21;
```

NOTE

A command that is typed directly can be entered from any level (menu or sub-menu).

Response Format

The user should receive a complied message such as the one below to indicate that the cross-connect was successfully initiated.

```
  Litespan2000  02-02-20 14:11:23
M  0 COMPLD
  “RT-1-1,RT-1-21”
  /* 1 T1 Cross-Connection Entered */
;
<
```

RTRV-CRS-T1 Command

Input Fomrat

Retrieving existing cross-connect status may be accomplished either by selecting “18” from the Cross-Connection Menu or by entering the command directly as shown in the example below.

```
 <RTRV-CRS-T1
AID[ALL]= RT-1-1;
```

or

```
<RTRV-CRS-T1::RT-1-1;
```

Response Format

If a cross-connect exists at the indicated slot, the user will see an indication of the slots involved in the cross-connect as shown below.

```
  Litespan2000  02-02-20 14:12:18
M  0 COMPLD
  “RT-1-1,RT-1-21:::IS-NR,CRS”
  /* 1 T1 Cross-Connection Retrieved */
;
<
```

HDSL PROVISIONING MENU

From the Provisioning Menu, enter “6” to display the HDSL Provisioning Menu as shown below.

HDSL Provisioning Menu

1. DLT-HDSL
2. **ED-HDSL** ← **Edit HDSL provisioning parameters for the H2TU-C**
3. ENT-HDSL
4. RTRV-HDSL
5. DLT-GOS-HDSL
6. **ED-GOS-HDSL** ← **Edit the HDSL Grade of Service tables in the shelf**
7. ENT-GOS-HDSL
8. RTRV-GOS-HDSL

B. Provisioning Menu

M. Main Menu

ED-HDSL Commands

Input Format

HDSL configuration parameters may be changed by selecting “2” from the HDSL Provisioning Menu or by entering the ED-HDSL commands directly as shown below.

<ED-HDSL

NOTE

Items in braces { } are the available selections for the specified parameter.

<ED-HDSL
FT1MODE[]= {NO | YES};

or

<ED-HDSL::RT-1-21:::: FT1MODE ={NO | YES};

<ED-HDSL
LP[]= {SINK | SOURCE};

or

<ED-HDSL::RT-1-21:::: LP ={SINK | SOURCE};

<ED-HDSL
LPBKACTC[]={0000000000000000 | 0000000000000001 | 0000000000000010 | 0000000000000011 };

or

<ED-HDSL::RT-1-21:::: LPBKACTC ={0000000000000000 | 0000000000000001 | 0000000000000010 | 0000000000000011 };

<ED-HDSL
LPBKACTR[]={0000000000000000 | 0000000000000001};

or

<ED-HDSL::RT-1-21:::: LPBKACTR ={0000000000000000 | 0000000000000001};

<ED-HDSL
LPBKDEACTCDE[]={0000000000000000|0000000000000001|0000000000000010};

or

<ED-HDSL::RT-1-21:::: LPBKDEACTCDE={0000000000000000|0000000000000001|0000000000000010};

<ED-HDSL
LPBKTMO[]= {0 | 20 | 60 | 120 };

or

<ED-HDSL::RT-1-21:::: LPBKTMO ={0 | 20 | 60 | 120};

<ED-HDSL
NIDLPBK[]= {NO | YES};

or

<ED-HDSL::RT-1-21:::: NIDLPBK={NO|YES};

<ED-HDSL
NTWKKPALV[]= {NO | YES};

or

<ED-HDSL::RT-1-21:::: NTWKKPALV={NO|YES};

ED-GOS-HDSL Command

Input Format

HDSL configuration parameters for the Grade of Service tables may be changed by entering the ED-GOS-HDSL commands directly as shown below.

