

Lucent Technologies
Bell Labs Innovations



Stinger™

HDSL 32-Port Line Interface Module (LIM) Guide

For software version 9.0-126
October 2000

Copyright© 2000 Lucent Technologies Inc. All rights reserved.

This material is protected by the copyright laws of the United States and other countries. It may not be reproduced, distributed, or altered in any fashion by any entity (either internal or external to Lucent Technologies), except in accordance with applicable agreements, contracts, or licensing, without the express written consent of Lucent Technologies. For permission to reproduce or distribute, please email your request to techpubs@ascend.com.

Notice

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing, but information is subject to change.

Safety, Compliance, and Warranty Information

Before handling any Lucent Access Networks hardware product, read the *Access Networks Safety and Compliance Guide* included in your product package. See that guide also to determine how products comply with the electromagnetic interference (EMI) and network compatibility requirements of your country. See the warranty card included in your product package for the limited warranty that Lucent Technologies provides for its products.

Security Statement

In rare instances, unauthorized individuals make connections to the telecommunications network through the use of access features.

Trademarks

4ESS, 5ESS, A Network of Expertise, AnyMedia, AqueView, AUDIX, B-STDX 8000, B-STDX 9000, ...Beyond Compare, CaseView, Cajun, CajunDocs, CAJUNVIEW, Callmaster, CallVisor, CBX 500, CellPipe, ChoiceNet, ClearReach, ComOS, cvMAX, DACScan, Dacsmate, Datakit, DEFINITY, Definity One, DSLMAX, DSL Terminator, DSLPipe, DSLTNT, Elemedia, Elemedia Enhanced, EMMI, End to End Solutions, EPAC, ESS, EVEREST, Gigabit-scaled campus networking, Globalview, GRF, GX 250, GX 550, HyperPATH, Inferno, InfernoSpaces, Intragy, IntragyAccess, IntragyCentral, Intuity, IP Navigator, IPWorX, LineReach, LinkReach, MAX, MAXENT, MAX TNT, Multiband, Multiband PLUS, Multiband RPM, MultiDSL, Multi-Voice, MultiVPN, Navis, NavisAccess, NavisConnect, NavisCore, NavisRadius, NavisXtend, NetCare, NetLight, NetPartner, OneVision, Open Systems Innovations, OpenTrunk, P550, PacketStar, PathStar, Pinnacle, Pipeline, PMVision, PortMaster, SecureConnect, Selectools, Series56, SmoothConnect, Stinger, SYSTIMAX, True Access, WaveLAN, WaveMANAGER, WaveMODEM, WebXtend, and Where Network Solutions Never End are trademarks of Lucent Technologies Inc. Advantage Pak, Advantage Services, AnyMedia, ...Beyond Compare, End to End Solutions, Inter.NetWorking, MAXENT, and NetWork Knowledge Solutions are service marks of Lucent Technologies Inc. Other trademarks, service marks, and trade names mentioned in this publication belong to their respective owners.

Copyrights for Third-Party Software Included in Lucent Access Networks Software Products

C++ Standard Template Library software copyright© 1994 Hewlett-Packard Company and copyright© 1997 Silicon Graphics. Permission to use, copy, modify, distribute, and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. Neither Hewlett-Packard nor Silicon Graphics makes any representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

Berkeley Software Distribution (BSD) UNIX software copyright© 1982, 1986, 1988, 1993 The Regents of California. All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met: 1. Redistributions of source code must retain the above copyright notice, this list of conditions, and the following disclaimer. 2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions, and the following disclaimer in the documentation and/or other materials provided with the distribution. 3. All advertising materials mentioning features or use of this software must display the following acknowledgement: This product includes software developed by the University of California, Berkeley, and its contributors. 4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Ordering Information

You can order the most up-to-date product information and computer-based training online at <http://www.lucent.com/ins/bookstore>.

Feedback

Lucent Technologies appreciates your comments, either positive or negative, about this manual. Please send them to techpubs@ascend.com.

