# 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

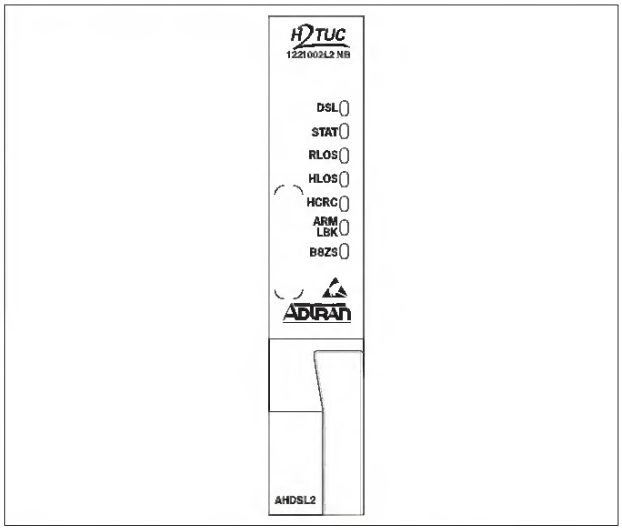


**Figure 1. ADTRAN H2TU-C for Litespan**

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 |

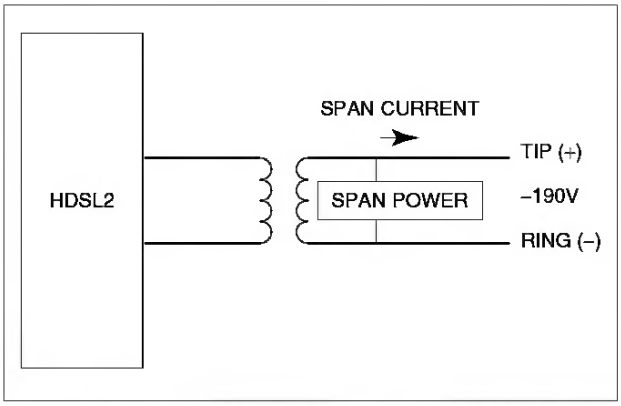


**Figure 2. H2TU-C Span Powering Diagram**

## 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.

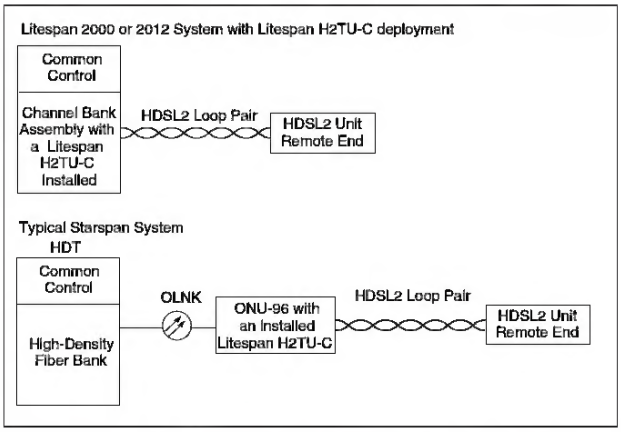


**Figure 3. Deployment from a Litespan Channel Bank**

## 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, ohserve the following warning: lf the Litespan H2TU-C is removed from a line card slot, wait at least 15 seconds hefore reinsertion. lf connected to the MTl craft interface terminal, wait until the message "AlD:MJ,UEQ." appears (where "AID" is the access identifier). This informs the Litespan common control assemhly that the H2TU-C has heen removed from its slot, after which the common control assemhly begins looking for the reinsertion of the line card. Reinsertion any earlier than this may temporarily lock the H2TU-C into a nonfunctional state hecause the common control assemhly 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 he present on telecommunications wiring. The DSX-1 interface is intended for connection to intra-huilding wiring only. Ensure chassis ground is properly connected.