<ED-GOS-HDSL
AID[]= ← Grade of Service table of interest
MONTYPE[]= ES, SES, UAS, LA, SNR, CV
THLEV[]= Each montype has its level ← Threshold level for the particular monitored type
TMPER[]= 1-DAY, 15-MIN, ← Time periods setting for the indicated monitored type and level

Grade of Service tables allow the user to set performance monitoring threshold levels for various alarms/event conditions. There are 15 GOS tables available for each type of service (in our case T1 and HDSL).

Example: The HDSL GOS1 may contain a loop attenuation threshold setting of 30 (dB) while HDSL GOS2 contains a loop attenuation threshold setting of 25. (Each GOS table can be edited by the user but it will affect all slots that are provisioned to use the edited GOS table.)

Using the ED-HDSL command, the user can select GOS=1 or 2 depending on whether they want the shelf to alarm or report the loop attenuation threshold crossing at 30 dB or 25 dB.

T1 PROVISIONING MENU

From the Provisioning menu, enter "15" to display to the T1 Provisioning Menu as shown below.

T1 Provisioning Menu

1. DLT-GOS-T1
2. DLT-T1
3. **ED-GOS-T1** ← **Edit the T1 Grade of Service tables in the shelf**
4. **ED-T1** ← **Edit T1 provisioning parameters for the H2TU-C**
5. ENT-GOS-T1
6. ENT-T1
7. RTRV-GOS-T1
8. RTRV-T1

B. Provisioning Menu

M. Main Menu

ED-GOS-T1 Command

Input Format

T1 Grade of Service parameters may be changed by selecting "3" from the T1 Provisioning Menu or by entering the ED-GOS-T1 command as shown below.

<ED-GOS-T1
AID[]= ← Grade of Service table of interest
MONTYPE[]= CVL, ESL, SESL, UASL, B8ZSSL, PDVSL
THLEV[]= Each montype has its level ← Threshold level for the particular monitered type
TMPER[]= 1-DAY, 1-HR, ← Time periods setting for the indicated monitered type and level

ED-T1 Commands

Input Format

T1 configuration parameters may be changed by selecting "4" from the T1 Provisioning Menu or by entering the ED-T1 command as shown below.

<ED-T1
AT[]={0 | 15.0 | 7.5};

or

<ED-T1::RT-1-21::::AT={0 | 15.0 | 7.5};

NOTE

For framing format (FMT) changes the card must first have its service state changed to OOS.

<ED-T1
FMT[]={ESF | SF | UNFR | AUTO};

or

<ED-T1::RT-1-21::::FMT={ESF | SF | UNFR | AUTO};

<ED-T1
LINECDE[]= {AMI | B8ZS};

or

<ED-T1::RT-1-21::::LINECDE={AMI | B8ZS};

TESTING MENU

From the Main Menu, enter "4" to display the Testing Menu as shown below.

Testing Menu

1.	**OPR-LPBK-HDSL**	**← Enable a loopback**
2.	OPR-LPBK-OC12	
3.	OPR-LPBK-OC3	
4.	OPR-LPBK-T0	
5.	OPR-LPBK-T0TS	
6.	OPR-LPBK-T1	
7.	OPR-LPBK-T3	
8.	**RLS-LPBK-HDSL**	**← Remove a loopback**
9.	RLS-LPBK-OC12	
10.	RLS-LPBK-OC3	
11.	RLS-LPBK-T0	
12.	RLS-LPBK-T0TS	
13.	RLS-LPBK-T1	
14.	RLS-LPBK-T3	
B.	Main Menu	
M.	Main Menu	

NOTE

Prior to entering any loopback command, the line card must be removed from service.

