Lucent Technologies
Bell Labs Innovations

Stinger™ DS3-ATM

Trunk Module Guide

For software version 9.0-126
October 2000

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 DS3-ATM Trunk Module Guide

The DS3-ATM trunk module provides a coaxial copper interface between the Stinger™ unit and the carrier ATM core network. Each DS3-ATM trunk module™ supports two 44.736 Mbps interfaces. Each DS3-ATM interface connects to one ATM switch.

This guide provides specifications and status lights information, and describes how to connect the DS3-ATM module to a switch. The parameters of the trunk module profiles and line configuration are defined and DS3-ATM framing formats and clocking are discussed. An example configuration shows how to enable the ports on one trunk module and designate the ports on a second module as spare ports, and how to set up virtual channel switching on the active ports.

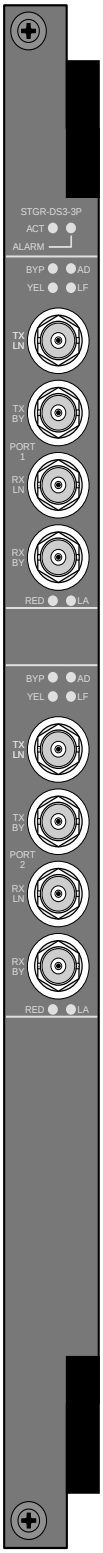
Introducing the DS3-ATM trunk module

Stinger units support one-port and two-port DS3-ATM trunk modules.

Platform	Product code	Description
Stinger FS	STGR-TM-DS3-1	One-port trunk module with DS3 (coax) interface for operation at 44.736 Mbps.
Stinger LS	STGRLS-TM-DS3-1	
Stinger FS	STGR-TM-DS3-2	Two-port trunk module with DS3 (coax) interfaces for operation at 44.736 Mbps per port.
Stinger LS	STGRLS-TM-DS3-2	

Figure 1 shows the DS3-ATM trunk module.

Figure 1. DS3-ATM trunk module



Installing a DS3-ATM trunk module

See the *Stinger Hardware Installation Guide* for installation instructions. You can install up to two DS3-ATM trunk modules in a Stinger™ unit.

After installing a DS3-ATM trunk module and connecting it to a network, you verify connections by checking the status lights. You then configure the physical link. Use a status profile to display the state of the DS3 line and any error conditions.

Interpreting DS3-ATM status lights

All status lights except line active (LA) are lit upon startup or restart and remain lit until the trunk module passes power-on self test (POST). If no status lights are lit, the DS3 interface either is disabled or is receiving an alarm indication signal.

Table 1 explains the DS3-ATM trunk module status lights.

Table 1. DS3-ATM trunk module status lights

Light	Color	Status
Red	Red	Red Alarm. ON indicates the DS3 interface is experiencing loss of receive signal.
Yel	Yellow	Yellow Alarm. ON indicates the DS3 interface has detected Far End Receive Failure indication transmitted from the other side.
Byp	Yellow	Bypass. ON indicates the line is in bypass mode.
LA	Green	Link active. ON indicates the DS3 interface is enabled and has not detected any error conditions.
LF	Yellow	Loss of frame. ON indicates the DS3 interface is out of frame alignment.
LA	Yellow	AIS detected. ON indicates the local device has received an alarm indication signal.

Configuring a DS3-ATM trunk module

The Stinger unit creates a DS3-ATM profile containing the following parameters for each DS3 interface detected in the system. The parameters are shown with default settings for the first port of a trunk module in slot 17.

```
[in DS3-ATM/{ shelf-1 trunk-module-1 1 }]
name = 1:17:1
physical-address* = { shelf-1 trunk-module-1 1 }
enabled = no
spare-physical-address = { any-shelf any-slot 0 }
sparing-mode = inactive
```

```
[in DS3-ATM/{ shelf-1 trunk-module-1 1 }:line-config]
trunk-group = 9
nailed-group = 801
activation = static
call-route-info = { any-shelf any-slot 0 }
loopback = no-loopback
high-tx-output = no
framer-mode = C-BIT-PLCP
vpi-vci-range = vpi-0-255-vci-32-8191
vc-switching-vpi = [ 0 0 0 0 0 0 0 ]
clock-source = not-eligible
clock-priority = middle-priority
```

