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Stinger®

Administration Guide

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About This Guide

This guide explains how to administer a Stinger unit and manage its operations. To use this guide, you must have set up the Stinger system as described in the *Getting Started Guide* for your Stinger unit and configured it for network connectivity as described in the *Stinger ATM Configuration Guide*.

What is in this guide

Each chapter in this guide focuses on a particular aspect of Stinger unit administration and operations. The chapters describe tools for system management, network management, and SNMP agent management.

To perform many of the tasks in this manual, you must have administrative permission on the Stinger unit. For instructions on logging into the Stinger unit with administrative permissions, see "Logging into a Stinger unit" on page 1-2.

Note This manual describes the set of features for Stinger units running software version TAOS 9.7.2. Some features might not be available with earlier versions or specialty loads of the software.

Warning Before installing or operating your Stinger unit, be sure to read the safety instructions in the *Edge Access and Broadband Access Safety and Compliance Guide*. For information specific to your unit, see the "Safety-Related Electrical, Physical, and Environmental Information" appendix in your unit's *Getting Started Guide*s.

What you should know

This guide attempts to provide enough information to enable an administrator who is not an expert in a particular network technology to operate and troubleshoot a Stinger unit. However, this guide does not provide a complete explanation of any network management topic. For best results, when working with the following capabilities on a Stinger unit, make sure that you have some applicable general knowledge:

- Line configuration and testing
- Connection negotiation and authentication
- Connection cost management and accounting
- IP routing
- Network security

Documentation conventions

Following are all the special characters and typographical conventions used in this manual:

<table>
<tr><th>Convention</th><th>Meaning</th></tr>
<tr><td><code>Monospace text</code></td><td>Represents text that appears on your computer’s screen, or that could appear on your computer’s screen.</td></tr>
<tr><td><code>Boldface monospace text</code></td><td>Represents characters that you enter exactly as shown (unless the characters are also in <code>italics</code>—see Italics, below). If you could enter the characters but are not specifically instructed to, they do not appear in boldface.</td></tr>
<tr><td>Italics</td><td>Represent variable information. Do not enter the words themselves in the command. Enter the information they represent. In ordinary text, italics are used for titles of publications, for some terms that would otherwise be in quotation marks, and to show emphasis.</td></tr>
<tr><td>[ ]</td><td>Square brackets indicate an optional argument you might add to a command. To include such an argument, type only the information inside the brackets. Do not type the brackets unless they appear in boldface.</td></tr>
<tr><td>|</td><td>Separates command choices that are mutually exclusive.</td></tr>
<tr><td>></td><td>Points to the next level in the path to a parameter or menu item. The item that follows the angle bracket is one of the options that appear when you select the item that precedes the angle bracket.</td></tr>
<tr><td>Key1+Key2</td><td>Represents a combination keystroke. To enter a combination keystroke, press the first key and hold it down while you press one or more other keys. Release all the keys at the same time. (For example, Ctrl+H means hold down the Ctrl key and press the H key.)</td></tr>
<tr><td>Press Enter</td><td>Means press the Enter or Return key or its equivalent on your computer.</td></tr>
<tr><td>Note</td><td>Introduces important additional information.</td></tr>
<tr><td>Caution</td><td>Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment.</td></tr>
<tr><td>Warning</td><td>Warns that a failure to take appropriate safety precautions could result in physical injury.</td></tr>
<tr><td>Warning</td><td>Warns of danger of electric shock.</td></tr>
</table>

Stinger documentation set

The Stinger documentation set consists of the following manuals, which can be found at `http://www.lucent.com/support` and `http://www.lucentdocs.com/ins`.

- **Read me first:**
  - *Edge Access and Broadband Access Safety and Compliance Guide*. Contains important safety instructions and country-specific information that you must read before installing a Stinger unit.
  - *TAOS Command-Line Interface Guide*. Introduces the TAOS command-line environment and shows you how to use the command-line interface effectively. This guide describes keyboard shortcuts and introduces commands, security levels, profile structure, and parameter types.
- **Installation and basic configuration:**
  - *Getting Started Guide* for your Stinger platform. Shows how to install your Stinger chassis and hardware. This guide also shows you how to use the command-line interface to configure and verify IP access and basic access security on the unit, and how to configure Stinger control module redundancy on units that support it.
  - Module guides. For each Stinger line interface module (LIM), trunk module, or other type of module, an individual guide describes the module's features and provides instructions for configuring the module and verifying its status.
- **Configuration:**
  - *Stinger Compact Remote Getting Started Guide*. Provides an overview of the Stinger Compact Remote and provides instructions for the installation and replacement of its components. This guide also describes how to configure and manage the Compact Remote as a hosted unit
  - *Stinger ATM Configuration Guide*. Describes how to integrate the Stinger into the ATM and Digital Subscriber Line (DSL) access infrastructure. The guide explains how to configure PVCs, and shows how to use standard ATM features such as quality of service (QoS), connection admission control (CAC), and subtending.
  - *Stinger IP Control Module Configuration Guide*. For Stinger systems with an IP control module, this guide describes how to integrate the system into the IP infrastructure. Topics include IP-routed switch-through ATM PVCs and RFC 2684 PVCs, IEEE 802.1Q VLAN, and forwarding multicast video transmissions on DSL interfaces.
  - *Stinger Private Network-to-Network Interface (PNNI) Supplement*. For the optional PNNI software, this guide provides quick-start instructions for configuring PNNI and soft PVCs (SPVCs), and describes the related profiles and commands.
  - *Stinger SNMP Management of the ATM Stack Supplement.* Describes SNMP management of ATM ports, interfaces, and connections on a Stinger unit to provide guidelines for configuring and managing ATM circuits through any SNMP management utility.
  - *Stinger T1000 Module Routing and Tunneling Supplement.* For the optional T1000 module, this guide describes how to configure the Layer 3 routing and virtual private network (VPN) capabilities.

- **RADIUS:** *TAOS RADIUS Guide and Reference*. Describes how to set up a unit to use the Remote Authentication Dial-In User Service (RADIUS) server and contains a complete reference to RADIUS attributes.
- **Administration and troubleshooting:** *Stinger Administration Guide* (this guide). Describes how to administer the Stinger unit and manage its operations. Each chapter focuses on a particular aspect of Stinger administration and operations. The chapters describe tools for system management, network management, and Simple Network Management Protocol (SNMP) management.
- **Reference**:
  - *Stinger Reference*. An alphabetic reference to Stinger profiles, parameters, and commands.
  - *TAOS Glossary*. Defines terms used in documentation for Stinger units.

Administering a Stinger System 1

This chapter describes the system administration tasks that you might perform on the Stinger unit, such as enabling basic security, configuring and managing administrative access to a system, configuring and displaying basic system settings, and managing user connections.

To use this chapter, you must have performed the tasks described in the *Getting Started Guide* for your unit and the *Stinger ATM Configuration Guide*. You can obtain Stinger manuals at `http://www.lucent.com/support`.

Note In this document, *Stinger MRT* refers to Stinger MRT 23, Stinger MRT 19, and Stinger MRT-2 chassis. On a Stinger MRT device, control module and line interface module (LIM) functions are incorporated into the unit's chassis. The terms *control module* and *LIM* in this guide refer to the control module and the LIM port functions on a Stinger MRT and not to physical modules.

About standalone and hosted Stinger systems

In this document, a Stinger FS, Stinger FS+, Stinger LS, Stinger RT, Stinger MS+ or Stinger MRT unit that does not provide host functions to other Stinger units is referred to as a *standalone* unit.

You can provision and manage up to five cascaded Stinger MRT units as a single hosted system, with a single management interface. Only one of the Stinger MRT units supports ATM trunk interfaces, and that unit must be the controlling unit (the *host*) for the hosted system. The other cascaded units (*remote shelves*) are included in the hosted system topology by enabling the remote shelf through a profile for that shelf ID. For more information about the hosted operations of Stinger MRT units, see the *Stinger MRT Getting Started Guide* for your unit.

Stinger FS+, Stinger LS, and Stinger RT units with revision 2.0, revision 2.1, and IP2 control modules also support host functions to Stinger Compact Remote units. The Stinger Compact Remote unit is a small temperature-hardened unit that extends the reach of *host* Stinger units located in the central office. For more information about the hosted operations of a Compact Remote unit, see the *Stinger Compact Remote Getting Started Guide*.

On hosted systems, provisioning and management of the remote shelves is performed on the host. The look and feel of the host management interface is very similar to that of a standalone system, except that some commands require that you specify a shelf ID in the physical address of a slot or port, and the shelf ID is also displayed in the output of commands that previously showed only slot and port information. For more information about shelf, slot, and port addressing on Stinger systems, see “Understanding physical addressing on Stinger units” on page 2-1.

Logging into a Stinger unit

When you log into a Stinger unit, you actually connect to its control module. If the Stinger unit contains two control modules, you can connect to either control module. To administer the system, you can log in from a PC connected to the control module’s serial port, from a workstation that has Telnet access or secure shell (ssh) access to the system. For more information about logging in using secure shell, see “Logging in using SSH” on page 1-5.

Note On units with redundant control modules, only one control module is active at a time. The secondary control module becomes the primary (active) control module if the primary control module can no longer support the Stinger unit. The unit transfers any configuration changes that you make on the primary control module to the secondary control module, except for changes to IP addresses. Each control module must have a unique IP address.

When you log in, you are prompted for a username:

```
User:
```

To log in with administrative privileges, enter the default password (`Ascend`) assigned to the Stinger `admin` login at the factory:

```
User: admin
Password: Ascend
```

The name specified in the `name` parameter of the `admin user` profile appears as your system prompt. For example:

```
admin>
```

If you are already connected to the Stinger unit as a different user, use the `auth` command to log in as the administrator:

```
admin> auth user
Password:
```

For additional information about `user` profiles, see “Creating user profiles for administrative access” on page 1-12.

Enabling basic security measures

The Stinger unit is shipped with certain default parameters set to allow easy access for the initial configuration. After you have initially logged in as administrator, ensure that the following three basic security tasks have been completed:

- Change the default `admin` password.
- Secure the serial port on both control modules.
- Specify one of the Ethernet ports as a management-only port.

You can also manage administrative access to the Stinger unit by specifying the types of tasks administrative users can perform on the Stinger unit. See "Creating user profiles for administrative access" on page 1-12.

If the Stinger unit will be configured for SNMP, see also "Securing the SNMP agent" on page 7-4.

Changing the default `Admin` password

Because the `admin` login has superuser privileges, you must change the default password immediately. Be sure to write down the password you assign and store it in a safe place.

To change the password for the `admin` login, proceed as follows:

```
admin> read user admin
USER/admin read

admin> set password = top-secret

admin> write
USER/admin written
```

All subsequent administrator logins are required to supply the new password. (For more information about configuring `user` profiles, see "Creating user profiles for administrative access" on page 1-12.)

Securing the serial port of each control module

The default settings for the control module allow anyone connecting to the serial port to access the system as the `admin` user, without logging in or being authenticated. Therefore, you must configure each control module to request a username and password and to automatically log the user out when the terminal session is terminated.

To secure the serial port on a single or primary control module, proceed as follows:

1. Read the `serial` profile of the primary (or single) control module:

   ```
   admin> read serial {1 8 2}
   ```

   The `serial` profile index refers to a physical port on the control module. The serial port is always designated as the second physical port of the control module.

2. Set the `user-profile` parameter to null:

   ```
   admin> set user-profile =
   ```

3. Set the `auto-logout` parameter to `yes`:

   ```
   admin> set auto-logout = yes
   ```

With this setting, the system automatically logs off the current user profile if the Data Terminal Ready (DTR) signal is lost on the serial port.

4 Write the profile.

admin> **write -f**

If your Stinger unit is operating with two control modules, both are working in parallel. As a result, the primary control module does not copy over this configuration to the secondary control module. You must secure both serial ports manually.

The following sample commands show how to secure the serial port on a secondary control module:

```
admin> read serial {1 9 2}
admin> set user-profile =
admin> set auto-logout = yes
admin> write -f
```

Now users connecting to a control module must supply a valid username and password for access to the Stinger unit.

Specifying a management-only Ethernet interface

You can specify that a control module's Ethernet interface is for management only. Following is the relevant parameter, which is shown with its default setting:

```
[in IP-INTERFACE/{ { any-shelf any-slot 0 } 0 }]
management-only-interface = no
```

Setting the management-only-interface parameter to yes means that incoming traffic on the interface terminates in the system itself and is not forwarded on any other interface. In addition, only traffic generated by the system is forwarded onto the management-only interface. Traffic generated externally is dropped by the interface.

The following commands configure a management interface for each of the control modules:

```
admin> read ip-int {{ 1 8 1 } 0}
admin> set management-only = yes
admin> write

admin> read ip-int {{ 1 9 1 } 0}
admin> set management-only = yes
admin> write
```

To verify that an Ethernet interface has been set for management only, display the output of the ifmgr -d command, as shown in the following example:

```
admin> ifmgr -d
bif slot sif u m p ifname     host-name  remote-addr       local-addr
---------------------------------------------------------------------------
000 1:09 000 *     ie0        -          0.0.0.0/32        134.112.26.201/32
001 1:09 001 *     ie1        -          0.0.0.0/32        0.0.0.0/32
002 1:09 002 *     lo0        -          0.0.0.0/32        127.0.0.1/32
003 0:00 000 *     rj0        -          0.0.0.0/32        127.0.0.2/32
```

```
004 0:00 000 *     bh0        -         0.0.0.0/32        127.0.0.3/32
005 1:09 000 *     wanabe     -         0.0.0.0/32        127.0.0.3/32
006 0:00 000 *     local      -         0.0.0.0/32        127.0.0.1/32
007 0:00 000 *     mcast      -         0.0.0.0/32        224.0.0.0/32
008 0:00 000 -     tunnel0    -         0.0.0.0/32        134.112.26.201/32
009 0:00 000 *     vr0_main   -         0.0.0.0/32        134.112.26.201/32
010 0:00 000 -     sip0       -         0.0.0.0/32        0.0.0.0/32
011 1:05 006 *   p wan11     bir-2-2  222.222.222.222/32 222.222.222.1/32
```

The `u` column displays an asterisk (*) to indicate that the interface is operational or a hyphen (-) to indicate that it is disabled. For the system to respond to the `ifmgr -d` command, your `user` profile must be enabled with debug privileges. For information on enabling debug privileges see "Enabling debug permissions" on page A-1.