This product provides span powering voltage (negative only with respect to ground, –190 VDC nominal, GFl 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 applicahle 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 (GUl). 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 he viewed from the H2TU-R DB-9 RS-232 craft interface port. However, the provisioning options may not he 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 MTl 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 ln-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 availahle 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<br>Enabled | NO<br>YES | YES |
| ED-HDSL | LPBKTMO | Loopback Time Out[1] | 0<br>20 Minutes<br>60 Minutes<br>120 Minutes | 0<br>20<br>60<br>120 | 120 |
| ED-HDSL | LPBKACTR | New England Loopback[2] | Disabled<br>Enabled | 0000000000000000<br>0000000000000001 | 0000000000000000 |
| ED-HDSL | FT1MODE | Latching Loopback | T1<br>FT1 | NO<br>YES | NO |
| ED-HDSL | LP | Span Power | Disabled<br>Enabled | SINK<br>SOURCE | SOURCE |
| ED-HDSL | LPBKDEACTCDE | Customer Loss Indicator[3] | A1S<br>A1S/CI<br>Loopback | 0000000000000000<br>0000000000000001<br>0000000000000010 | 0000000000000001 |
| ED-HDSL | LPBKACTC | PRM setting[1,3] | None<br>SPRM<br>NPRM<br>Auto (Both) | 0000000000000000<br>0000000000000001<br>0000000000000010<br>0000000000000011 | 0000000000000001 |
| ED-HDSL | NTWKKPALV | Network Keep Alive | Disabled<br>Enabled | NO<br>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<br>B8ZS | AMI<br>B8ZS | B8ZS |
| ED-T1 | FMT | Framing[1] | SF<br>ESF<br>Unframed<br>AUTO | SF<br>ESF<br>UNFR<br>AUTO | AUTO |
| ED-T1 | AT | DS1 TX Level[1] | 0 dB<br>–7.5 dB<br>–15 dB | 0.0<br>7.5<br>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 loophacks and disconnect for testing purposes. **Table 8** lists and defines the TL1/Litecraft testing commands.

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**NOTE**

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

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**NOTE**

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

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## Alarms

The selectahle 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 hy 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 he considered for product mix calculations and maximum numher of Litespan H2TU-Cs within a channel hank assemhly. 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 witb 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. Tbe 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 sbown 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 |

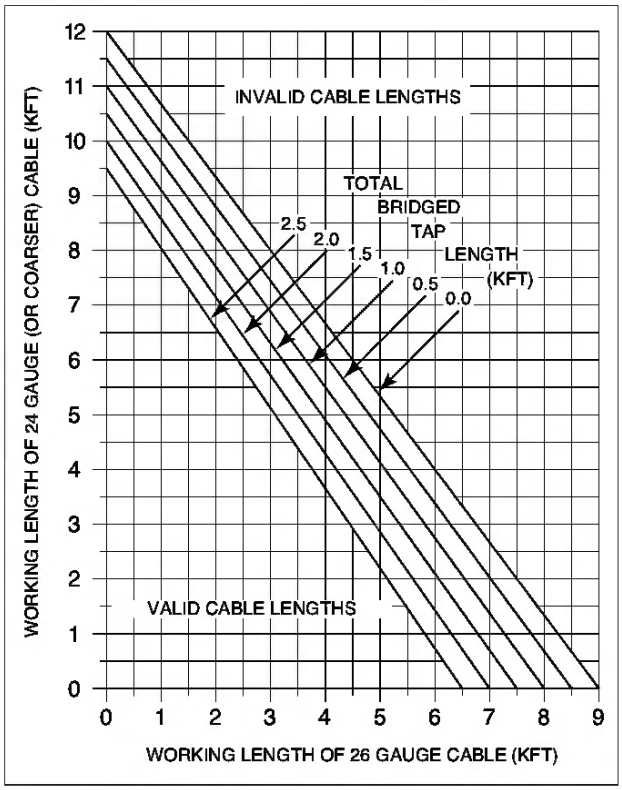


**Figure 4. Deployment Guidelines**

**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 70°F, 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 $\leq$ 31 dBrn.