Parameter	**Specifies**
Name	Name of the interface. The default value is the interface address in *shelf*`:`*slot*`:`*item* format (for example, `1:2:3`), but you can assign a text string of up to 16 characters.
Physical-Address	Physical address of the trunk port in the Stinger unit.
Enabled	Enable/disable the DS3-ATM interface. (Disabled by default.)
Spare-Physical-Address	Physical address of the trunk port to be used as a spare.
Sparing-Mode	Redundancy mode for the port.
Trunk-Group	*Not currently used.* Leave the default value (zero).
Nailed-Group	Nailed-group number for the DS3-ATM physical interface. A Connection or RADIUS profile specifies this number to make use of the interface. 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. See “Displaying DS3 port status and nailed groups” on page 7 for related information.
Activation	Line activation mode. Only the `static` setting is currently supported.
Call-Route-Info	*Not currently used.* Leave the default value (the zero address).
Loopback	Enable/disable loopback for diagnosing connectivity or possible equipment problems. Loopback is disabled by default, which is required for normal operations.
High-Tx-Output	Enable/disable high transmit output. The default is `no`, which is correct for DS3 cables that are less than 255 feet (78 m) long. For cables longer than 255 feet, set to `yes`.
Framer-Mode	DS3-ATM framer mode. Following are valid values `C-bit-ADM`, `C-BIT-PLCP`, `c-bit-adm-loop-timed`, `c-bit-plcp-loop-timed`, `c-bit-adm-frame-locked`, and `c-bit-plcp-frame-locked`. For more information, see “Setting DS3 framing formats” on page 7.

Parameter	Specifies
VPI-VCI-Range	Valid range of virtual channel identifier (VCI) numbers to be used with specified virtual path identifier (VPIs) for virtual channel connections (VCCs).
VC-Switching-VPI	Array of up to seven VPIs to use for virtual channel (VC) switching.
Clock-Source	Enable/disable obtaining the system clock signal from the port.
Clock-Priority	Priority of the interface as the system's clock source.

Displaying DS3 port status and nailed groups

To see the nailed-group numbers for trunk ports, use the `atmtrunks` command. For example, the command output that follows shows the nailed-group numbers for DS3 trunks. In this example, the system has one DS3-ATM trunk module installed in slot 18.

```
admin> atmtrunks  -a

All OC3 ATM trunks:
OC3 Lines                    (dvOp   dvUpSt  dvRq    sAdm    nailg)

All DS3 ATM trunks:
DS3 Lines                    (dvOp   dvUpSt  dvRq    sAdm    nailg)
Line    {    1 18  1 }       (Up      Idle    UP      UP     00851)
Line    {    1 18  2 }       (Up      Idle    UP      UP     00852)
```

Setting DS3 framing formats

You can specify C-bit Physical Layer Convergence Protocol (PLCP) or C-bit ATM direct mapping (ADM) framing format for a DS3-ATM interface. Both sides of a DS3-ATM link must agree about the framing format.

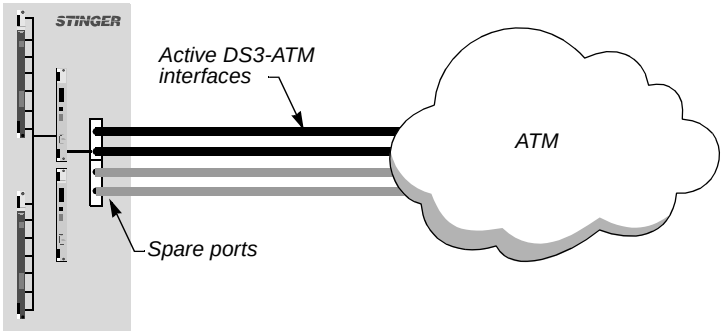
The PLCP format incurs some overhead for framing. ADM format does not. When ADM framing is used, the entire DS3 payload is used for ATM cells. Within each format, the framer can operate in the following modes:

Free-running and fixed-stuffing	The DS3 transmit clock signal and the PLCP frame are derived from an onboard oscillator. This mode is typically used when the line is neither providing the clock signal (frame-locked) nor synchronizing to an incoming clock (loop-timed).
Loop-timed	The Stinger unit obtains the clock signal from the other side of the link.
Frame-locked	The Stinger unit provides the clock signal.