Managing administrative access to the unit

You can administer the Stinger system remotely using the secure shell (SSH) program or Telnet.

Administering the system remotely using secure shell (SSH) and Telnet

The ssh program enables an administrator to log securely into another computer over a network, to enter commands on a remote machine, and to move files from one machine to another.

The ssh program provides strong authentication, encryption, and secure communications over unsecure channels, for secure administrative access to a Stinger system.

The ssh program can replace Telnet, which is a less secure method of administrative access.

Lucent recommends that you use ssh for administrative access to a TAOS unit. For information about how to disable Telnet access, see "Disabling telnet access" on page 1-10. If you must use Telnet access, see "Telnet access" on page 1-10.

Logging in using SSH

You can use the ssh program to log securely into the Stinger system and administer the system remotely.

TAOS implementation

The Stinger system sports up to five simultaneous SSH connections. The system refuses any additional attempts to login using a secure shell connection.

TAOS supports SSH versions v1 and v2.

SSHv1 implementation in TAOS supports the following protocols:

- User authentication: user password
- Encryption
  - Data Encryption Standard (DES)
  - Triple data encryption standard-cypher block chaining (3DES-CBC)

SSH2 implementation in TAOS supports the following protocols:

- User authentication: user password
- Encryption: Triple data encryption standard-cypher block chaining (3DES-CBC)
- Message authentication code (MAC) Algorithm: HMAC-SHA1
- Key Exchange Algorithm: Diffie-Hellman key exchange (ediffie-hellman-group1-sha1)
- Server-Host Key Algorithm: ssh-dss
- Channel type: session
- Channel Type Request: pty-req

The following drafts were used as references for SSHv2 implementation in TAOS:

- `draft-ietf-secsh-assignednumbers-08.txt`, *SSH Protocol Assigned Numbers*
- `draft-ietf-secsh-architecture-16.txt`, *SSH Protocol Architecture*
- `draft-ietf-secsh-transport-18.txt`, *SSH Transport Layer Protocol*
- `draft-ietf-secsh-userauth-21.txt`, *SSH Authentication Protocol*
- `draft-ietf-secsh-connect-19.txt`, *SSH Connection Protocol*

User authentication

When the secure shell server is enabled, the system authenticates an administrator using the user name and password specified in the administrator's `user` profile. RADIUS authentication is not supported.

MAC verification

With the SSHv2 protocol, packet integrity is verified by the message authentication code (MAC). The sending party calculates the MAC and appends it to the packet before sending. The receiving party verifies the MAC before processing the packet.

If the MAC is incorrect, the packet is discarded and the session is disconnected.

Key generation

Table 1-1 lists the authenticated keys generated or regenerated by the system, depending version of SSH enabled for the system.

Table 1-1. Authentication keys generated by the system

SSH version	Key generated
v1	RSA Key, Digital Signature Standard (DSS) Key, and Server Key
v2	RSA Key and DSS Key
v1 and v2	RSA Key, DSS Key, and Server Key

RSA and DSS keys are generated regardless of the SSH version selected, and they are generated only once. The Server Key is generated only if SSHv1 is selected or if both SSHv1 and SSHv2 are selected.

Encryption and MAC key re-exchange

The SSHv2 draft recommends that the encryption and MAC keys be changed after each gigabyte of transmitted data or after each hour of connection time, whichever occurs sooner. However, because the re-exchange process is a public key operation requiring a fair amount processing power, it should not be performed too often.

A client initiates the key re-exchange by sending the KEXINIT message. On the receipt of this message, the Stinger system stops sending any data and proceeds with key re-exchange. On the re-exchange is completed, new keys are used for encryption and mac.

Limitations

TAOS support for ssh includes the following limitations:

- No flow control mechanism is implemented for ssh sessions.
- Only one channel is allowed per session. The Stinger system discards any additional channel requests for the same session.
- Any packet that is sent during algorithm negotiation is discarded.
- During the Key exchange, if a client guesses incorrectly, the client is sent a second key exchange packet, which is not handled currently. This situation is rare as most of the draft-compliant clients have the required algorithms as the preferred algorithms.
- In rare event that a client sends an appended packets—that is, two ssh packets are in a single TCP segment—the Stinger system processes only the first packet.

Configuring the secure shell server

The `ssh-server-config` profile contains the parameters used for enabling and configuring the SSH daemon. A listing of the `ssh-server-config` profile is shown below, followed by parameter descriptions.

```
[in SSH-SERVER-CONFIG]
ssh-enabled = yes
ssh-version = any-ssh-version
server-key-size = 768
server-key-regeneration-interval = 3600
login-grace-time = 300
authentication-type = password-authentication
allow-empty-passwords = yes
host-key-length = 540
dss-host-key-length = 512
```

Parameter	Specifies
`ssh-enabled`	Enable or disable the secure shell server. By default, SSH access is disabled. Specify `yes` to enable it. **Note** You must reset the system for the new setting to take effect.

Parameter	Specifies
ssh-version	Version of the SSH protocol that the system negotiates. Valid settings are as follows: ■ any-ssh-version (the default)—SSHv1 and SSHv2 ■ ssh-version-1—Only SSHv1 is negotiated. ■ ssh-version-2—Only SSHv2 is negotiated.
server-key-size	Size of the server key (in bits) generated in every server-key-regeneration-interval seconds. The change is reflected the next time the server key is generated. The valid range of values is from 512 through 896. The default value is 768.
server-key-regeneration-interval	Interval at which the server key is changed. This change takes effect immediately. The new key generation interval is updated depending upon the new value. Valid range of values is from 3600 through 7200 seconds. The default value is 3600 seconds.
login-grace-time	Period during which the login must be completed once authentication starts. Specify a value from between 0 through 600 seconds. The default value is 300 seconds.
authentication-type	Type of password authentication. This parameter reports only the value password-authentication, because this release supports only password authentication.
allow-empty-passwords	Whether empty password are allowed for secure shell authentication. The default setting is no. Specifying yes, that is, allowing empty passwords, is insecure.
host-key-length	RSA host key length. This field is read-only.
dss-host-key-length	DSS Host key length. Read only field

Enabling the SSH daemon

The following sample commands enable the SSH daemon:

```
admin> read SSH-SERVER-CONFIG

admin> set ssh-enabled = yes

admin> write
NOTE: A reset is required for the change to take effect.
SSH-SERVER-CONFIG written

admin> reset -f
```

Verifying that the SSH daemon is active

After the system reset, use netstat command to verify that the secure shell daemon is running. For example:

```
admin> netstat
udp:
-Socket-  Local Port  InQLen  InQMax   InQDrops   Total Rx  Service
1/c    0       1023       0       1         0          0   Syslog
1/c    1       1022       0       1         0          0  ASyslog
1/c    2       1021       0       1         0          0  ASyslog
```

```
1/c    3       520       0      50          0         43      Rip
1/c    4         7       0      32          0          0  EchoSer
1/c    5       123       0      32          0          0     Sntp
1/c    6      5150       0     256          0          0     Atmp
1/c    7      1020       0     128          0          0  RadAuth
1/c    8       161       0       0          0          0     Snmp

tcp:
-Socket-   Local                  Remote                 Service State
1/c 131073 *.22                   *.*                    SSH     LISTEN
```

Logging into a system using secure shell

When the ssh daemon is running, you can log into a Stinger unit from a workstation using secure shell (ssh). For example, the following command entered on a UNIX system initiates an ssh login, using DES encryption and authenticating the `admin` user profile, to a Stinger unit at 1.1.1.1:

```
ssh -x -c des -l admin 1.1.1.1
```

Log messages related to SSH support

Table 1-2 lists syslog messages introduced in this release to report error conditions related to secure shell support.

Table 1-2. Syslog messages reported for secure shell error conditions

Error condition	Syslog message
Server key information loading failure	`* LOG error, Shelf 1, Controller, Time: 13:07:54--` `SSHD: Server Key Load info failed`
Host key import from NVRAM failure.	`* LOG error, Shelf 1, Controller, Time: 13:07:54--` `SSHD: SSHD_HOST_KEY_IMPORT failed`
Host key generation failure	`* LOG error, Shelf 1, Controller, Time: 13:07:54--` `SSHD: SSHD_HOST_KEY_GENERATE .. SSH abort`

Host key export to NVRAM failure.	`* LOG error, Shelf 1, Controller, Time: 13:07:54-`
	`-`
	`SSHD_HOST_KEY_EXPORT failed .. SSH abort`

Host key information loading failure.	`* LOG error, Shelf 1, Controller, Time: 13:07:54-`
	`-`
	`SSHD: SSHD_HOST_KEY_LOAD .. SSH abort`

SSH and telnet access are both enabled.	`* LOG warning, Shelf 1, Controller, Time:`
	`12:20:25--`
	`Both SSH and telnet access have been enabled.`
	`Telnet is not secure`

Telnet access

The secure shell program is more secure method for administering the Stinger system remotely. You can disable Telnet access on a system, but if you must use Telnet, consider the additional security measures described below.

Disabling telnet access

The `telnet-enabled` parameter in the `IP-GLOBAL` profile enables or disables telnet access. With the default `yes` setting, telnet access is available.

To disable telnet access, set `telnet-enabled` to `no`.

To verify that telnet access has been disabled, check the output of the `netstat` command. No Telnet service should be showing under the TCP field. For example:

```
admin> netstat
udp:
...
tcp:
-Socket-   Local                  Remote                 Service State
1/c 131073 *.22                   *.*                    SSH     LISTEN
admin>
No telnet listener.
```

Enabling mild authentication

If the Telnet is enabled for a system (that is, `telnet-password` parameter in the `ip-global` profile is set to `yes`), and no `user` name is set for the `user-profile` parameter, you can configure a Stinger system to support mild authentication for telnet access. When a user attempts to access the system via telnet, the user must provide a password when prompted. After telnet authentication, the user goes through the terminal session authentication similar to authentication for console access.

User authentication can be internal or external based on system configuration. If the `user-profile` parameter in the `ip-global` profile is set with the name of a `user` profile, then the terminal session's user authentication is bypassed. To ensure that the user is authenticated for telnet access, the `user-profile` parameter should not be set to any `user` profile.

Creating Telnet access control lists

You can restrict `telnet` access to the Stinger system by configuring a `tacl` (`telnet` access control list) profile. You must have `system` authorization to create, read, or modify the profile.

You can configure up to 20 entries in the `tacl` profile, each of which specifies a source IP address that is explicitly allowed `telnet` access to the system. Specifying a subnet address allows access from any of the addresses within the subnet range.

The `tacl` profile contains the following parameters, shown with default values:

```
[in TACL]
enable-permit = no

[in TACL:permit-list[1]]
valid-entry = no
source-address = 0.0.0.0/0
```

```
source-address-mask = 0.0.0.0
```

Parameter	Setting
enable-permit	Enables or disables control over telnet access to the system on the basis of the permit-list settings in the tacl profile. With the no setting (the default), the permit-list settings have no effect. If set to yes, only the IP addresses specified in the permit-list subprofiles are allowed telnet access. Setting enable-permit to yes has no effect if none of the permit-list subprofiles have been configured.
valid-entry	Enables or disables the permit-list entry.
source-address	Source IP address of a host or subnet to be allowed telnet access to the system. If you specify the subnet mask as part of the source-address value, the source-address-mask value is set automatically to the corresponding dotted decimal value.
source-address-mask	Subnet mask to be applied to the source-address value. You can set the value directly in dotted decimal format or by including a subnet as part of the source-address value.

For example, the following commands create a tacl profile that enables telnet access from 30 host addresses from 10.27.34.1 to 10.27.34.31:

```
admin> new tacl
admin> set enable-permit = yes
admin> set permit-list 1 valid-entry = yes
admin> set permit-list 1 source-address = 10.27.34.1/27
admin> write -f
```

With this tacl configuration, only telnet attempts from the specified subnet will be allowed access. For example, the following sequence shows a successful telnet session established to a Stinger system at 210.210.210.99 from a valid IP address:

```
(sys10-27-34-1) telnet 210.210.210.99
Trying 210.210.210.99...
Connected to 210.210.210.99.
Escape character is '^]'.
User: admin
Password:
```

An attempt to telnet to the Stinger system from an IP address that is not on the specified subnet will fail. For example, the following sequence is displayed:

```
(sys10-27-45-45) telnet 210.210.210.99
Trying 210.210.210.99...
Connected to 210.210.210.99.
Escape character is '^]'.
Connection closed by foreign host.
```

Summary of administrative access available

Table 1-3 shows the type of access available on the system based on the settings of the ssh-enabled and telnet-enabled parameters.

Table 1-3. Administrative access available on a system

Parameter setting		Access provided
SSH-SERVER-CONFIG: ssh-enabled	IP-GLOBAL: telnet-enabled	
no	no	Console only
yes	no	SSH and console
no	yes	Telnet and console
yes	yes	SSH, Telnet, and console

Creating user profiles for administrative access

You create and define administrative access to the Stinger unit using user profiles. Do not confuse them with connection profiles. You configure user profiles to provide access to the Stinger command-line interface to monitor or configure the unit. In contrast, connection profiles contain authentication and configuration information for a remote device or user and allow the remote user to connect to the Stinger unit for WAN or LAN access.

You can create any number of user profiles and fine-tune the privileges they allow. In addition to authentication and permission information, user profiles also contain parameters that affect how the user's environment appears at login.

A Stinger unit is shipped with the predefined user profiles admin and default. An admin user profile provides full read-write permissions, while the default user profile authorizes minimal use of commands.

Many sites choose to create some administrative accounts with read-only permissions, to allow certain users to check status windows, read log buffers, and enter diagnostic commands. You need at least one administrative account with read-write permissions, but you might choose to create several read-only accounts.

For information about managing administrative sessions, see "Managing administrative connections" on page 1-39.

To log into the Stinger unit for administrative tasks, use a profile that has write permissions, as in the following example:

```
% telnet myStinger
User: admin
Password: mypassword

admin>
```

If you are already logged into the Stinger unit, make sure you are at the highest level by entering the `list ..` command (possibly more than once), as in the following example:

```
admin> list ..
name = ""
physical-address* = { shelf-1 slot-1 1 }
line-interface = { yes esf b8zs eligible middle-priority inband wink-start
digi+
admin> list ..
error: at highest level
```

Creating a new administrative profile

You use the `new user` command to create a new administrative profile. You must then activate and authenticate the new profile.