An approximation for the maximum level of impulse noise as measured using a 50 kb filter on an HDSL2 loop is $\leq$ 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.<br>2. Make sure that the unit is fully and correctly inserted into the channel bank or ONU.<br>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.<br>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).<br>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.<br>2. Confirm that the HDSL2 loop is not shorted.<br>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.<br>4. Verify that the HDSL2 loop has acceptable noise limits (see Section 4).<br>5. Verify that tip and ring of the HDSL2 loop belong to the same twisted pair.<br>6. If steps 1 through 5 pass, but the HLOS LED remains red, replace the H2TU-C.<br>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.<br>2. Check that the RLOS LED at the H2TU-R is off.<br>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 T1 interface, 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<br>Storage: –40°C to 85°C |
| Humidity | Up to 95% noncondensing |
| **Compliance** | |
| Bellcore GR-1089-CORE (Class 2), ANSI T1.418-2002<br>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 bas 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 tbe 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, tben 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<br>1001 0011 1001 0011 | When sent from the network or customer, all units currently in loophack will loop down. Armed units will not disarm. In order to hehave like a smartjack, the H2TU-R will not loop down from a network loophack in response to the 9393 pattern if NIU Loophack is enahled. |
| Query Loophack[1, 2] | D5D5<br>1101 0101 1101 0101 | When the pattern is sent from the network, logic errors will he injected towards the network to indicate a loophack is present toward the network. When the pattern is sent from the customer, logic errors will he injected towards the customer to indicate a loophack is present toward the customer. The numher of errors injected is determined hy the nearest unit that is in loophack. As long as the pattern continues to he sent, errors are injected again every 20 seconds (H2TU-C = 231 errors), (H2TU-R = 20 errors). |
| Query Loop Parameters[2] | DBDB<br>1101 1011 1101 1011 | If the H2TU-C is in network loophack 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 he sent, errors are injected again every 20 seconds. The numher of errors injected each time depends on the current status of signal margin and pulse attenuation parameters on each loop.<br><br>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. |
| Loophack Time Out Override[1, 2, 4] | D5D6<br>1101 0101 1101 0110 | If the units are armed or a unit is currently in loophack when this pattern is sent from the network or customer, the loophack time out override feature will automatically disahle loophack time out. In other words, the loophack will not time out due to the current loophack time out option setting. As long as the units remain armed, the time out will remain disahled. When the units are disarmed, the loophack time out will revert to the previous loophack time out setting. |
| Span Power Disahle[1, 2, 4] | 6767<br>0110 0111 0110 0111 | If the units are armed and 6767 is sent from the network or customer, the H2TU-C will disahle span power, turning off the H2TU-R. If the pattern is sent from the network, the span power will he disahled 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 he disahled 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 he found in the Alcatel TL1 Reference Practice, OSP-363-205-502.

Logging into the TL1 command screens is accomplished hy 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 suh-menus.

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

## MAIN MENU

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

**NOTE**

Items in hold 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 he accomplished either by selecting "12" from the Cross-Connection Menu or hy entering the command directly as shown in the example helow where a cross-connect is initiated hetween 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 he entered from any level (menu or suh-menu).

---

#### Response Format

The user should receive a complied message such as the one helow 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 he accomplished either hy selecting "18" from the Cross-Connection Menu or hy entering the command directly as shown in the example helow.

```
 <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 helow.

```
  Litespan2000  02-02-20 14:12:18
M  0 COMPLD
  "RT-1-1,RT-1-21:::1S-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.

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## 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;