Remove card from service = **RMV-HDSL;**
H2TU-C Network Loopback
Loop up command = **OPR-LPBK-HDSL::RT-1-21-C:::NEND;**
Loop down command = **RLS-LPBK-HDSL::RT-1-21-C:::NEND;**
H2TU-C Customer Loopback
Loop up command = **OPR-LPBK-HDSL::RT-1-21-C:::FEND;**
Loop down command = **RLS-LPBK-HDSL::RT-1-21-C:::FEND;**
H2TU-R Network Loopback
Loop up command = **OPR-LPBK-HDSL::RT-1-21-R:::NEND;**
Loop down command = **RLS-LPBK-HDSL::RT-1-21-R:::NEND;**
H2TU-R Customer Loopback
Loop up command = **OPR-LPBK-HDSL::RT-1-21-R:::FEND;**
Loop down command = **RLS-LPBK-HDSL::RT-1-21-R:::FEND;**

Upon completion of loopback testing, return the card to service.

Restore card to service = **RST-HDSL;**

Appendix C
Metallic Test Access Unit (MTAU) Testing Capabilities

This appendix describes the testing functionality available for the ADTRAN H2TU-C card via the MTAU unit. For a complete description of the MTAU unit refer to Alcatel document *Common Equipment Unit Descriptions*, OSP 363-405-250.

NOTE

The functionality of the SPLIT and MON features detailed in this document supercedes that shown in the OSP 363-405-250.