To create a new `user` profile based on the `user` profile `admin`, append `admin` to the `new user` command. The following example shows how to create a new `user` profile named `test`, with full administrative privileges:

```
admin> new user admin
USER/admin read
admin> set name = test
admin> set password = test-pw
admin> write
USER/admin written
```

To create a new `user` profile based on the `user` profile `default`, use the `new user` command with no additional arguments. The following example shows how to create a new user profile named `test2`, with default administrative privileges:

```
admin> new user
USER/default read
admin> set name = test2
admin> set password = my-password
admin> write
USER/test2 written
```

To activate a `user` profile, proceed as follows:

```
admin> read user test
USER/test read
admin> set active-enabled = yes
admin> write
USER/test2 written
```

If you are connected to the Stinger unit as a different user, use the `auth` command to log in as the administrator:

```
admin> auth user
Password:
```

Enabling two level authentication

You can configure the system to require a second level of authentication for the following types of access to a Stinger unit or for any combination of the following:

- Telnet access using system IP address

- system console access
- modem access
- opening a session from a remote shelf to a host Stinger unit

By default, the system uses only single-level authentication.

If two-level authentication is enabled, at login, the system prompts the user to log in twice, each time with a different username and password.

Note After an NVRAM operation, the system defaults to a single level of authentication.

To enable two-level authentication, you must perform the following tasks, in the following recommended order:

1 Create a second-level `user` profile and link it to a first level `user` profile.

2 Specify the type of access for which two-level authentication is required, systemwide.

Note Before enabling two-level authentication for a system, make sure that you have configured first-level and second-level `user` profiles for your system. If you configure the system to require two-level authentication without defining first-level and second-level `user` profiles, you might be unable to log into the system.

Settings in the *user* profile and comparable RADIUS attributes

To configure second-level authentication for a system, configure first and second level `user` profiles that define the user name and password for each login level. Then, specify a first-level profile for the second-level `user` profile.

You use the following parameters in the `user` profile to designate the login level for a `user` profile and to associate a first-level `user` profile with a second-level `user` profile. The comparable RADIUS attributes are also shown below.

Command-line interface parameter	RADIUS attribute	Specifies
`first-level-user`	`Ascend-First-Level-User`	Name of a first-level `user` profile. The default setting is null. If possible, do not assign a first-level `user` profile to more than one second-level `user` profile.
`login-level`	`Ascend-User-Login-Level`	Login level for this `user` profile. Specify one of the following values: ■ `first-level` (the default)—This `user` profile is to be used for first level authentication. ■ `second-level`—This `user` profile is to be used for second level authentication. If the `login-level` parameter is set to `second-level`, you must specify the name of a valid first-level `user` profile for the `first-level-user` parameter.

A user cannot use a first-level user profile name and password to login for the second level of authentication or use a second-level user profile name and password to login at the first level of authentication.

If you are configuring the system for RADIUS support, keep the following in mind:

- If the rad-serv-enable and rad-auth-client parameters are enabled in the external-auth profile, external authentication is supported by a RADIUS server by selecting the appropriate setting for the cli-user-auth parameter in the external-auth profile. If the system is set for single-level authentication, the system uses the RADIUS server for single level authentication. If the system is configured for two-level authentication, RADIUS authentication also requires two levels of authentication.
- For all telnet user accounts, first and second level, the attribute Ascend-Telnet-Profile must be set to a valid Stinger user profile.
- For a second level user, the attribute Ascend-First-Level-User must specify a first-level user account.
- The attributes Ascend-User-Login-Level and Ascend-First-Level-User must be set as part of the check list items in the telnet user account.

Settings in the *system* profile

To configure second-level authentication for a Stinger system, in the system profile, set the user-second-level-authentication parameter. The user-second-level-authentication parameter is defined as follows:

Parameter	Specifies
user-second-level-authentication	Enables/disables two-level user authentication for the different types of administrative access to a Stinger system. Specify one of the following the values: ■ none (the default)—Second level authentication is disabled for the system. ■ console-only—Second level authentication is enabled only for console access. ■ telnet-only—Second level authentication is enabled only for console access. ■ modem-only—Second level authentication is enabled only for modem access. ■ control-bus-only—Second level authentication is required only for control-bus access (from a remote shelf to a host Stinger system).

Parameter	Specifies
	■ console-modem-only—Second level authentication is enabled for console and modem access. ■ console-telnet-only—Second level authentication is enabled for console and telnet access. ■ telnet-modem-only—Second level authentication is enabled only for telnet and modem access. ■ console-control-bus-only—Second level authentication is required for console and control-bus access. ■ telnet-control-bus-only—Second level authentication is required for telnet and control-bus access. ■ modem-control-bus-only—Second level authentication is required for telnet and control-bus access. ■ console-telnet-modem-only—Second level authentication is enabled for console,telnet, and modem access. ■ console-telnet-ctrl-bus-only—Second level authentication is enabled for console, telnet and control-bus access. ■ console-modem-ctrl-bus-only—Second level authentication is enabled for console, modem and control-bus access. ■ modem-telnet-ctrl-bus-only—Second level authentication is enabled for modem, telnet, and control-bus access. ■ system-level—Second level authentication is enabled system access.

Sample configuration

Suppose you have an existing user profile called admin. To require two levels of authentication for the user admin, create a new user john and configure it as a first-level login. Then, configure the user profile admin as a second level login and specify the user profile john as its first level login profile.

The following sample commands create the first level user profile john:

```
admin> new user john
admin> set login-level = first-level
admin> write
```

The following commands configure the user profile admin as a second-level login profile and assigns the profile john as its first-level login profile:

```
admin> read user admin
admin> set login-level = second-level
admin> set first-level-user = john
admin> write -f
```

Following are examples of RADIUS user files for telnet user accounts with settings for first-level and second-level authentication.

```
raduser1      Password = "system123", Ascend-User-Login-Level = First-Level
              User-Service = Shell-User,
              Ascend-Telnet-Profile = "admin",
              Ascend-User-Acct-Expiration = "Jan 6, 2006"
```

```
raduser2 Password = "system234", Ascend-User-Login-Level = Second-Level,
Ascend-First-Level-User = "raduser1"
              User-Service = Shell-User,
              Ascend-Telnet-Profile = "admin",
              Ascend-User-Acct-Expiration = "Dec 01 2003"
```

The following sample commands configure the system to require second-level authentication for telnet access:

admin> **read system**

admin> **set user-second-level-authentication = telnet-only**

admin> **write**

The system generates a log message whenever a user has successfully logged in. For example:

```
LOG info, Shelf 1, Controller-1, Time: 12:57:14--
login success : user 'admin', source '135.17.134.39'on first level access
```

Specifying the maximum number of login attempts

To specify the maximum number of login attempts that a user can make, set the `maximum-login-attempts` parameter in the `system` profile. Specify a number between 1 through 6. The default value is 3.

The system generates a log message whenever a login attempt fails. The log message indicates whether the level of authentication failure is at the first level or second level. For example:

```
LOG critical, Shelf 1, Controller, Time: 16:46:32--
login failure: user 'john', source '135.17.134.39' on first level access
```

or

```
LOG critical, Shelf 1, Controller, Time: 16:47:17--
login failure: user 'mitch', source '135.17.134.39' on second level access
```

If a user fails to login after making the number of attempts specified by the `maximum-login-attempts` parameter, the system generates the `maxTelnetAttempts` trap.

Authentication from a remote shelf to a host Stinger unit

When a user opens a session from a remote shelf (Stinger MRT or Compact Remote) to a host Stinger unit using the `open` *`shelf slot`* command, the systems creates a terminal session using the control bus.

The host Stinger unit authenticates a user by prompting the user for a user name and password. The user name and password must be defined in a `user` profile in the host Stinger system. The host grants access to the user only after successful authentication, and the host Stinger unit logs a message for every successful login and for every login failure.

If the host unit is configured for two-level authentication or control bus access, the host requires the user to log in twice.

No authentication is required when a user opens a session from the host Stinger unit to any of its own slots or to a remote controller or remote LIM.

The following sample session shows a user logging in from a remote shelf to a host unit. Two-level authentication is not configured on the host.

```
admin> show
   Shelf 2 ( slave ):
   Reqd  Oper   Slot Type
   { shelf-2 slot-1 0 }         N/A   UP     mrt-36-adsl-card
   { shelf-2 trunk-module-1 0 } UP    UP     oc3-atm-trunk-daughter-card
admin> open 1 8
Usage: open - start session with master controller
User: admin
Password:
shelf-router-1/8>
```

The following sample session shows a user logging in from a remote shelf to a host unit. Two-level authentication is configured on the host Stinger unit.

```
admin> open 1 8
Usage: open - start session with master controller
User: admin
Password:
User: user1
II Level Password:
shelf-router-1/8>
```

When a user has successfully logged in, the host generates a log message, such as the one shown below:

```
LOG info, Shelf 1, Controller, Time: 19:57:03--
login success : user 'admin', source 'control bus'on first level access
LOG info, Shelf 1, Controller, Time: 19:57:08--
login success : user 'user1', source 'control bus'on second level access
```

User account and user password expiration

You can configure Stinger systems to monitor for expired user accounts and user passwords. To enable the system to audit `user` profiles for expired passwords or user accounts, set the `audit-user-profiles` in `system` profile to `yes`. By default, the system does not audit `user` profiles.

If the `audit-user-profiles` parameter is set to `yes`, by default, a user account expires after three years and a password expires after 60 days. Users with `Admin` privileges can modify user account and password expiration dates.

What happens when a user account or user password expires

If enabled, the system monitors user profiles for expired accounts and passwords. If a user account is expired, the system disables that account and terminates any active user sessions. A user with an expired account is denied access to the system. Note that the system-generated `user` profile `admin` and its password do not expire.

Note When you clear NVRAM, the system reverts to the default settings for this feature. That is, the system does not audit `user` profiles for expired accounts or passwords.

When the system terminates a user session because the user account is expired, it generates the following sample log message:

```
LOG critical, Shelf 1, Controller, Time: 00:51:55--
Account expired for User: user1 from 135.17.134.39, disconnected by system
```

If the user's account is still active, the user can change the expired password from the terminal session.

RADIUS support for account and password expiration

RADIUS supports user account expiration, but a user cannot change an expired password. All password administration must be performed by the RADIUS server system administrator. After successful authentication, the RADIUS server returns the name of the Stinger `user` profile that is linked to the external user account. The system authenticates users as defined in the `user` profile for user terminal session.

Setting expiration dates for user accounts and passwords

The following parameters in the `user` profile enable you to view the last login date for a user account and specify an expiration date for a user account and user password. Only user account expiration is supported by RADIUS.

Parameter	RADIUS attribute	Specifies
`last-login-date`	n/a	Date when this user profile was used to log in.
`user-acct-expiration-date`	`Ascend-User-Acct-Expiration`	Expiration date for this user account. Complex field.
`user-passwd-expiration-date`	Not supported	User password expiration date. Complex field.

Note Stinger systems do not audit RADIUS server user accounts. If a Stinger system is configured for external authentication and the `audit-user-profiles` parameter in the `system` profile is enabled, for the users to be authenticated, the RADIUS server administrator must ensure that for all system telnet user accounts, the attribute `Ascend-User-Acct-Expiration` is set to the correct date.

The following sample commands specify the expiration date for the user account `remote` and the expiration date for its password. Note that you cannot set the parameter `weekday`.

```
admin> read user remote

admin> list user-acct-expiration-date
[in USER/remote:user-acct-expiration-date]
weekday = Monday
month = January
```

```
year = 1990
day = 1
admin> set month = December
admin> set year =2005
admin> set day = 31
admin> list user-passwd-expiration-date

[in USER/remote:user-passwd-expiration-date]
weekday = Monday
month = January
year = 1990
day = 1
admin> set month = dec
admin> set year = 2003
admin> set day = 31
admin> write -f
```

Enforcing a password check

To configure the system to validate that any new password created is unique and that it is at least 8 characters in length, with at least two numbers and four alphabetical characters, set the `enforce-password-check` parameter in `user` profile to yes. By default, this feature is disabled.

If this feature is enabled, the system administrator must provide a new user with a password for the user's initial login. After a user has logged in and has been authenticated by the system, the user can use the `changepasswd` command to set a new password.

Changing a user password

If a user with an expired password attempts to log in and the user account is still valid, the system prompts the user to set a new password.

The `changepasswd` command enables a user to change password from the terminal session. When a user enters the `changepasswd` command, the system first authenticates the old password and then accepts the new password. If the system is configured for two-level authentication, the user can change the first and second level passwords. If password validation is enabled for the user's account (the `enforce-password-check` parameter in the `user` profile is set to yes), the new password must be at least 8 characters long, containing at least two numbers and four alphabetical characters.

Following is a sample session showing a user changing a password using the `changepasswd` command:

```
bash-2.05$ telnet 135.17.134.28
Trying 135.17.134.28...
Connected to 135.17.134.28.
Escape character is '^]'.

User: user1
```

```
Password:

SECOND LEVEL ACCESS
User: user2
II Level Password:

user2>
user2>
user2> changePasswd
Old SYSTEM Password:
New SYSTEM Password:
ReEnter New Password:
Old II Level Password:
New II Level Password:
ReEnter New Password:
user2>
user2> quit
Connection closed by foreign host.
bash-2.05$
```

The following sample session shows a user changing an expired password:

```
bash-2.05$ telnet 135.17.134.28
Trying 135.17.134.28...
Connected to 135.17.134.28.
Escape character is '^]'.

User: user1
Old Password:
New Password:
ReEnter New Password:

SECOND LEVEL ACCESS
User: user2
Old II Level Password:
New II Level Password:
ReEnter New Password:

user2>
```

Assigning permissions

If you have administrative privileges, you can create any number of `user` profiles that grant other administrators various degrees of access to the system.

You can set the following permission parameters in any combination:

Parameter	Setting
`allow-code`	Enable/disable permission to upload code to the Stinger unit and use the following code-level commands: ■ `format`—Prepares a flash card for use ■ `fsck`—Checks the file system on a flash card

Parameter	Setting
allow-diagnostic	Enable/disable administrative access to diagnostic profiles.
allow-password	Enable/disable administrative access to the password command.
allow-system	Enable/disable administrative access to system profiles.
allow-termserv	*Does not apply to the Stinger unit.* Enable/disable administrative access to the terminal-server commands.
allow-update	Enable/disable administrative access to update profiles.
allow-debug	Enable/disable administrative access to debug commands. This parameter is not visible on the interface. See "Enabling debug permissions" on page A-1.