Lucent Technologies

Stinger HDSL2 32-Port Line Interface Module (LIM) Guide

- Installing the HDSL2 LIM. 1
- Configuring ATM HDSL2 interfaces. 1
- Checking status of HDSL2 interface 4
- Specifications. 8

The Stinger HDSL2 Line Interface Module (LIM) provides 32 HDSL2 interfaces that allows high-speed, symmetric data transfer at the T1 rate of 1.544 Mbps over a single twisted pair. Maximum loop length for a 24 ga loop is 12,000 feet and 9,000 feet for a 26 ga loop.

HDSL2 provides the same capabilities as HDSL but operates over a single loop. HDSL2 is spectrally compatible with other loop technologies such as ISDN, T1, and HDSL.

Two versions of the 32-port HDSL LIM are available.

Product Code	Specifics
STGR-LIM-H2-32	For use in the Stinger FS and LS. Designed for the operating environment of the Stinger FS and LS.
STGRRT-LIM-H2-32	For use in the Stinger RT. Designed to withstand greater temperature extremes.

Installing the HDSL2 LIM

Install the HDSL2 32-port module in the same manner as any other LIM module. See *Stinger Hardware Installation Guide* for details. After installation, you must configure the module following the instructions in this document.

Configuring ATM HDSL2 interfaces

The HDSL2 module supplies up to 32 interfaces per LIM, with each interface supporting data rates up to 1.544 Mbps. A Stinger unit creates an HDSL2 profile for each HDSL2 interface in the system.

For example, for an HDLS2 LIM installed in slot 1, the system creates profiles such as the following:

```
admin> dir hds12
 18 06/20/1999 23:18:51 { shelf-1 slot-1 1 } 1:1:1
 18 06/20/1999 23:18:51 { shelf-1 slot-1 2 } 1:1:2
 18 06/20/1999 23:18:51 { shelf-1 slot-1 3 } 1:1:3
 18 06/20/1999 23:18:51 { shelf-1 slot-1 4 } 1:1:4
 18 06/20/1999 23:18:51 { shelf-1 slot-1 5 } 1:1:5
 18 06/20/1999 23:18:51 { shelf-1 slot-1 6 } 1:1:6
 18 06/20/1999 23:18:51 { shelf-1 slot-1 7 } 1:1:7
 18 06/20/1999 23:18:51 { shelf-1 slot-1 8 } 1:1:8
...
```

Configuring HDSL2 settings

HDSL2 ports are configured using the HDSL2 profile. The parameters are shown with example values.

```
admin> read hds12 { 1 2 1 }
HDSL2/{ shelf-1 slot-2 1 } read
admin> list
[in HDSL2/{ shelf-1 slot-2 1 }]
name = 1:2:1
physical-address* = { shelf-1 slot-2 1 }
enabled = no
sparing-mode = inactive
line-config = { 0 51 15 static { any-shelf any-slot 0 } coe }

admin> list line
[in HDSL2/{ shelf-1 slot-2 1 }:line-config]
trunk-group = 0
nailed-group = 51
vp-switching-vpi = 15
activation = static
call-route-info = { any-shelf any-slot 0 }
unit-type = coe
ntr-enable = no
clock-source = not-eligible
clock-priority = middle-priority
```

Parameter	Specifies
Name	Name of the interface. The default value is the interface address in <i>shelf:slot:item</i> format (for example, 1:2:1), but an administrator can assign a text string of up to 16 characters.
Physical-Address	Physical address of the interface in the Stinger unit.
Enabled	Enable/disable the HDSL2 interface. HDSL2 lines are disabled by default until an administrator activates the line in the HDSL2 profile.
Trunk-Group	<i>Not currently used.</i> Use the default value (zero).