INITIATING MTAU TEST ACCESS

CONN-JACK-T1

The Connect T1 Jack command connects a T1 or HDSL facility to the MTAU via the channel bank test bus.

Input Format: **CONN-JACK-T1**:<TID>:<**AID**>:<CTAG>::<**MD**>;

AID = Access ID of the unit to be connected to the MTAU

MD = Mode (SPLIT or MON)

Example: CONN-JACK-T1::COT-1-15:::SPLIT;

NOTE

To use SPLIT mode, a facility must be out of service for maintenance or out of service for memory administration.

Diagrams of the functionality of the two modes are shown below:

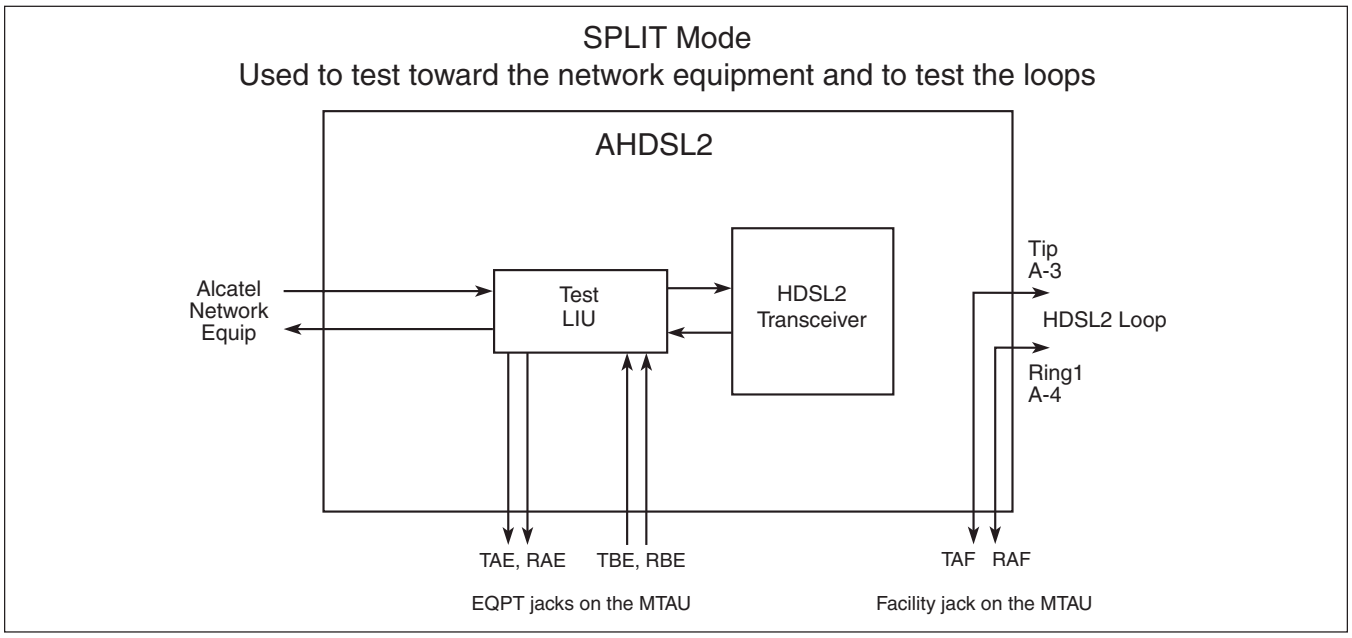

Figure C-1. SPLIT Mode

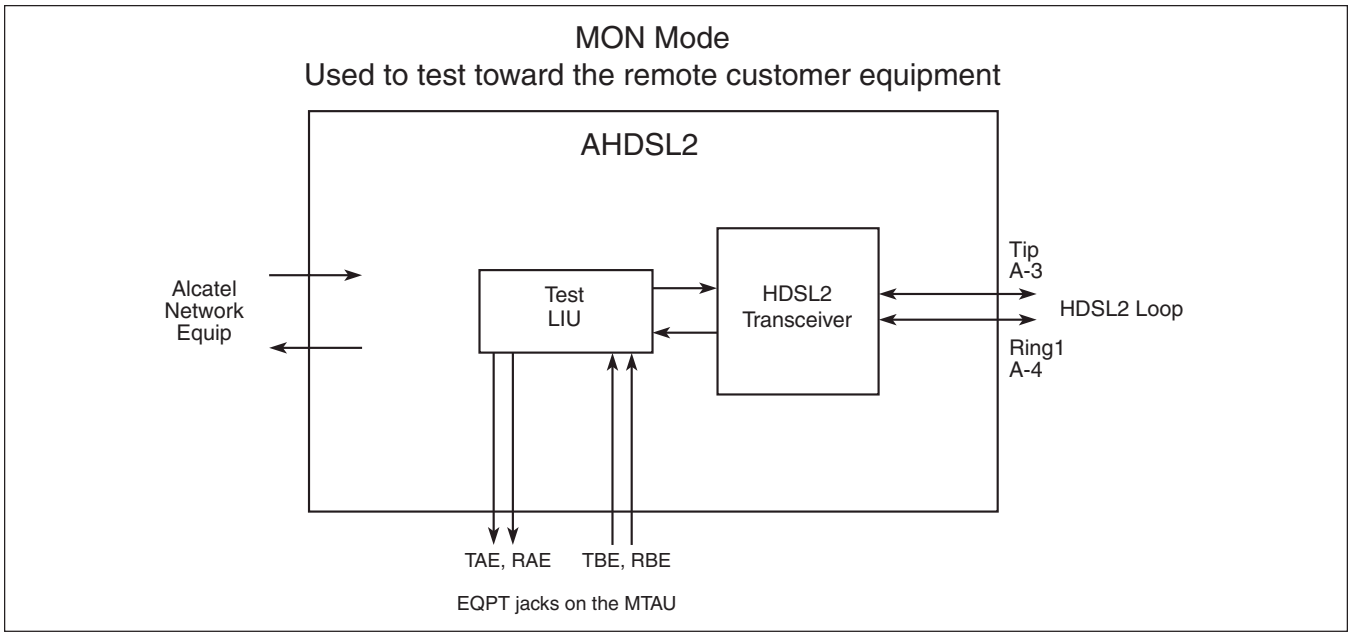

Figure C-2. MON Mode

REMOVAL OF MTAU TEST ACCESS

DISC-JACK-T1

The Disconnect T1 Jack command disconnects a T1 or HDSL facility from the metallic test access unit (MTAU).

Input Format: **DISC-JACK-T1**:<TID>:<**AID**>:<CTAG>;

Example: DISC-JACK-T1::COT-1-15;

NOTE

AIDs of T1 or HDSL facilities currently connected can be determined using the RTRV-STATUS-MTAU command.