Understanding command permissions

Permissions control the actions that a user who logs in with a particular profile can perform on a Stinger unit. Each permission enables the use of a particular command *class*. When you use the `help` command to display available commands, the left column shows command names, and the right column shows the command class. For example:

```
admin> ?
 ?                              ( user )
 acct-failsafe                  ( debug )
 agsh                           ( debug )
 alarm                          ( system )
 aliasTable                     ( debug )
 annexType                      ( debug )
 apsMgr                         ( debug )
 arptable                       ( system )
 atmcacstat                     ( debug )
 atmCacToggle                   ( debug )
 atmCktState                    ( debug )
 atmConnectionFailures          ( system )
 atmControlState                ( debug )
 atmDelGet                      ( debug )
 atmds3trunkdev                 ( debug )
 atme3trunkdev                  ( debug )
 atmems                         ( debug )
 AtmEmsDebug                    ( debug )
 atmFlexVpiVci                  ( debug )
 atmGet                         ( debug )
 atmInternalLines               ( system )
 atmnbase                       ( debug )
[More? <ret>=next entry, <sp>=next page, <^C>=abort]
```

Typically, read-write accounts enable the System command class. They might also enable the Update and Code command classes. Read-only accounts might be limited to the Diagnostic command class. Table 1-4 shows command class and the associated permission.

Table 1-4. Permissions and associated commands

Permission	Command class
N/A (always enabled)	User
`Allow-System`	System
`Allow-Update`	Update
`Allow-Code`	Code
`Allow-Diagnostic`	Diagnostic
`Allow-Termserv`	Termserv (*Does not apply to the Stinger unit.)*
`Allow-Password`	N/A. The Allow-Password permission enables a user to view passwords. If the permission is set to `no`, the user sees a row of asterisks instead of the actual configured password. If the administrator who backs up system configurations does not have the `allow-password` permission set to `yes`, passwords are not saved as part of the configuration.

Typical permission configurations

The following commands create a read-write administrative login named `Marco`, which is based on the `admin user` profile, but has access only to System, Diagnostic, and Update command classes:

```
admin> new user admin
admin> set name = marco
admin> set password = my-password
admin> set allow-password = yes
admin> set allow-code = no
admin> write -f
```

The following commands create a `user` profile named `test` based on the `user` profile `admin`, but restricts some permissions and assigns a different password:

```
admin> new user admin
admin> set name = test
admin> set password = test-pw
admin> set allow-update = no
admin> set allow-code = no
admin> write -f
```

The following commands create a profile that enables the user to use the update commands, but not to perform any other actions:

```
admin> new user
admin> set name = techpubs
admin> set password  = january
admin> set allow-update= yes
admin> set prompt = *
admin> set log-display-level = none
admin> write
```

Specifying group permissions for commands and profile access

You can create a centralized definition of the TAOS commands that a group of users can perform, and associate individual users with a command user group. You use the `user-group` profile to define command access for a group of users you specify. Then, assign a user group to a user by specifying a valid `user-group` profile for the `user-group` parameter in the `user` profile.

Creating a user group

To define a command user group, set the following parameters in the `user-group` profile. You can specify access settings and a list of up to 512 commands that users in the user group have permission to use.

Parameter	Setting
`name`	Name of a command user group. Specify up to 23 characters. The default is null.
`use-group-permissions`	Enable/disable the user's access to all the `allow-`*xxx* settings in the `user-group` profile specified by the `user-group` parameter. With the default `no` setting, the user does not have access to the commands permitted by the `allow-`*xxx* settings in the `user-group` profile and only the commands permitted by the `allow-`*xxx* settings in the `user` profile apply. Specify `yes` for the user to have access to all commands permitted by the `allow-`*xxx* setting in the `user-group` profile and for the `allow-`*xxx* settings in the `user` profile to be ignored.
`allow-termserv`	Enable/disable permission for the users in the group to use terminal-server commands. With the default `no` setting, users do not have terminal-server permission. Specify `yes` to enable users to have terminal-server permission.
`allow-system`	Enable/disable permission for the users in the group to use system-level commands. With the default `no` setting, users do not have system-level permission. Specify `yes` to give users system-level permission.

Parameter	Setting
allow-diagnostic	Enable/disable permission for the users in the group to use diagnostic-level commands. With the default no setting, users do not have diagnostic-level permission. Specify yes to give users diagnostic-level permission.
allow-update	Enable/disable permission for the users in the group to use update-level commands. With the default no setting, users do not have update-level permission. Specify yes to give users update-level permission.
allow-password	Enable/disable permission for the users in the group to view passwords. With the default no setting, users cannot view passwords. Specify yes to enable users to view passwords.
allow-code	Enable/disable permission for the users in the group to use code-level commands. With the default no setting, users do not have code-level permission. Specify yes to give users code-level permission.
exclude-listed-commands	Enable/disable permission for the users in the group to use the commands designated by the command parameter. With the default no setting, users have permission to use the designated commands. Specify yes to disable permission to use the designated commands.
command [*n*]	Commands to allow or exclude.
profile	Array that contains a listing of system profiles to which users in this user group are denied access. You can specify up to 400 profiles. The default setting for this array is null.

Specifying a command user group for a user

You assign a command user group to a user by specifying a valid user-group profile name for the user-group parameter in the user profile. Following is the definition for the user-group parameter:

Parameter	Setting
user-group	Name of a user-group profile. The default is null. If the user-group parameter refers to a valid user-group profile, the access settings of the user-group profile are applied to the user session, overriding those in the user profile. If the user-group profile cannot be found, the user cannot log on or perform any commands. If no user-group profile is specified in the user profile, the access settings in the user profile apply.

In this example, the existing user bill is given permission to use the six commands that he needs to provision new users. The existing user ted can use all the Stinger commands except reset, slot, and read:

```
admin> read user bill
admin> set user-group = provisioning
admin> write -f

admin> new user-group provisioning
admin> set command 1 = new
admin> set command 2 = list
admin> set command 3 = delete
admin> set command 4 = write
admin> set command 5 = get
admin> set command 6 = auth
admin> write -f

admin> read user ted
admin> set allow-update = yes
admin> set allow-system = yes
admin> set allow-termserv = yes
admin> set allow-diagnostic = yes
admin> set allow-password = yes
admin> set allow-code = yes
admin> set user-group = maintenance
admin> write -f

admin> new user-group maintenance
admin> set use-group-permissions = yes
admin> set exclude-listed-commands = yes
admin> set command 1 = reset
admin> set command 2 = slot
admin> set command 3 = read
admin> write -f
```

When you change the user-group settings, the permissions of the associated users are automatically adjusted. If a user-group profile is deleted, the sessions of all the associated users are terminated.

Restricting access to profiles

You can maintain a list of system profiles that are critical to system security, for which access is denied. You define the restricted profiles in the array called profile in the user-group profile. Users that belong to this user group cannot perform read, write, get, new, delete, or save commands on restricted profiles. If a user attempts to access a restricted profile, the system displays an access denial message.

In the following sample user-group profile called remote, users that belong to this user group cannot perform read, write, get, new, delete, or save commands on the user, ip-interface, and user-group profiles.

```
[in USER-GROUP/remote (changed)]
name* = remote
use-group-permissions = no
allow-termserv = yes
allow-system = yes
allow-diagnostic = yes
allow-update = yes
allow-password = no
allow-code = no
allow-debug = no
exclude-listed-commands = no
command = [ "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "" "+
profile = [ user ip-int user-group "" "" "" "" "" "" "" "" "" "" "" "" "" ""
```

Verifying user group settings

The system does not prohibit you from entering a command user group or a user that does not exist, nor from entering an invalid list of commands. Use the usergroupcheck command to verify that your specifications are valid. For syntax information, see the *Stinger Reference*.

To verify that all the user-group profiles specify valid lists of commands and that all user-group profiles specified by user profiles are valid, use the usergroupcheck command with the -a option. For example:

```
admin> usergroupcheck -a
All groups and users verified
```

To verify that the user-group profile specified in the user profile enter the usergroupcheck command with the -u option. For example:

```
admin> usergroupcheck -u bill
Group provisioning: Commands all valid.
Commands available to this user are:
     ?                              ( user )
     auth                           ( user )
     clear                          ( user )
     date                           ( user )
     delete                         ( update )
     dtunnel                        ( user )
     filtcache                      ( user )
     get                            ( system )
     gre                            ( user )
     grep                           ( user )
     help                           ( user )
     l2tp                           ( user )
     l2tpcards                      ( user )
     l2tpsessions                   ( user )
     l2tptunnels                    ( user )
```

```
list                            ( system )
netware                         ( user )
new                             ( system )
prtcache                        ( user )
quit                            ( user )
whoami                          ( user )
write                           ( update )
```

To verify the `user-group` profile specified by the `user-group` parameter in the `user` profile called *`user`*, and display the commands to which *`user`* has access, use the `-g` *`group`* option. For example, the following example verifies that the `newyork` command user group contains a valid list of commands:

```
admin> usergroupcheck -g newyork
Group provisioning commands all valid
```

Extra levels of security for some commands

Certain command options have extra levels of security restricting access beyond that of standard commands, and these security levels cannot be bypassed by means of the `user-group` profile. For example, the standard `arptable` command displays the contents of the ARP cache, and is protected by the `system` level in both the `user` and `user-group` profiles. In addition, the option to add entries to the table is protected by the `diagnostic` or `update` level. As a result, allowing a command user group access to the `arptable` command by designating it with the `command` parameter does not allow members of the group to add entries to the ARP cache, unless the group or any of its users is granted access to system, diagnostic, and update commands.

Following are other commands and options that have additional levels of security:

- `arptable -a`—Protected by update or diagnostic permission.
- `arptable -d`—Protected by update or diagnostic permission.
- `arptable -f`—Protected by update or diagnostic permission.
- `loadmate`—Protected by debug and code permissions.
- `filtcache -f`—Protected by update or diagnostic permission.
- `prtcache -f`—Protected by update or diagnostic permission.
- `resrcmgr -t`—Protected by diagnostic permission.

When used to restore configurations, the `load` command also requires the use of the `new`, `set`, and `write` commands, because the device runs these commands in the process of loading the configuration.

Specifying a time-out for user logins

You can specify a time-out period after which idle sessions on the Stinger unit disconnect. The default is 60 seconds. To configure an idle time-out, proceed as in the following example:

```
admin> read user test
admin> set idle-logout = 120
admin> write
```

Setting the command-line prompt

The command-line prompt is configured with the `prompt` parameter. The following sample commands show how to configure a command-line prompt of `hello`:

admin> **read user test**

admin> **set prompt = hello**

admin> **write**

The default command-line prompt is an asterisk followed by a right angle bracket (*>). An asterisk in this setting causes the Stinger system to substitute the value of the profile's `name` parameter after a successful login. For example, for the `admin` profile, the following prompt appears:

admin>

Setting log levels for each login

You can configure the `user` profile to display one or more levels of log messages immediately in the interface. The display level you set causes messages at that level and above to be displayed in the interface, interrupting whatever work might be going on at the prompt. For example, the following commands cause messages at the critical, alert, and emergency levels to be displayed:

admin> **read user test**

admin> **set log-display-level = critical**

admin> **write**

Table 1-5 lists the message levels in order from highest to lowest severity.

Table 1-5. Message levels

Message level	Indicates
`emergency`	Error condition in the Stinger unit. The unit is probably not operating normally.
`alert`	Error condition in the unit. However, the unit is still operating normally.
`critical`	Inoperative interface or a security error.
`error`	Error event.
`warning`	Unusual event (a user entering an incorrect password, for example). However, the unit is otherwise operating normally.
`notice`	Event of interest in normal operation (for example, the establishment of a link).
`info`	State or status change that is not of general interest.
`debug`	Helpful debug information.
`none`	No messages are displayed.

Logging in as a different user

To log in with a different user profile, use the auth command, as in the following example:

```
admin> auth test
Password:@3wPZHd2
```

You must supply the password configured in the specified profile to be logged in as the user. Logging in as a different user can be helpful for verifying that the user profile permissions are correct.

Displaying the current user

To display the user profile that you are currently using, enter the whoami or who am i command. For example:

```
admin> whoami
User Name : admin User Profile : admin
```

Basic system settings

The following sections describe how to set the system name, time, date and system clock source.

Setting the system name

The Stinger system name is used only during Point-to-Point Protocol (PPP) negotiations. The name is not used in Domain Name System (DNS) lookups.

The system name is specified in the system profile. For example, to set the Stinger unit's system name to Stinger01, proceed as follows:

```
admin> read system
admin> set name = Stinger01
admin> write
```

Setting the system time and date

The Stinger unit maintains the time and date. For proper operation, set the time and date at initial configuration using the timedate profile.

Viewing the system time and date

To view the current time and date, enter the date command with no argument. For example:

```
admin> date
Tue Nov  6 14:52:25 2001
```

You can also access the timedate profile to view the information:

```
admin> get timedate
[in TIMEDATE]
time = { 14 53 10 }
date = { Tuesday November 2001 6 }
```

Changing the system time

If the time is incorrect, you can change it by entering the current time in the timedate profile. The following example shows how to change the system time to 12:30:08 a.m.:

```
admin> read timedate
admin> set time = { 12 30 08 }
admin> write
```

Changing the system date

If the date is incorrect, you can change it by entering the current time in the timedate profile. Because the date subprofile includes a read-only field (day of week), you must set the date parameters independently. The following example shows how to change the system date to January 6, 2002.

```
admin> read timedate
admin> set date month = 01
admin> set date day = 06
admin> set date year = 2002
admin> write
```

Configuring system clocking

The Stinger unit requires a clock source for its timing subsystem. By default, the system uses the a built-in 8kHz clock on the single or primary control module as its timing source. The system-8k-clock parameter in the system profile specifies the clock source for the Stinger system. You can configure the system to take its clock source from a line interface module (LIM), trunk port, or from an external building integrated timing supply (BITS) clock connected to the unit's alarm relay. By default, the system-8k-clock parameter is set to controller.