Parameter	Specifies
Nailed-Group	<p>Nailed-group number for the HDSL2 physical interface. A Connection or RADIUS profile specifies this number to make use of the interface.</p> <p>Each interface is assigned a unique default number, so you do not need to modify this parameter. If you assign a new value, it must be a number from 1 to 1024 that is unique within the system.</p>
VP-Switching-VPI	<p>The Virtual Path Identifier (VPI) to use for Virtual Path (VP) switching on the LIM port. The default is 15. All other VPI's are used for Virtual Circuit (VC) switching.</p>
Activation	<p><i>Not currently used.</i> Leave the default value (Static).</p>
Call-Route-Info	<p><i>Not currently used.</i> Leave the default value (the zero address).</p>
Unit-Type	<p>Type of unit: Central Office Equipment (COE) or Customer Premises Equipment (CPE). Remote equipment must have opposite setting. The default value is COE.</p>
Ntr-enabled	<p>Enables Network Time Reference (NTR) functionality.</p> <p>No indicates NTR functionality is disabled. This is the default value.</p> <p>Yes indicates functionality is enabled.</p> <p>If the unit-type is COE, the system clock is taken as the input and the CPE, if equipped to do so, can recover the clock.</p> <p>If the unit-type is CPE, the port outputs the recovered clock as the system clock if Clock-Source is set to <code>eligible</code> and Clock-Priority is set to allow the clock to be selected.</p>
Clock-Source	<p>Sets eligibility for the 8KHz clock from the HDSL2 line to be used as the 8KHz system clock (Unit-Type must be set to CPE).</p> <p><code>eligible</code>: The line can be used as the master clock source. <code>not-eligible</code>: The line can not be used as the master clock source.</p>
Clock-Priority	<p>Clock priority assigned to the HDSL2 line. Used to select a particular HDSL2 line as the 8KHz system clock source.</p> <p><code>high-priority</code>: A line with this priority is selected over lines with lower priorities. If more than one line has the highest priority, the first one to become available is the source.</p> <p><code>middle-priority</code>: Second-highest clock priority. <code>low-priority</code>: Last clock priority.</p>

Displaying HDSL2 port status

To display the port status and nailed group for each HDSL2 port use the `hds12Lines` command. The command is used as follows:

```
Stinger> hds12Lines
usage: Hds12Lines -[ a | d | f | u | t ]
-a show (a)ll HDSL2 lines
-d show (d)isabled lines
```

Stinger HDSL2 32-Port Line Interface Module (LIM) Guide

Checking status of HDSL2 interface

```
-f show all (f)ree lines
-u show in-(u)se lines
-t toggle debug flag
```

For example here is the display for the first 16 ports on and HDSL2 card in slot 4.

```
Stinger> hdsl2 -a
```

All HDSL2 lines:

		(dvOp	dvUpSt	dvRq	sAdm	naillg)
Line	{ 1 4 1 }	(Down	Idle	DOWN	DOWN	00151)
Line	{ 1 4 2 }	(Down	Idle	DOWN	DOWN	00152)
Line	{ 1 4 3 }	(Up	Idle	UP	UP	00153)
Line	{ 1 4 4 }	(Down	Idle	DOWN	DOWN	00154)
Line	{ 1 4 5 }	(Down	Idle	DOWN	DOWN	00155)
Line	{ 1 4 6 }	(Down	Idle	DOWN	DOWN	00156)
Line	{ 1 4 7 }	(Up	Idle	UP	UP	00157)
Line	{ 1 4 8 }	(Down	Idle	DOWN	DOWN	00158)
Line	{ 1 4 9 }	(Up	Idle	UP	UP	00159)
Line	{ 1 4 10 }	(Up	Idle	UP	UP	00160)
Line	{ 1 4 11 }	(Down	Idle	DOWN	DOWN	00161)
Line	{ 1 4 12 }	(Down	Idle	DOWN	DOWN	00162)
Line	{ 1 4 13 }	(Up	Idle	UP	UP	00163)
Line	{ 1 4 14 }	(Down	Idle	DOWN	DOWN	00164)
Line	{ 1 4 15 }	(Down	Idle	DOWN	DOWN	00165)
Line	{ 1 4 16 }	(Down	Idle	DOWN	DOWN	00166)