Example of DS3-ATM configuration

In this example (see Figure 2), the administrator enables two DS3-ATM interfaces and designates the ports of the other DS3-ATM trunk module as spare ports, for use if the primary trunk ports becomes inactive. Because two ports are spares, the administrator increases the number of VCCs that can be handled by both of the primary ports from 8K to 16K.

Figure 2. DS3 interfaces to the ATM network



The following commands list the trunk port profiles:

```
admin> dir ds3-atm
40  08/03/1999 15:33:35  { shelf-1 trunk-module-1 2 }  1:17:2
25  08/03/1999 15:37:13  { shelf-1 trunk-module-2 1 }  1:18:1
25  08/03/1999 15:38:25  { shelf-1 trunk-module-2 2 }  1:18:2
40  08/04/1999 10:18:22  { shelf-1 trunk-module-1 1 }  1:17:1
```

The following commands enable the ports of the first trunk module and make them spares:

```
admin> read ds3-atm {1 trunk-module-1 1}
DS3-ATM/{ shelf-1 trunk-module-1 1 } read

admin> set enabled = yes

admin> set spare-physical-address shelf = 1

admin> set spare-physical-address slot = 18

admin> set spare-physical-address item-number = 1

admin> set sparing-mode = automatic

admin> write
DS3-ATM/{ shelf-1 trunk-module-1 1 } written

admin> read ds3-atm {1 trunk-module-1 2}
DS3-ATM/{ shelf-1 trunk-module-1 2 } read

admin> set enabled = yes

admin> set spare-physical-address shelf = 1

admin> set spare-physical-address slot = 18

admin> set spare-physical-address item-number = 2

admin> set sparing-mode = automatic

admin> write
DS3-ATM/{ shelf-1 trunk-module-1 2 } written
```

The following commands add VPI 10 and VPI 20 as valid VPI, for virtual channel switching on the first and second active ports, respectively. The addition of these VPIs doubles the number of VCCs the ports can handle from 8K to 16K:

```
admin> read ds3-atm {1 trunk-module-1 1}
DS3-ATM/{ shelf-1 trunk-module-1 1 } read

admin> set line-config vc-switching-vpi 2 = 10

admin> write
DS3-ATM/{ shelf-1 trunk-module-1 1 } written

admin> read ds3-atm {1 trunk-module-1 2}
DS3-ATM/{ shelf-1 trunk-module-1 2} read

admin> set line-config vc-switching-vpi 2 = 20

admin> write
DS3-ATM/{ shelf-1 trunk-module-1 2} written
```

Checking ATM trunk interface status

The Stinger unit creates a DS3-ATM-Stat profile for each of its DS3 interfaces. The profiles provide information about the state of the physical interfaces, error counters, and other status information. The error counters in the DS3-ATM-Stat profile are cleared when the DS3 physical interface becomes active (synchronized). The counts accumulate every second if an error occurs.

Following are the DS3-ATM-Stat parameters, shown with sample settings for an active line:

```
[in DC3-ATM-STAT/{ shelf-1 trunk-module-2 1 }]
physical-address* = { shelf-1 trunk-module-2 1 }
line-state = active
spare-physical-address = { any-shelf any-slot 0 }
sparing-state = sparing-none
vpi-vci-range = vpi-0-255-vci-32-8191
vc-switching-vpi = 0
vcc-vpi = [ 0 0 0 0 0 0 0 0 ]
f-bit-error-count = 0
p-bit-error-count = 0
cp-bit-error-count = 0
feb-error-count = 0
bpv-error-count = 0
loss-of-signal = False
loss-of-frame = False
yellow-receive = False
ais-receive = False
```