Displaying the current clock-source

You can view the current clock source by using the get command to display the setting for the system-8k-clock parameter. For example:

```
admin> get system system-8k-clock
[in SYSTEM:system-8k-clock]
system-8k-clock = controller
```

The clock-source command also displays the current clock-source along with available clock sources.

```
admin> clock-source
Master: slot-1/1 line 3
Source List:
    Source: slot-1/1 Available      priority: 1
```

A line specified as the clock source can be used as the source of timing information for synchronous connections, so both the sending device and the receiving device can determine where one block of data ends and the next begins. If multiple lines specify that they are the clock-source (the default configuration), you can assign clock-source priority among multiple lines.

The following commands cause the system to first attempt to use a trunk port as its clock source, and to use the built-in clock only if it finds no ports that are eligible clock sources:

```
admin> read system
admin> set system-8k-clock = lim-or-trunk-module
admin> write
```

Configuring trunk ports as clock sources

You can specify whether a trunk port can be used to source the ATM network clock and feed it to the primary control module as the master clock for the unit. To specify whether a trunk port as eligible or ineligible for this use, set the `clock-source` parameter in the trunk profile for that port (`ds3-atm`, `oc3-atm`, or `e3-atm` profile). You can assign a high, middle, or low priority for being elected as the clock source by setting the `clock-priority` parameter in the trunk profile for that port.

If more than one line is eligible to be the clock source, the system chooses the one with the highest priority, as specified by the `clock-priority` setting. If multiple sources of equal priority are present, the system selects the first valid clock source. (A clock source is valid if the `clock-source` parameter is set to `eligible` and the OC12, DS3, OC3, or E3 interface is synchronized.)

Once it has selected a clock source, the system uses that source until the source becomes unavailable or a higher-priority source becomes available. If no eligible external sources exist, the system uses an internal clock generated by the primary control module.

The following sample commands configure both ports of the first DS3-ATM module as eligible clock sources, with the first port assigned a higher priority for this use:

```
admin> read ds3-atm { 1 trunk-module-1 1 }
admin> set line-config clock-source = eligible
admin> set line-config clock-priority = high
admin> write

admin> read ds3-atm { 1 trunk-module-1 2 }
admin> set line-config clock-source = eligible
admin> set line-config clock-priority = low
admin> write
```

The following commands configure only the first port of the second OC3-ATM trunk module as an eligible clock source. If this port becomes unavailable and is not backed up, the unit begins using the built-in clock on the primary control module.

```
admin> read oc3-atm { 1 trunk-module-1 1 }
admin> set line-config clock-source = eligible
admin> set line-config clock-priority = high
admin> write
```

The *Getting Started Guide* for your unit provides additional information about configuring the system clock source.

Displaying basic system information

The following sections describe how to display hardware platform, system name, serial number, software version, boot firmware version, control module role, control module revision and model number, system and module uptime.

For information about see displaying system components, see “Working with Stinger Shelves and Modules” on page 2-1

Displaying system hardware information and software version

The system-level command `info` displays information about the Stinger system, including hardware platform, system name, serial number, software version, boot firmware version, installed memory and control module role.

During system reboot, if you are connected to the control module console port, the system displays the platform type and the TAOS version running on the system.

```
admin> info
Platform         : Lucent Stinger CRT COP
System Name      : (not configured)
Serial Number    : 58737
Software Version : TAOS 9.6.0 (crtcm)
                   * * * rtr/crtcm <ss120> June 06 2004 18:16 * * *
Boot Version     : TAOS 9.7.0
Installed Memory : 64MB
Hardware revision: 1.0
```

The fields displayed by the `info` command are defined as follows:

Field	Definition
`Platform`	Hardware platform type. This field reports one of the following values: ■ Lucent Stinger MRT - 23" ■ Lucent Stinger MRT - 19" ■ Lucent Stinger LS/RT - 23" ■ Lucent Stinger LS/RT - 19" ■ Lucent Stinger FS ■ Lucent Stinger FS+ ■ Lucent Stinger CRT COP On a redundant system, if you enter the info command from the secondary control module, this field shows `Lucent Stinger`.
`System name`	Name of the system as configured in the `system` profile. If the `system` profile has not been configured, the command displays `(not configured)`.
`Serial number`	Serial number of the control module on which you entered the command.
`Software version`	Current version of TAOS.
`Boot version`	Version of boot loader on the system.

Field	Definition
Controller role	Current role of the control module, either primary or secondary.
Installed Memory	Installed memory on the system.
Hardware revision	Revision number of the control module on which you entered the command.

System and module uptime

The uptime command reports how long the system and its individual modules have been operating. Without an argument, the command displays system uptime. For example:

```
admin> uptime
12:53:37
{ shelf-1 first-control-module } cm-v2   0 days 18:58:57 (PRIMARY)
```

If you specify a slot and shelf number, the uptime command displays the current time; identifies the module installed in the slot, and the length of time that the module installed in the slot has been operating. The following example shows that an SDSL LIM in slot 3 has been operating for 48 minutes and 38 seconds:

```
admin> uptime 1 3
16:15:06
{ shelf-1 slot-3 }     sdsl-atm-card    0 days 00:48:38 9.6.0
```

If you use the -a option, the command displays the uptime only for modules in the UP state. For example:

```
admin> uptime -a
Current system time: 16:49:30
{ shelf-1 slot-5 }     ima-8-e1-card    9 days 06:17:16     9.6.0
{ shelf-1 first-control-module } cm-v2    9 days 06:18:37 ( PRIMARY )
{ shelf-1 slot-12 } glite-atm-48-card    9 days 06:16:54     9.6.0
{ shelf-1 slot-15 }  sdsl-atm-v2-card    9 days 06:17:00     9.6.0
{ shelf-1 slot-16 }     ima-8-t1-card    9 days 06:17:16     9.6.0
```

Using the status window

You can use a status window to display the continuous stream of statistics that the Stinger unit generates about its activities. For example, one status window displays up to 100 of the most recent system events that have occurred since the Stinger unit was started up, and another displays statistics about the currently active session. A VT100 window that can accommodate an image of at least 80 columns by 24 rows is required for displaying the status screens.

Displaying the status window

You can open the status window using the status, connection, line, view, or log command. For details about using these commands, see the *Stinger Reference*.

To open the system status window, enter the status command. Figure 1-1 shows the sample contents for each area of the status window.

Figure 1-1. Sample contents of a status window

Left: Connections *Top: General*

```
12 Connections                   ScootersStngr Status
0008 c9   ATM 04/09/ 0 7616K      Serial number: 123456 Version: 9.5.206
0007 c7   ATM 04/07/ 0 7616K
0006 c11  ATM 04/11/ 0 7616K      Rx Pkt:    998004
0005 c10  ATM 04/10/ 0 7616K      Tx Pkt:    266585
0004 c8   ATM 04/08/ 0 7616K         Col:        34
0003 c6   ATM 04/06/ 0 7616K
0002 c5   ATM 04/05/ 0 7616K     07/03/2003 12:47:16 Up:42days, 15:15:36
0001 c4   ATM 04/04/ 0 7616K
                                 M: 242 L: notice Src: shelf-1/slot-6
                                 Line 48 00S

                                         Issued: 09:37:03, 07/23/2003
```

Bottom: Log

The system prompt moves to just below the status window. If the system prompt is not visible below the status window, press Escape to display it.

To close the status window, enter the `status` command again:

admin> **status**

Understanding the status window

Figure 1-1 shows the main areas of the status window. In its default configuration, these areas contain the following information:

- Left—Connection information is displayed on the left side of the window.
- Top—General information, such as serial number, software version, and uptime are displayed in the upper right side of the window.
- Bottom—Log information is displayed in the lower right side of the window.

Connection status information

With the default settings in a `user` profile, the left area of the status window initially displays connection information, as shown in Figure 1-1. Each line represents an active connection; its username or station name; the type of connection (`A` for ATM, `P` for PPP, or `M` for MPP); the shelf ID, line, and channel (separated by slashes) on which the call was placed or received; and the bandwidth or baud rate of the connection.

If the status window is not already visible, the `connection` command opens it with the connection-status information displayed:

```
admin> connection
2 Connections                  | Status
0003 test1 A 02/01/01/ 0 8000  | Serial number: 11XYZ90A7 Version: 9.7
0002 test2 A 01/17/01/ 1 155M  |
                               |  Rx Pkt:     184381
                               |  Tx Pkt:        735
                               |     Col:          5
                               |
                               |08/08/2003 08:03:33  Up: 0 days, 12:36:12
                               |________________________________________
                               |  1/ 17/  1/  0/  555  Rx:0          Tx:0
                               |  1/ 17/  1/  0/  777  Rx:0          Tx:0
                               |
                               |
===========================================================================
```

This command puts the window in connection-status mode, with the following message displayed below the status window:

```
[Next/Last Conn: <dn/up arw>, Next/Last Page: <pg dn/up>, Exit: <esc>]
```

This message indicates the keystroke sequences you can use for displaying additional information in the connection-status area. The Down Arrow and Up Arrow keys display the next and previous connections, respectively, in the list of active connections. The Page Down and Page Up keys display the list, one screen at a time.

When the `connection-status-mode` message is displayed, the system prompt does not appear at the bottom of the window. Press the Escape key to exit this mode and return to the system prompt.

General status information

With the default settings in a `user` profile, the top area of the status window initially displays general status information about the Stinger unit, including its serial number, the version of system software that the unit is running, and the number of packets transmitted and received. This area also shows the current system date and time and how long the system has been operational.

If the top of the status window is displaying another kind of information, you can redisplay the general status information with the `view` command:

```
admin> view top general
```

Line and channel status

To display information about WAN lines and channels, use the `line` command. Because space is limited for this graphical display of status information about lines and channels, the line-status window uses identifiers and codes. For example, the line’s link status uses a two-character code such as LA (link active), RA (Red Alarm), YA (Yellow Alarm), and so forth. For complete information on line-status codes, see the *Stinger Reference*.

If the status window is not already displayed, the following `line` command opens it with line-status information displayed in the bottom (lower right) of the window:

```
admin> line
```

Or, you can use the following command to specify that the line-status information appears in the top of the window, replacing the general status information:

```
admin> line top
```

You can display information about all lines installed in the system if you wish, but the default is to show information only about enabled lines. To display the status of all lines, enter the following command:

```
admin> line all
```

When you enter the `line` command, the system puts the window in line-status mode and displays the following message, which indicates the key sequences for displaying additional information in the line-status area:

```
[Next/Last Line: <dn/up arw>, Next/Last Page: <pg dn/up>, Exit: <esc>]
```

The Down Arrow and Up Arrow keys display the next and previous lines, respectively, in the list. The Page Down and Page Up keys display the list a screen at a time.

Line status information includes the following identifiers and codes:

- Line identifier in the format *shelf slot line*
- Two-character code indicating the line's link status
- Single-character code indicating channel status
- Single-character code indicating channel type

For additional information about identifiers and codes, see the *Stinger Reference*.

When the line-status-mode message is displayed, the system prompt does not appear at the bottom of the window. Press the Escape key to exit this mode and return to the system prompt.

Log message information

With the default settings in a `user` profile, the bottom area of the status window initially displays the most recent message from the Stinger log buffer. The number of system event messages stored in the log is set by the `save-number` parameter in the `log` profile.

The first line of the event log window shows the log entry number (M: 00 through M: *N*, where *N* is set in the `save-number` parameter of the `log` profile), the level of message, and the device on which the event occurred. The last line shows the date and time when the event occurred.

The middle of the window displays the text of the most recent message.

If the status window is not already displayed or if you want to scroll through the log, use the `log` command:

```
admin> log
```

If the Status window is not displayed, the `log` command opens it and displays the log-mode message below the Status window. (If the Status window is already open, the `log` command just displays the message.)

```
[Next/Last Conn:<dn/up arw>, Next/Last Page:<pg dn/up>,Exit: <esc>]
```

This message indicates the key sequences you can use for displaying additional information in the Log area:

- The Down Arrow and Up Arrow keys display the next and previous messages in the buffer, respectively.
- The Page Up and Page Down keys display the first and last messages in the buffer, respectively.

When the log-mode message is displayed, the system prompt does not appear at the bottom of the window. Press the Escape key to exit this mode and return to the system prompt.

Customizing the status window display

You use the `user` profile to specify whether these statistics are always displayed when a user logs in using that profile, the areas of the window that are displayed by default, and the size of the status windows.

The following parameters in a `user` profile, shown with their default values, specify the contents of the status window:

```
left-status = connection-list
top-status = general-info
bottom-status = log-window
```

The following parameters in a `user` profile, shown with their default values, specify the size of the status window. The `status-length` parameter must be at least 6 lines smaller than `screen-length`.

```
screen-length = 24
status-length = 18
```

See the *Stinger Reference* for details about these parameters.

The following commands configure the `user` profile to display the status window after login, and to show line information in the bottom area of the window. This set of commands also configures a larger terminal emulator window and status screens.

```
admin> set default-status = yes
admin> set bottom-status = line-status
admin> set screen-length = 36
admin> set status-length = 30
```

Changing current status window sizes

The `screen` command enables you to change the size of the terminal emulator and status windows for the current session. For syntax information, see the *Stinger Reference*.

The following example changes the current display size to 55 lines long and 100 characters wide:

```
admin> screen 55 -w 100
```

If the Status window is open when you enter the `screen` command, the command resizes it dynamically. If it is not open, the Status window is resized when you next open it.

Viewing the factory configuration and software licenses

The read-only base profile displays software version, enabled features (software licenses), network interfaces, and other system information that is not modified across resets. These values are read from the system ROM, security program array logic (PAL), and the hardware assembly itself. For information about the parameters in the base profile, see the *Stinger Reference*.

To view the base profile, use the get command. For example:

```
admin> get base
[in BASE]
shelf-number = 1
software-version = 9
software-revision = 7
software-level = ""
...
...
...
```

Managing administrative connections

You can use the userstat, view left session, or who command to display connection information for users.

Displaying administrative session information with the userstat command

To display the most complete information about active sessions, use userstat with the -l option, as in the following example:

```
admin> userstat -l
SessionID  Line/Chan   Slot:Item   Tx/Rx Rate  Svc Address   Username
ConnTime   IdleTime   Dialed#
383578461  1.17.02/002 1:17:02/002  155M/ 155M ATM 0.0.0.0
sig-17-2-0-5
32:21:18   unknown
383578460  1.17.03/002 1:17:03/002   44M/  44M ATM 0.0.0.0
rcc-17-3-0-18
32:21:18   unknown
383578459  1.17.03/001 1:17:03/001   44M/  44M ATM 0.0.0.0
sig-17-3-0-5
32:21:19   unknown
383578458  1.17.02/001 1:17:02/001  155M/ 155M ATM 0.0.0.0
rcc-17-2-0-18
32:21:27   unknown
<end user list>  4 active user(s)
```

Following are the userstat output fields with descriptions:

Field	Description
Sessionid	Unique ID assigned to the session.