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**NOTE**

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

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

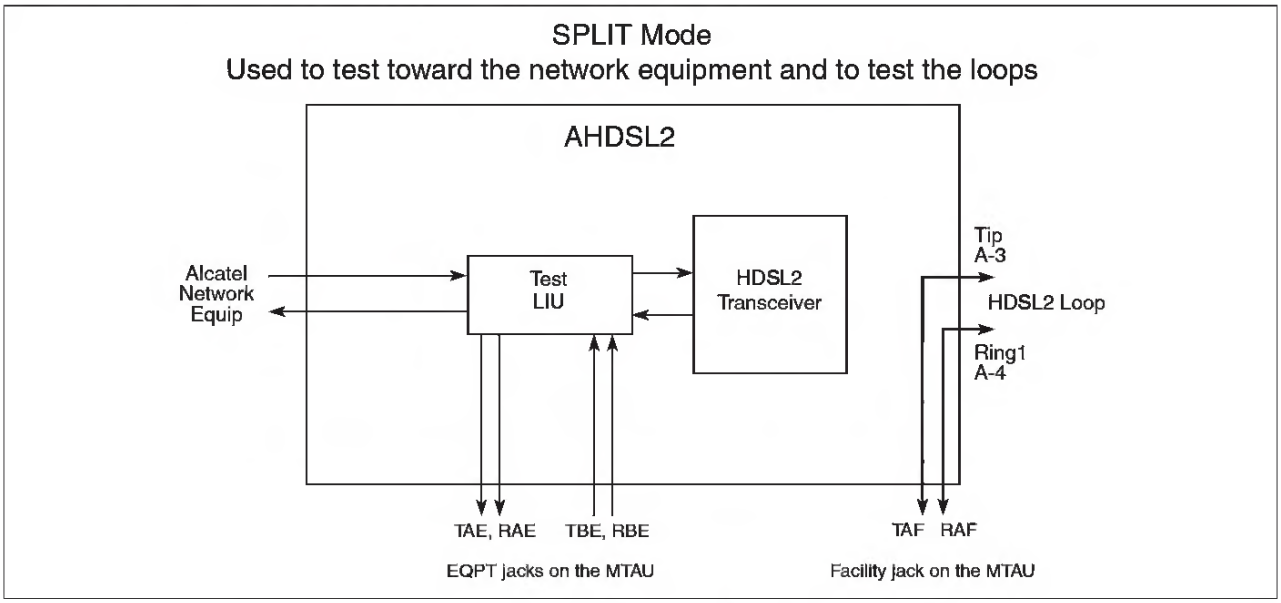


**Figure C-1. SPLIT Mode**

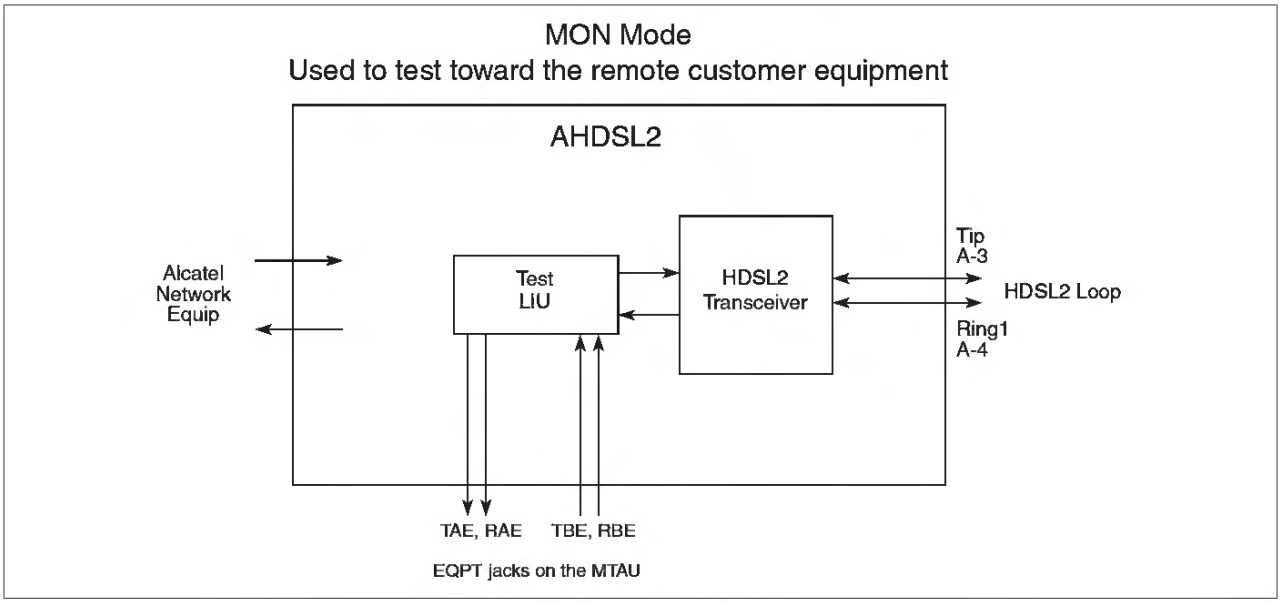


**Figure C-2.** MON Mode

## 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;

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**NOTE**

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

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