Parameter	Indicates
Physical-Address	Physical location of the DS3-ATM line within the Stinger system.
Line-State	Overall state of the DS3 line, which can be any of the following states: • `active`—Line is enabled and a multipoint connection is established. • `does-not-exist`—Link is not physically on the trunk module. • `disabled`–Line is disabled. • `loss-of-signal`—Near end has loss of signal. • `loss-of-frame`—Near end has loss of frame (also known as Red Alarm). • `yellow-alarm`—Near end is receiving a Yellow Alarm from the far end, indicating a loss of frameing. • `ais-receive`—Near end is receiving an alarm indication signal (AIS).
Spare-Physical-Address	The redundant peer of this trunk port. If the current port is the primary trunk port, the value identifies its spare (secondary) trunk port. If the current port is the secondary trunk, the value identifies the primary trunk port.
Sparing-State	The state of the redundancy function. `sparing-none` indicates that redundancy is not enabled. If redundancy is enabled and the current port is the primary trunk port, the value can be `primary-active` or `primary-inactive.` If redundancy is enabled and the current port is the secondary trunk port, the value can be `secondary-active` or `secondary-inactive`.
VPI-VCI-Range	Current valid VCI range configured for the port.
VC-Switching-VPI	Array of VPIs used for virtual channel switching.
VCC-VPI	*For internal use only.*
F-Bit-Error-Count	Number of F-bit errors. If three or more errors occur in up to 16 consecutive F-bits in a DS3 M-frame, a DS3 out-of-frame defect is detected. If an out-of-frame defect is consistent for up to 10 seconds, a DS3 loss-of-frame detect is detected.
P-Bit-Error-Count	Number of P-bit parity errors. These errors occur when the system receives P-bit code on a DS3 M-frame that is not identical to the corresponding P-bit code that was calculated locally.
CP-Bit-Error-Count	Number of CP-bit parity errors.
FEB-Error-Count	Number of far-end C-bit coding violations reported through the far-end block error count.
BPV-Error-Count	Number of bipolar violation (BPV) errors. BPV errors can indicate that the line sent consecutive one bits with the same polarity. It could also mean that three or more consecutive zeroes were sent.
Loss-of-Signal	Loss of signal on the line. `False` indicates that the carrier is maintaining a connection.

Parameter	Indicates
Loss-of-Frame	Loss of frame on the line (also known as a Red Alarm.) `False` indicates that the line is up and in frame.
Yellow-Receive	Far end loss-of-frame (Yellow Alarm) occurred on the line. `False` indicates that a Yellow Alarm was not received.
AIS-Receive	Far end is sending an alarm indication signal (AIS). `False` indicates that the local device has not received an AIS.

For details about DS3 line errors, see RFC 1407, *Definitions of Managed Objects for the DS3/E3 Interface Type*.

DS3-ATM trunk module specifications

The two-port DS3-ATM trunk module provides two active and two standby trunk connections at data rates of 44.736 Mbps at each port. You can configure each port as one of the following:

- User-to-Network Interface (UNI)
- Interim Interswitch Signaling Protocol (IISP) connection
- Direct trunk

The Stinger unit provides a maximum of four DS3 active ports per unit (four active, four standby).

Table 2 provides DS3-ATM trunk module specifications.

Table 2. DS3-ATM trunk module specifications

Category	Specification
Physical dimensions	Height: 15 inches (38.1 cm) Width: 1.06 inches (2.69 cm) Depth: 5 inches (12.7 cm) Weight: 1.5 pounds (0.68 kg)
Power requirements	11.5 W
Temperature range	0° to 40°C (32° to 122°F)
Operating humidity	0 to 90 %, noncondensing
Agency approvals	Electromagnetic Emissions Certifications: FCC Part 15 Class A, CISPR Class A
Interface standards	ITU G.703 ANSI T1.102

Table 2. DS3-ATM trunk module specifications (continued)

Other standards supported	ANSI T1E1.1/94-002R1 ANSI T1.107 ANSI T1.107a ANSI T1.403 ATM Forum UNI 3.0/3.1 Bellcore TR-NWT 001112 Bellcore TR-TSY-000499 Bellcore TR-NWT-000820 ITU G.804 RFC 1407 TR54014 (AT&T ACCUNET T45 and T45R)
Physical interfaces	Four (two active, two standby) ATM UNI 3.0/3.1 cell-bearing DS3 ports supporting C-bit/M-framing, PLCP according to TR-TSY-000773, and direct cell mapping according to G.804 BNC connector according to ANSI T1.404
Maximum modules per unit	Two