Field	Description
Line/Chan	Physical address (*shelf.slot.line/channel*) of the network port on which the connection was established.
Slot:Item	*Shelf:slot:item/logical-item* of the host port to which the call was routed.
Tx/Rx Rate	Transmit and receive rate.
Svc	Type of service in use for the session. Following are the possible values: ■ --- The service is being negotiated. ■ TLN Telnet ■ BTN Binary Telnet ■ ATM Asynchronous Transfer Mode
Address	IP address of the user.
Username	Name of the user.
ConnTime	The amount of time (in hours:minutes:seconds format) since the session was established. This field appears only with the -l option.
IdleTime	The amount of time (in *hours:minutes:seconds* format) since data was last transmitted across the connection. This field appears only with the -l option.
Dialed#	The number dialed to initiate this session.

Customizing the output of the `userstat` command

The -O option with one or more format specifiers can limit the commands's output to those fields of interest. For example, if you use the -O option and indicate the codes for session ID and line or channel information, the command shows only the following details:

admin> **userstat -o %i %l**

```
SessionID  Line/Chan
288532030  1.01.01/012
<end user list>  1 active user(s)
```

For definitions of the available specifiers, see the *Stinger Reference*.

Displaying information related to a known IP address

Use the `userstat -a` command to display information related to a known IP address. The `userstat -a` command requires an IP address argument on the command line. For example:

admin> **userstat -a 1.1.1.238**

```
SessionID  Line/Chan   Slot:Item   Tx/Rx Rate  Svc Address    Username
288532030  1.01.01/012  1:03:01/002 56000/56000  PPP 1.1.1.238  net1
<end user list>  1 active user(s)
```

To display only the relevant username, include the -o option as follows:

```
admin> userstat -a 1.1.1.238 -o %u
Username
net1
<end user list>  1 active user(s)
```

Displaying information related to a known username

Use the userstat -u command to display information related to a known username. You must enter a username argument on the command line. For example:

```
admin> userstat -u net1
SessionID  Line/Chan   Slot:Item   Tx/Rx Rate  Svc Address    Username
288532030  1.01.01/012  1:03:01/002 56000/56000  PPP 1.1.1.238  net1
<end user list>  1 active user(s)
```

To display only the user's IP address, include the -o option as follows:

```
admin> userstat -u net1 -o %a
Address
1.1.1.238
<end user list>  1 active user(s)
```

Using the view left session command

To display information about administrative users, including user name and source IP address, use the view left session command. For example:

```
admin> view left session
Sessions                     x Status
admin      console           x Serial number: 11038184 Version: 9.6.0
admin      192.11.156.32     x
admin      192.11.156.149    x  Rx Pkt:     230059
admin      192.11.157.123    x  Tx Pkt:       1186
                             x     Col:          3
                             x
                             x01/10/2004  16:33:21   Up:    9 days, 06:22:31
                             xqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
                             xM: 181  L: notice  Src: shelf-1/slot-3
                             x
                             x Line 48 up
                             x
                             x
                             x
                             x
                             x                  Issued: 10:14:29, 01/01/2004
qqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
```

The Sessions section shows the user name and source IP address of administrative users from Telnet sessions. An asterisk (*) denotes the current session.

Displaying administrative users

The who command displays names of administrative users, user profiles, and IP addresses of administrative users from Telnet sessions. An asterisk (*) denotes the current session. For example:

```
admin> who
  user                    profile                 from
                          super                   console
* admin                   admin                   135.254.196.37
  pratul                  admin                   135.254.196.37
```

Terminating a user connection

To terminate a user connection, use the userstat -k command. For example:

```
admin> userstat
SessionID Line/Chan  Slot:Item   Rate  Svc Address        Username
332429649 1.13.01/000 1:13:01/000 3360/3360 ATM 1.1.1.1 11-0-13
<end user list>  1 active user(s)
```

```
admin> userstat -k 332429649
Session 246986325 cleared
```

The userstat command can terminate Telnet, Telnet binary, Raw TCP, or terminal server user sessions.

You can also terminate an administrative session using the who -k command. The who -k command requires System privileges. For example, the following command disconnects the user pratul logged in from IP address 135.254.96.37:

```
admin> who -k pratul 135.254.196.37
LOG critical, Shelf 1, Controller-1, Time: 05:24:17--user
admin from 135.254.196.37 disconnected user pratul from 135.254.196.37
1 administrative user killed.
```

The who -k command disconnects all sessions with the user name pratul logged in from IP address 135.254.96.7.

You cannot use the who -k command to disconnect the current session or a session from the console if for its serial port the user-profile parameter in the serial profile is set to a value other than null.

Disconnecting an idle connection

You can configure a Stinger unit to disconnect a modem connection after a specified period of inactivity. To configure a timeout value, set the inactivity-time parameter in the modem profile with a value from 0 through 255 seconds. With the default setting of 0, the timer is disabled and an inactive modem connection is not disconnected after any period of inactivity.

The following sample commands configure the Stinger unit to disconnect a modem connection after it has been inactive for 120 seconds.

```
admin> read modem { shelf-1 first-control-module 3 }
admin> set inactivity-time = 120
admin> write -f
```

Resetting a Stinger system

When you reset the Stinger system, it restarts and terminates all active connections. All users are logged out, and the default security level is reactivated. In addition, a system reset can cause a WAN line to temporarily shut down due to momentary loss of signaling or framing information. After a reset, the system runs power-on self tests (POSTs).

When you enter the `reset` command without any arguments, the system resets each control module. In hosted systems, this command resets each controller on the remote shelves. To reset the Stinger with confirmation, proceed as follows:

```
admin> reset
Reboot the entire system, dropping all connections? [y/n]
```

In a redundant system, to reset the secondary control module only with no confirmation. For example:

```
admin> reset -f -r secondary_controller
Please standby. System reset in progress.
```

On a hosted system, to reset only the master controller (the controller in the host system), use the `-m` option. For example:

```
HOST> reset –m
```

To reset a specific remote shelf, use the `-s` option and specify the shelf's ID. For example, the following command resets shelf 3:

```
HOST> reset –s 3
```

In an open session to a remote shelf, the `-m` and `-s` options are not supported. Executing a reset on a remote shelf resets only that shelf.

For additional command options, see the *Stinger Reference*.

Working with Stinger Shelves and Modules

2

For information about how to configure a particular module, see the module guide for your device at `http://www.lucentdocs.com/support`. For information about managing the Stinger system, see Chapter 1, "Administering a Stinger System."

Understanding physical addressing on Stinger units

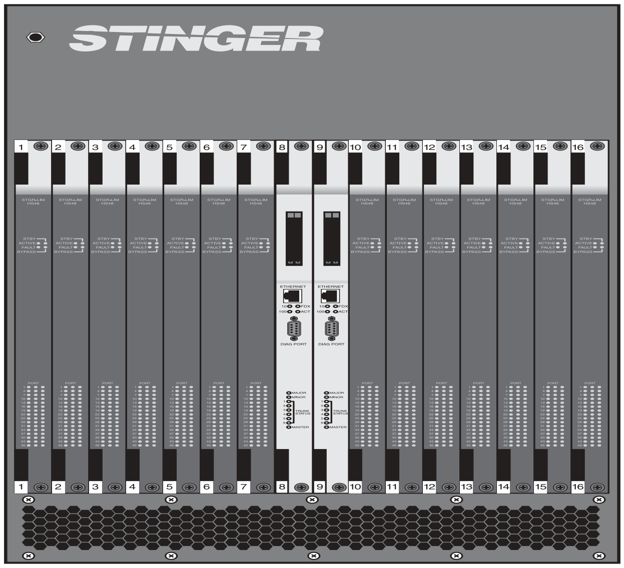
On modular Stinger units, the True Access™ Operating System (TAOS) software uses the physical address to provide configuration and administration access to a shelf or module's functions. Because TAOS associates module functions with the same slot numbers on all Stinger units, the functions are grouped into *virtual* slots on the Stinger MRT chassis. In this document, *Stinger MRT* refers to the 19" and 23" versions of the Stinger MRT and Stinger MRT-2 units.

The chassis of Stinger FS, Stinger FS+, Stinger LS, Stinger RT, or Compact Remote units have slots that accept plug-in modules with different functions. The smaller Stinger MRT units integrate the functions of the control module, line interface modules (LIMs), and line protection modules (LPMs) into the chassis, and have a single trunk module slot. Each module has a physical address composed of its shelf number, slot number, and item number in the format `{ shelf-`*`N`*` slot-`*`N`*` item-`*`N`*` }`.

On hosted Stinger MRT systems, the value of `shelf` is defined by the SHELF ID switch on that shelf. On hosted Compact Remote systems, the value for `shelf` is assigned.

Figure 2-1 shows the modules on the front panel of a Stinger FS or Stinger FS+ unit. The slots are numbered from left to right, with the middle slots reserved for the control modules. On a Stinger LS or Stinger RT unit, which has fewer slots, the control modules are on the right.

Figure 2-1. Front panel of a Stinger FS unit



Note On a Stinger MRT, because control module and LIM functions are incorporated into the unit's chassis, the terms *control module* and *LIM* in this guide refer to the control module and LIM functions on the Stinger MRT, and not to physical modules.

Table 2-1 shows how TAOS relates slot numbers to modules and module functions on all Stinger units, for configuration and administration. (LPMs are not configured.)

Table 2-1. How TAOS organizes Stinger module functions

	Stinger component		
Stinger platform	**LIM**	**Control module(s)**	**Trunk module (s)**
Stinger FS, Stinger FS+, Stinger LS, and Stinger RT units	■ Slots 1 through 7 ■ Slots 10 through 16 (Stinger FS and Stinger FS+ only)	Slots 8 and 9	Slots 17 and 18
Stinger MRT units	Virtual slot 1	Virtual slot 8	■ Virtual slot 17 (built-in STS-3 interface) ■ Virtual slot 18 (trunk module)
Stinger MS+ units	Slots 1 through 4	Virtual slot 8	Virtual slot 17

Table 2-1. How TAOS organizes Stinger module functions

	Stinger component		
Stinger platform	LIM	Control module(s)	Trunk module (s)
Stinger Compact Remote (standalone)	Slots 1 through 3	Virtual slot 8	Virtual slot 17

Viewing system components

You can use the `show` command and `slot-info` profile to display information about the modules installed or configured in Stinger systems and the status of each module.

Using the show command

The `show` command lists the address of all modules installed in a Stinger system including those installed in remote shelves, their required operating states and current operating states, and the type of module installed.

Following is a sample output from a standalone Stinger FS, Stinger FS+, Stinger LS, or Stinger RT,

```
admin> show
Controller { first-control-module } ( PRIMARY ):
                             Reqd  Oper   Slot Type
{ shelf-1 slot-2 0 }         UP    NONE   stngr-48a-adsl-card
{ shelf-1 slot-3 0 }         UP    UP     al-dmtadsl-atm-card
{ shelf-1 slot-5 0 }         UP    NONE   dadsl-atm-24-card
{ shelf-1 slot-6 0 }         UP    NONE   dadsl-atm-24-card
{ shelf-1 slot-7 0 }         DOWN  RESET  glite-atm-48-card
{ shelf-1 slot-11 0 }        UP    NONE   stngr-48a-adsl-card
{ shelf-1 slot-14 0 }        DOWN  RESET  stngr-48b-adsl-card
{ shelf-1 trunk-module-1 0 } UP    UP     ds3-atm-trunk-daughter-card
```

On an ADSL 36-port Stinger MRT, the `show` command displays the following output:

```
admin> show
Shelf 1 ( standalone ):
                               Reqd  Oper  Slot Type
  { second-control-module }    UP    UP    ( SECONDARY )
  { shelf-1 slot-1 0 }         UP    UP    mrt-36-adsl-card
  { shelf-1 trunk-module-1 0 } UP    UP    oc3-atm-trunk-daughter-card
  { shelf-1 trunk-module-2 0 } UP   UP     oc3-atm-trunk-daughter-card
```

On a unit with dual control modules, the `show` command identifies which control module is primary. The command also lists the addresses of each slot with an installed module.

On a hosted system, the `show` command displays information about all shelves with an active control link to the host. For example, on a hosted Stinger MRT system, the following command output shows that in addition to the host shelf (shelf ID 1), shelves 3, 4, 5, and 6 have an active link to the host. For more information about physical addressing on Stinger systems, see "Understanding physical addressing on Stinger units" on page 2-1.

```
HOST> show
Shelf 1 ( master ):
                                 Reqd  Oper   Slot Type
    { shelf-1 slot-1 0 }         UP    UP     mrt-36-adsl-card
    { shelf-1 trunk-module-1 0 } UP    UP     oc3-atm-trunk-daughter-card
    { shelf-1 trunk-module-2 0 } UP    UP     ds3-atm-trunk-daughter-card
    { shelf-3 slot-1 0 }         UP    UP     mrt-36-adsl-card
    { shelf-3 first-control-mod+ UP    UP     mrt-cm
    { shelf-4 slot-1 0 }         UP    UP     mrt-36-shdsl-card
    { shelf-4 first-control-mod+ UP    UP     mrt-cm
    { shelf-5 slot-1 0 }         UP    UP     mrt-36-adsl-card
    { shelf-5 first-control-mod+ UP    UP     mrt-cm
    { shelf-6 slot-1 0 }         UP    UP     mrt-36-adsl-card
    { shelf-6 first-control-mod+ UP    UP     mrt-cm
```

Note All configuration profiles reside on and are accessible only on the host system.

Field description from the output of the show command

Table 2-2 describes the values displayed for the Reqd, Oper, and Slot-Type fields.

Table 2-2. Description of Reqd, Oper, and Slot Type fields

Field	Indicates
Reqd	Required operational state of the module, which can be up, down, or maint. This field reports the setting of the reqd-state parameter in the slot-state profile. See "Using slot-admin profiles" on page 2-15.
Oper	Current operational state of the slot, which can be one of the following values: ■ UP—Normal operational mode. ■ DOWN—Not in an operational mode. ■ POST—Module is running power-on self tests (POSTs). ■ BOOT—Control module has recognized the module and has begun to run the code in its boot ROM. Typically, the LOAD state quickly follows the BOOT state. ■ LOAD—Module is loading code as part of booting up. ■ RESET—Module is resetting. ■ NONE—Module has been removed, but its configuration remains in NVRAM. ■ DIAG—The slot is being controlled by a remote debugger or is trying to perform a core dump as the result of a fatal error.