Checking status of HDSL2 interface

The Stinger creates an HDSL2-Stat profile for each HDSL2 interface in the system. The HDSL2 parameters are as follows, shown with sample settings for an active line:

```
[in HDSL2-STAT/{ shelf-1 slot-2 10 }]
physical-address* = { shelf-1 slot-2 10 }
line-state = active
spare-physical-address = { any-shelf any-slot 0 }
sparing-state = sparing-none
sparing-change-reason = unknown
sparing-change-time = 0
sparing-change-counter = 0
vpi-vci-range = vpi-0-15-vci-32-127
vp-switching-vpi = 15
physical-status = { 0 cpe port-up 1544000 A100 1 }
physical-statistic = { { 0 0 3 } yes 36 3 passed 10 0 in-sync 0 0 0 0 0 0 0 no+
```

Checking status of the physical interface

The Physical-Status subprofile provides information about the physical interface:

```
admin> list physical-status
[in HDSL2-STAT/{ shelf-1 slot-2 10 }:physical-status]
if-group-index = 0
unit-type = cpe
dev-line-state = port-up
operational-rate = 1544000
firmware-ver = A100
hardware-ver = 1
```

Parameter	Specifies
IF-Group-Index	SNMP interface group index of the line.
Unit-Type	Operating mode specified by the Unit-Type setting in the HDSL2 profile.
Dev-Line-State	Current state of the interface (described below).
Operational rate	Data rate for this symmetrical interface. The data rate is currently fixed at 1.544 Mbps.
Firmware-Ver	Version number of the HDSL2 modem firmware.
Hardware-Ver	Hardware version of the SDSL modem.

The Dev-Line-State parameter shows one of the following possible states:

Dev-Line-State value	Description
port-up	Connected to CPE and data can be transferred.
test	Line is in test mode.
start-up-handshake	Start up handshake is occurring.
start-up-training	Start up training is occurring.
start-up-download	Start up download is occurring.
idle	Line is idle.
down	Line is down.
out-of-service	Line is out of service.
unknown	Line status is unknown.
analog-loopback	Line is in analog loopback mode.
digital-loopback	Line is in digital loopback mode.

Obtaining statistics about operations

The Physical-Statistic profile enables administrators to check interface operations. For example:

```
admin> list physical-statistic
[in HDSL2-STAT/{ shelf-1 slot-2 10 }:physical-statistic]
line-up-timer = { 0 0 3 }
rx-signal-present = yes
line-quality = 36
up-dwn-cntr = 3
self-test = passed
transmit-power = 10
framer-crc-errors = 0
framer-sync-status = in-sync
framer-drift-alarm-cnt = 0
framer-losd-cnt = 0
framer-sega-cnt = 0
framer-segd-cnt = 0
framer-rx-cell-cnt = 0
framer-tx-cell-cnt = 0
framer-rx-hec-errors = 0
bert-timer = 2 minutes
bert-enable = no
bert-operation-state = stopped
bert-error-counter = 0
code-violations = 17
errored-second = 2
severely-errored-second = 1
losw-second = 1
unavailable-second = 0
loop-attenuation = 10
```

Parameter	Indicates
Line-Up-Timer	How long the line has been up (days, hours, and minutes in <i>dd hh mm</i> format).
RX-Signal-Present	Receiving signal from the remote (Yes or No).
Line-Quality	Line quality in decibels. A value of -5dB or better is required for reliable data transfer.
Up-Down-Cntr	Number of times the link has transitioned from an Up state to a Down state since the module was last reset.
Self-Test	Outcome of modem chipset self-test.
Transmit-Power	The transmit power is the current transmission power the transceiver is using. It is reported in dBm.
framer-sync-status	Reports the state of the HDSL2 framer. Provides troubleshooting information and can assist in determining LOS. Details are shown below.