Table 2-2. Description of Reqd, Oper, and Slot Type fields (Continued)

Field	Indicates
`Slot Type`	Type of device installed in a slot, or the function defined by a virtual slot. For a list of all the devices, see the definition of the `slot-type` parameter in the *Stinger Reference*.

The system considers a module to be present if a `slot-type` profile exists for that type of module. If you remove a module, the system does not delete the `slot-type` profile for that module until you use the `slot -r` command or clear NVRAM. For more information, see "Removing a module and its configuration" on page 2-17.

Displaying the status of LPMs, PSMs, and CLT modules

The `rearslotshow` command shows the status of all slots used for LPMs, path selector modules (PSMs), and copper loop test (CLT) modules. It also reports on the status of the midplane sparing bus. For details, see "Verifying port redundancy status" on page 4-18.

Monitoring the status of remote shelves

The `remote-shelf-stat` profile resides on the host for monitoring remote shelves. The `remoteshelf` command displays information about enabled remote shelves in the hosted system.

You can set alarms and traps to notify an SNMP management station when certain conditions occur on a remote shelf. See "Enabling traps for events on remote shelves" on page 8-29 for more information.

Using the `remote-shelf-stat` profile

When the host detects an enabled remote shelf, the system creates a `remote-shelf-stat` profile for the shelf. For example:

```
HOST> dir remote-shelf-stat
     0 08/27/2003 16:11:22 shelf-2
     0 08/27/2003 16:17:39 shelf-3
     0 08/27/2003 16:13:33 shelf-4
```

The `remote-shelf-stat` profile is read-only, and maintains dynamic state information regarding the remote shelf. It is accessible by SNMP managers.

The contents of the `remote-shelf-stat` profile are listed in the following table. The differences in the fields of the `remote-shelf-stat` profile for a hosted Compact Remote system and a hosted MRT system are noted where applicable.

Parameter	Setting
`remote-shelf-id`	Shelf ID of the remote shelf represented in this profile.

Parameter	Setting
remote-shelf-oper-state	Operational state of the remote shelf. Values can indicate that the remote shelf is up or down, if the link between the host and remote shelf failed to come up, or that the host-to-shelf autodiscovery process is currently in progress or has established the link to the operational remote shelf.
internal-fan-unit-failed	An alarm was received from the remote shelf fan to indicate a failure of the internal fan unit (yes or no). *Not meaningful for* Stinger *MRT units.*
external-fan-unit-failed	An alarm was received from the remote shelf fan to indicate a failure of the external fan unit (yes or no). *Not meaningful for Stinger MRT units.*
door-open	An alarm was received from the remote shelf fan to indicate that the door is open (yes or no). *Not meaningful for Stinger MRT units.*
over-temperature	Whether the cabinet temperature exceeds the threshold (yes or no).
contact-closure[*n*]	An array of indexed parameters that indicate the contact closure state (yes if contact closure is detected) on the corresponding remote shelf. *Only the first two contact closure values are meaningful for Stinger MRT units.*
host-port:physical-address	Physical address of the remote shelf. The address specifies a shelf ID, followed by a slot number, followed by the item number of an addressable entity within the context of shelf and slot. *Not meaningful for Stinger CR units.*
host-port:logical-item	Number that specifies an addressable logical entity within the context of a physical address. *Not meaningful for Stinger CR units.*
topology:port-towards-host-shelf	Port on the remote shelf used for the link to the host. *Not meaningful for Stinger CR units.*
topology:port-1-shelf	Shelf ID of the remote shelf directly connected to the first cascade port on the host. *Not meaningful for Stinger CR units.*
topology:port-2-shelf	Shelf ID of the remote shelf directly connected to the second cascade port on the host. *Not meaningful for Stinger CR units.*

Parameter	Setting
validation-status:id-valid	Indicates whether the validation-id setting in the remote-shelf-config profile matches the validation ID specified by the remote shelf's DIP-switch setting. The disabled value indicates that no validation was performed. A true setting indicates that validation was done, and the software validation ID setting matched the DIP switch setting. A false setting indicates that validation was done, and the software validation ID setting did not match the DIP switch setting. *Not meaningful for Stinger MRT units.*
validation-status: validation-id-setting	Physical validation ID set by DIP switches on the remote shelf (from 0 to 255). This value is read from the remote shelf. *Not meaningful for Stinger MRT units.*
validation-status: validation-id	The validation ID specified in the remote-shelf-config profile. This value is compared against the validation-id- setting from the remote shelf to determine the validation result, which is shown in the id-valid field. *Not meaningful for Stinger MRT units.*

Displaying information about enabled remote shelves

The remoteshelf command displays information about enabled remote shelves. It uses the following syntax on a hosted system:

```
HOST> help remoteshelf
usage: remoteShelf -[s|o] <param>
remoteShelf with no options, show all configured remote shelves
remoteShelf -s <shelf> show detailed information for a single remote shelf
```

For example, the following command shows details about remote shelf 3:

```
HOST> remoteshelf -s 3
Shelf:           3
Shelf Name:      MyShelfName
Shelf Location:  MyShelfLocation
Shelf Type:      Stinger MRT
Host Port:       { { 1 17 1 } 0 }
Shelf Enabled:   Yes
Oper State:      OPER_UP
Up Count:        2
Last Up Time:    Wed Sep 17 15:45:25 2003
Last down Time:  Wed Sep 17 15:45:21 2003
```

Without any options, the command displays all configured remote shelves:

```
HOST> remoteshelf
Shelf Name             AdminState OperState  host-port        up-count
   2  MyShelfName       Enabled    OPER_Down  {{ 0 0 0} 0}         0
```

Displaying hosted MRT system topology and statistics

To display the topology of a hosted system, use the `topology` command. For syntax information, see the *Stinger Reference*.

You can also execute the `topology` command in an open session on a remote shelf. In that case, the command displays the details of that shelf.

Displaying the entire topology

With no options, the `topology` command displays details about each shelf in the hosted system. In the following example, remote shelf 3 is connected to EXP1, and no remote shelves are connected after it. On EXP2 remote shelf 2 is connected, followed by remote shelf 5.

```
HOST> topol
Slaves connected to EXP1 of Master
==================================
ShelfId                         : 3
Operational State               : UP
Admin State                     : UP
Position                        : 1
MrtType                         : STINGER_MRT_23INCH_PLATFORM
MRT Connected to Exp1           : 1
MRT Connected to Exp2           : 16
Port connected to - On Master   : 0
Port connected to - On Slave    : 0

Slaves connected to EXP2 of Master
==================================
ShelfId                         : 2
Operational State               : UP
Admin State                     : UP
Position                        : 1
MrtType                         : STINGER_MRT_23INCH_PLATFORM
MRT Connected to Exp1           : 1
MRT Connected to Exp2           : 5
Port connected to - On Master   : 1
Port connected to - On Slave    : 0

ShelfId                         : 5
Operational State               : UP
Admin State                     : UP
Position                        : 2
MrtType                         : STINGER_MRT_23INCH_PLATFORM
MRT Connected to Exp1           : 2
MRT Connected to Exp2           : 16
Port connected to - On Master   : 1
Port connected to - On Slave    : 0
```

For an explanation about the output of the toplogy command, see the *Stinger MRT Getting Started Guide* for your unit or the *Stinger Reference*.

Displaying a picture of the topology

For a picture of the topology, use the `topology -p` command. For example:

```
HOST> topol -p
                    --------------------
                    |    MASTER: 1     |
              EXP1-------------------------------EXP2
               |                               |
               |                               |
       -------EXP1-------              -------EXP1-------
       | Slave     : 5  |              | Slave     : 4  |
       -------EXP2-------              -------EXP2-------
               |                               |
               |                               |
       -------EXP1-------              -------EXP1-------
       | Slave     : 3  |              | Slave     : 6  |
       -------EXP2-------              -------EXP2-------
```

Displaying the details for a specific shelf

To display the details about a particular shelf by using the `topology -d` command and specifying the remote shelf ID. For example:

```
HOST> topol -d 5
ShelfId               : 5
Operational State     : UP
Admin State           : UP
Position              : 2
MrtType               : STINGER_MRT_23INCH_PLATFORM
MRT Connected to Exp1 : 2
MRT Connected to Exp2 : 16
Port connected to - On Master : 1
Port connected to - On Slave  : 0
```

Displaying statistics for a specific shelf

To display statistics about the types of packets received and sent to a particular shelf, use the `topology -s` command with the remote shelf ID. For example:

```
HOST> topol -s 3
Statistics of Shelf: 3
discovery restart     : 0
Number of requests received
Valid             : 1
Duplicate ShelfId : 0
Admin State not UP: 0
Invalid           : 0
Discarded         : 0
Number of Ack Sent    : 1
Number of Nack Sent   : 0
Number of Reset Sent  : 0
Number of Init Sent   : 0
```

Table 2-3 shows details displayed by this command:

Table 2-3. Statistics displayed for a remote shelf

Output field	Description of value	
`discovery restart`	Number of times autodiscovery has been restarted.	
`Number of requests received`		
	`Valid`	Count of valid requests received.
	`Duplicate ShelfId`	Another MRT sent requests with this shelf ID.
	`Admin State not UP`	Request was received when administrative state for this shelf was down or unknown.
	`Invalid`	An invalid request was received. A request is invalid is it contains a protocol Id or version mismatch, or is sent from invalid intermediate shelf.
	`Discarded`	Request discarded, which might indicate that the intermediate shelf is down.
`Number of Ack Sent`	Number of Acks sent to the shelf.	
`Number of Nack Sent`	Number of Nacks sent to the shelf.	
`Number of Reset Sent`	Number of Resets sent to the shelf.	
`Number of Init Sent`	Number of Inits sent to the shelf.	

When you specify shelf ID 1, indicating the host, the `topology -s` command displays the number of erroneous packets received. For example:

```
HOST> topol -s 1
Discarded packets   : 0
Request Rcvd with Invalid ShelfID   : 0
```

Table 2-4 shows details displayed by this command.

Table 2-4. Statistics displayed for the host shelf

Output field	Description of value
Discarded packets	Packets discarded due to header errors, intermediate shelves being down. No action had been taken on these packets, they were silently discarded.

Table 2-4. Statistics displayed for the host shelf (Continued)

Output field	Description of value
Request Rcvd with Invalid ShelfID	Autodiscovery received from with invalid shelf ID (a shelf ID outside the range from 2 to 7).

If you execute this command on the remote shelf, statistics are displayed for that shelf only. For example:

```
HOST> open 3 8

SLAVE3/8>> topol -s
Statistics of Shelf: 3
Discarded packets       : 0
Discovery restart       : 0
Number of Req Sent      : 126
Number of Ack Rcvd      : 0
Number of Nack Rcvd     : 0
Number of PassThruReq   : 0
Number of PassThruRep   : 0
Number of Init Rcvd     : 0
Number of Reset Rcvd    : 0
```

Table 2-5 shows details displayed by this command:

Table 2-5. Statistics displayed in an open session on the remote shelf

Output field	Description of value
`Discarded packets`	Packet discarded due to header errors.
`Discovery restart`	Number of times Auto Discovery has been restarted.
`Number of Req Sent`	Number of Auto Discovery Request sent.
`Number of Ack Rcvd`	Number of Acks received from the host.
`Number of Nack Rcvd`	Number of Nacks received from the host.
`Number of PassThruReq`	Number of pass through request forwarded.
`Number of PassThruRep`	Number of pass through replies forwarded.
`Number of Init Rcvd`	Number of Inits received from the host.
`Number of Reset Rcvd`	Number of Resets received from the host.

Sending an init packet to a remote shelf

Usually, the host sends an init packet to a remote shelf only if its administrative state is UP and its operational state is DOWN. To restart autodiscovery between the host and a remote shelf without resetting the shelf, use the `topology -r` command and specify the shelf's ID. For example:

```
HOST> topol -r 2
```

Viewing information about a module

To display information about a particular module by entering the `show` command with the *`shelf-number`* and *`slot-number`* arguments or by displaying the `slot-info` profile.

Using the `show` command with the shelf and slot numbers

To use the `show` command for information about a particular module, add the shelf and slot numbers as arguments. For example:

```
admin> show 1 3
Controller { first-control-module } ( PRIMARY ):
                                 Reqd  Oper   Slot Type
    { shelf-1 slot-3 0 }         UP    UP     al-dmtadsl-atm-card:
    { shelf-1 slot-3 1 }         DOWN       xdsl-12-line1
    { shelf-1 slot-3 2 }         DOWN       xdsl-12-line-2
    { shelf-1 slot-3 3 }         DOWN       xdsl-12-line-3
    { shelf-1 slot-3 4 }         DOWN       xdsl-12-line-4
    { shelf-1 slot-3 5 }         DOWN       xdsl-12-line-5
    { shelf-1 slot-3 6 }         DOWN       xdsl-12-line-6
    { shelf-1 slot-3 7 }         DOWN       xdsl-12-line-7
    { shelf-1 slot-3 8 }         DOWN       xdsl-12-line-8
    { shelf-1 slot-3 9 }         DOWN       xdsl-12-line-9
    { shelf-1 slot-3 10 }        DOWN       xdsl-12-line-10
    { shelf-1 slot-3 11 }        DOWN       xdsl-12-line-11
    { shelf-1 slot-3 12 }        DOWN       xdsl-12-line-12
```

The following sample command displays information about the trunk module installed in a Stinger MRT, which is identified as virtual slot 18 :

```
admin> show 1 18
      Shelf 1 ( standalone ):
                              Reqd Oper  Slot Type
 { shelf-1 trunk-module-2 0 } UP    UP   oc3-atm-trunk-daughter-card:
 { shelf-1 trunk-module-2 1 }       UP   atm-oc3-trunk-1
 { shelf-1 trunk-module-2 2 }       DOWN atm-oc3-trunk-2
```

Using the `slot-info` profile

The read-only `slot-info` profile stores information about each module that has successfully booted. This profile is not stored in NVRAM, so it does not persist across system resets or power cycles. The system creates a `slot-info` profile when you boot the module and deletes the profile when your remove or reboot the module. SNMP managers can read the `slot-info` profile.