Parameter	Indicates
Framer-Rx-Cell-Cnt	The number of cells received by the on-board framer.
Framer-Tx-Cell-Cnt	The number of cells transmitted by the on-board framer.
Framer-Rx-Hec-Errors	The number of HEC errors detected by the on-board framer.
BERT-Timer	Bit Error Rate Test (BERT) timer.
BERT-Enable	Enable/disable BERT. (Note that a BERT disrupts data transmission.)
BERT-Operation-State	State of the test, described below.
BERT-Error-Counter	Number of bit errors counted by BERT.
Code-Violations	Number of HDSL2 CRC anomalies occurring during the accumulation period.
Errored-Second	Number of 1 second intervals during which one or more CRC anomalies are declared and/or one or more LOSW defects are declared.
Severely-Errored- Second	Number of 1 second intervals during which at least 50 CRC anomalies are declared or one or more LOSW defects are declared.
Losw-Second	Number of 1 second intervals during which one or more HDSL2 LOSW defects are declared.
Unavailable-Second	Number of 1 second intervals for which the HDSL2 line is unavailable. The HDSL2 line becomes unavailable at the onset of 10 contiguous SES-L's. Once unavailable, the HDSL2 line becomes available at the onset of 10 contiguous seconds with no SES-L's.
Loop-Attenuation	Current loop attenuation in dB.

The possible values for the Framer-Sync-Status parameter are as follows:

Framer-Sync-Status value	Description
In-Sync	Framer is in sync. The HDSL2 framers are successfully passing HDSL2 frames.
Resync-State 1	States 1 - 5 indicate that the HDSL2 framer is trying to gain synchronization
Resync-State 2	
Resync-State 3	
Resync-State 4	
Resync-State 4	
Out-of-Sync	HDSL2 framer is out of sync and is not trying to gain sync.
Out-of-Sync-Pre-sync	HDSL2 framer is out of sync and is not trying to gain sync.

Administrators can run a BERT to check the data integrity of the interface or connection. While a BERT is running, normal data transmission is interrupted on the line.

To run a BERT, set BERT-Enable to Yes. The test counts bit errors continuously for the interval specified by BERT-Timer. If both the CPE and COE are connected and have BERT enabled, the test runs between the two systems. If the two ends are not connected, the test runs within the HDSL2 interface in the Stinger unit.

When BERT is enabled and the BERT timer has not expired, BERT-Operation-State reports one of the following states:

BERT-Operation-State value	Description
waiting-for-511-sync	Waiting for remote before starting the BERT.
local-loop-active	The interface is in local analog loopback and is running the test. No remote device is involved.
active	BERT is running with remote.
stopped	BERT was disabled.
loop-back-setup	The interface is being placed into analog loopback.
start-up	BERT is starting up.

Specifications

Physical specifications

The specifications for the 32-port HDSL2 LIM are as follows:

Physical dimensions	Height: 15 in. (38.1 cm) Width: 1.06 in. (2.69 cm) Depth: 5 in. (12.7 cm) Weight: 1.5 lb (0.68 kg)
Power requirements	70 W
Temperature range	STGR-LIM-H2-32: 0°C to +55°C STGRRT-LIM-H2-32: -40°C to +65°C
Interface standards	ANSI T1 418 Issue 1
Physical connectors	USOC RJ21X 50-pin telco connector. Must meet JIS C5973 standards.

Status indicators

LED states are as follows:

LED State	Status
STBY (Green) ON	The LIM is a designated spare. The CM will switch traffic to the LIM if one of the other LIMs fail.
Active (Green) ON	The module or port is fully operational; no errors have been detected.
Fault (Orange) ON	The module failed to pass POST.
Bypass (Green) ON	The LIM is in bypass mode. (The LIM redundancy feature is activated).

Port indicators

LED states are as follows:

LED State	Status
Port LED lit	Packets are being transmitted or received on this interface
Port LED off	Port inactive

Embedded Operations Channel (EOC) Protocol compliance

Embedded operations channel (EOC) compliance is defined within the T1E1.4/99-006R6 HDSL2 Draft Standard specification. The EOC protocol provides in depth information of identification and statistics of a HDSL2 interface and its remote repeaters and associated CPE/COE nodes. This information is displayed to the administrator through profiles and debug commands.

Basic statistics can be found in the HDSL2-STAT:physical-statistic profile. Further statistics can be displayed using the hdsl2dumpeoc debug command, which is run directly from the HDSL2 LIM itself.

MIBS

An HDSL2 Mib has been created which provides status and statistical information.

Figure 1 shows the HDSL2 LIM front panel.

Figure 1. 32-Port HDSL2 LIM