The following sample commands display the contents of the `slot-info` profile for the module installed in slot 13:

```
admin> read slot-info {1 13 0}
SLOT-INFO/{ shelf-1 slot-13 0 } read
```

```
admin> list
[in SLOT-INFO/{ shelf-1 slot-13 0 }]
slot-address* = { shelf-1 slot-13 0 }
```

```
serial-number = 1018540161
software-version = 9.4-185.2
software-revision = 0
software-level = ""
hardware-level = 0
software-release = e0
```

For information about the parameters in the `slot-info` profiles, see the *Stinger Reference*.

Opening a session with a module

Each installed and operating LIM or T1 or E1 module on a Stinger FS, Stinger FS+, Stinger LS, or Stinger RT unit has its own processor and is running its own operating system. You can use the `open` command to connect to a module directly and run commands. On a Stinger MRT, you can open a session with virtual slot 1. (See "Understanding physical addressing on Stinger units" on page 2-1 for additional information.)

This type of connection is useful for performing debug operations, because when you issue a debug command from a module, the command operates only from the context of that module.

The syntax of the `open` command is as follows:

`open` ***`shelf-number slot-number`***

The `open` command creates an internal Telnet-like session with the module and displays a modified prompt indicating the slot and module you are managing.

The following command opens a session to the secondary control module in slot 9:

```
admin> open 1 9
shelf-router-1/9>
```

The following command opens a session to the LIM located in shelf 1, slot 4 of a Stinger FS, Stinger LS, or Stinger RT unit:

```
admin> open 1 4
dmtadsl-atm-1/4>
```

The following command opens a session with virtual slot 1 on a Stinger MRT:

```
admin> open 1 1
mrtdmt-1/1>
```

To exit the session with the module, enter `quit`, as in the following example:

```
dmtadsl-atm-1/4> quit
Terminated from far-end
```

When you are connected to a module, only a subset of the Stinger commands are available. To list the commands available on the module, enter a question mark (?) or `help`, as in the following example:

```
dmtadsl-atm-1/4> ?
?                               ( user )
@fatalTest                      ( debug )
addrpool                        ( debug )
alErrs                          ( debug )
```

```
alPorts                         ( debug )
alRestart                       ( debug )
apctog                          ( debug )
arptable                        ( system )
...
```

For information about module-level commands, see the *Stinger Reference*.

Changing the state of a module

You can temporarily start or stop the operation of a module, put it in maintenance mode, or reset it by using the `slot` command or by setting the `reqd-state` parameter in the `slot-admin` profile. This feature is particularly useful while performing maintenance operations, when you might want to replace a failed module without deleting its configuration.

Using the `slot` command

The `slot` command allows you to control the state of an installed module. For the syntax of the `slot` command, see the *Stinger Reference*.

To temporarily stop the operation of a module, use the `slot` command with the `-d` option, and specify the module's shelf and slot number. For example:

```
admin> slot -d 1 3
slot 1/3 state change forced
```

When you stop a module's operation with the `slot` command, it remains disabled only until the next reboot, and retains its configuration.

To start the operation of a module, use the `slot` command with the `-u` option, and specify the module's shelf and slot number. For example:

```
admin> slot -u 1 3
slot 1/3 state change forced
```

Note You cannot change the state of a secondary control module by using the `slot -u` or `slot -d` commands.

To put a module in maintenance state, use the `-m` option. For example:

```
admin> slot -m 1 3
Slot 1/1, state change forced
warning: new state will remain until next explicit management action.
```

To reset a module, use the `slot` command with the `-b` option, and specify the shelf and slot number of the module you want to reset (bounce). For example:

```
admin> slot -b 1 3
slot 1/3 state change forced
```

Using `slot-admin` profiles

You can also change the state of a slot and its module using the `reqd-state` parameter in the `slot-admin` profile.

The following commands display the contents of the `slot-admin` profile for the module in slot 1. The parameter descriptions follow the profile listing.

```
admin> read slot-admin {1 1 0}
SLOT-STATE/{ shelf-1 slot-1 0 } read
admin> list
[in SLOT-ADMIN/{ shelf-1 slot-1 0 }]
slot-address* = { shelf-1 slot-1 0 }
reqd-state = reqd-state-up
```

Parameter	Setting
`slot-address`	Address of the slot.
`reqd-state`	Required operational state of the slot. If you change the value of this parameter to `nonoperational`, you temporarily disable a slot and its module. The change in status is complete when the setting of `current-state` parameter has changed to match the setting of the `reqd-state` parameter. The unit retains this setting only until you reset the system or remove power to the unit. At system startup, the system reinitializes the required state to match the actual state of the module. Specify one of the following values: ■ `reqd-state-down`—Requires the device to be in an inactive, nonoperational state. ■ `reqd-state-up`—Requires the device to be in a normal operating state. ■ `reqd-state-maint`—Requires the device be in a nonoperational maintenance state.

The following sample commands disable a slot:

```
admin> read slot-admin {1 3 0}
admin> set reqd-state = reqd-state-down
admin> write
```

The following commands return a slot to normal operating mode:

```
admin> set reqd-state = reqd-state-up
admin> write
```

Changing the state of a module's interface

You can change the state of an interface on a module by entering the `device` command or by setting the `reqd-state` parameter in the `device-state` profile. An interface is specified by its interface address, which consists of the shelf number (always 1), slot number, item number, and logical item number (if necessary) of the interface.

Using the device command

The `device` command initiates a state change to a specified interface on a module. You typically use this command to administratively disable or enable an interface.

For example, to administratively disable port 24 on a module in slot 3, use the device command with the -d option as follows:

```
admin> device -d {{1 3 24} 0}
device { { 1 3 24 } 0 } state change forced
```

To reenable the port, use the device command with the -u option as follows:

```
admin> device -u {{1 3 24} 0}
device { { 1 3 24 } 0 } state change forced
```

Using the device-state profile

Every host interface or network interface on a Stinger unit has a device-state profile, which stores the current state of an interface and allows you to change it.

The following commands display the device profile for port 24 in slot 3. The description of the parameters follow the profile listing.

```
admin> read device-state {{1 3 24} 0}
DEVICE-STATE/{ { shelf-1 slot-3 24 } 0 } read
admin> list
device-address* = { { shelf-1 slot-3 24 } 0 }
device-state = down-dev-state
up-status = idle-up-status
reqd-state = up-reqd-state
```

Parameter	Setting
device-address	Address of the device whose state is stored in this profile, defined by the address {{*shelf slot item*}} *logical item*}.
device-state	Current operational state of the interface, which can be down-dev-state, up-dev-state, or none. A status of none indicates that the interface does not exist on the unit.
up-status	Status of an operational interface. This parameter is valid only if the device-state parameter is set to up-dev-state. An operational interface displays one of the following values: ■ idle—Interface is not in use. ■ reserved—Interface is not used until all idle interfaces of the same type are in use. ■ assigned—Interface is in use.
reqd-state	Required operational state of the interface, which can be up-reqd-state or down-reqd-state. Changing this value initiates a state change for the interface. The change is complete when device-state parameter changes to match the reqd-state parameter. A Stinger system retains this setting only until you reset or remove power to the unit. At system startup, the system reinitializes the required state to match the actual state of the interface.

The following commands disable port 24 on the device installed in slot 3:

```
admin> read device-state {{1 3 24} 0}
DEVICE-STATE/{ { shelf-1 slot-3 24 } 0 } read

admin> set reqd-state = down-reqd-state

admin> write
DEVICE-STATE/{ { shelf-1 slot-3 24 } 0 } written
```

Removing a module and its configuration

Stinger FS, Stinger FS+, Stinger LS, Stinger RT and Compact Remote modules are hot-swappable. When you remove a module, by default, the system retains its configuration. You can reinstall a module or install another of the same type in the same slot without reconfiguring the system or uploading a backup configuration. Keep in mind that when you remove a module, the NVRAM used to store configuration information is not cleared until you explicitly clear the configuration.

When you remove a module from a Stinger system, the `show` command reports a value of `NONE` for the empty slot. For example:

```
admin> show 1 4
Controller { first-control-module } ( PRIMARY ):
                                   Reqd  Oper   Slot Type
  { second-control-module }        UP    UP     ( SECONDARY )
  { shelf-1 slot-4 0 }             UP    NONE   stngr-32-idsl-card:
```

The status `NONE` indicates that the module was removed, but its profiles have been saved. The Stinger system saves the profile of modules that you have removed until you install a module of a different type in the same slot, or until you enter the `slot -r` command, as in the following example:

```
admin> slot -r 4
slot 1/4 removed
```

In either case, the system deletes all the old profiles associated with the slot. If you insert a different type of module, the system creates the appropriate new profiles.

Flagging a mismatched module and slot type

You can configure the system to flag when a module inserted into a slot does not match the slot type (that is, the new module is different from that which was previously installed). When this feature is enabled, and the system detects that a new module type has been inserted into a slot the new module is placed in an inactive state. You can then elect to reinstall a module of a type that was previously installed or activate the new module type.

The `slot-type-check` parameter in the `system` profile controls the system behavior when the system detects that a new type of module has been inserted into a slot.

With the default `no` setting, if the system detects that a new type of module has been inserted into a slot, the `slot-type` and `slot-status` profiles associated with the old module are removed and new `slot-type` and `slot-status` profiles are created for the new module. The new module is activated, as in previous releases.

You can configure the system to flag a mismatch between a module and slot type by setting the `slot-type-check` to `yes`. For example:

```
admin> read system
admin> set slot-type-check = yes
admin> write -f
```

With the yes setting, if the system detects that a new type of module has been inserted into a slot, the slot-type and slot-status profiles associated with the old module are retained and the new module remains inactive. You can then install/reinstall a module that matches the existing slot type or activate the new module.

When a new module does not match a slot type

When the system detects that a newly installed module does not match existing slot configuration and the slot-type-check parameter is set to yes, the module remains inactive and the condition is reported in the show command, the slot-status profile for the slot, and chassis.mib. In addition, the system generates a warning log message and a trap.

- The show command reports the operating state of the slot as MISMATCH, shown in bold in the following example:

  ```
  admin> show
  Shelf 1 ( master ):
  Controller { first-control-module } ( PRIMARY ):
                                   Reqd  Oper   Slot Type
      { second-control-module }    UP    UP     ( SECONDARY )
      { shelf-1 slot-2 0 }         UP    UP     stngr-olim-card
      { shelf-1 slot-3 0 }         UP    MISMATCH ep-72-gs-adsl2plus
    ...
  ```

- For a slot that is in a MISMATCH state, the slot-state profile reports the following information for that slot:
  - The current-state parameter, which reports the operational state of slot, reports the value oper-state-mismatch. The oper-state-mismatch state is applicable only when the slot-type-check parameter is set to yes.
  - The mismatched-slot-type parameter in the slot-state profile shows the type of module currently installed in the slot. If a module is not in the mismatch state, the mismatched-slot-type parameter reports none.

  Following is the sample listing of the slot-state profile for slot 3, which is in a MISMATCH state:

  ```
  [in SLOT-STATE/{ shelf-1 slot-3 0 }]
      slot-address* = { shelf-1 slot-3 0 }
      current-state = oper-state-mismatch
      mismatched-slot-type = dadsl-atm-24-card
  ```

- The information reported by the slot-state profile is reflected in chassis.mib as follows:
  - The slotMismatchedType object in slotTable shows the type of module currently installed in the slot. The value for is null if no modules in the MISMATCH state.
  - chassis.mib includes a new value for slotStatus to show the mismatched state for a LIM or trunk module.

- The system generates a warning level log message, such as the message shown below, to indicate that a module is installed in a slot with a different slot type:

  ```
  LOG warning, Shelf 1, Controller-1, Time: 14:00:39--
    Slot 1/1 MISMATCH, previous: stngr-48-gs-lp-adsl-card -> current:
  dadsl-atm-24-card
  ```

  The system sends `sysSlotStateChange` trap with the value for slotStatus.1, `operStateMismatch(10)`, to indicate that slot is in a mismatched state.Activating a LIM or trunk module in a mismatched state

If the operating state of a LIM or trunk module is `MISMATCH`, you can activate the newly installed LIM or trunk module or you can install a module type that matches the existing configuration for the slot.

Activating a LIM in a mismatched state

To activate a LIM that is in a mismatched state, remove the old profiles associated with the slot by using the `slot -r` *`slot_number`* command, force a state change using the `slot -u` command, and then reset the LIM.

Suppose that a system was installed with a 72-port enhanced processor ADSL2+ LIM (`ep-72-gs-adsl2plus`) in slot 3 and is replaced with a 24-port ADSL LIM (`dadsl-atm-24-card`).

The 24-port ADSL LIM is inactive and its operating state is `MISMATCH`.

```
admin> show
Shelf 1 ( master ):
Controller { first-control-module } ( PRIMARY ):
                                 Reqd  Oper   Slot Type
    { second-control-module }    UP    UP     ( SECONDARY )
    { shelf-1 slot-2 0 }         UP    UP     stngr-olim-card
    { shelf-1 slot-3 0 }         UP    MISMATCH ep-72-gs-adsl2plus
  ...
```

The following commands activate the 24-port ADSL LIM in slot 3:

```
admin> slot -r 1 3
LOG notice, Shelf 1, Controller-1, Time: 15:32:29--
  Slot 1/3, state NONE 8
Slot 1/3 removed

admin> slot -u 1 3
Slot 1/3, state change forced.
LOG warning, Shelf 1, Controller-1, Time: 15:32:55--
  Slot 1/3 up
admin>
LOG notice, Shelf 1, Controller-1, Time: 15:33:01--
  Slot 1/3, state DOWN 1


LOG notice, Shelf 1, Controller-1, Time: 15:33:07--
  Shelf 1, slot 3 changed from none to dadsl-atm-24-card


...
LOG notice, Shelf 1, Controller-1, Time: 15:34:15--
  Slot 1/3, state UP 2
```

The following command confirms that the module has been activated:

```
admin: show
Shelf 1 ( master ):
Controller { first-control-module } ( PRIMARY ):
                                 Reqd  Oper   Slot Type
    { second-control-module }    UP    UP     ( SECONDARY )
    { shelf-1 slot-2 0 }         UP    UP     stngr-olim-card
    { shelf-1 slot-3 0 }         UP    UP     dadsl-atm-24-card
    { shelf-1 slot-4 0 }         UP    UP     stngr-olim-card
    { shelf-1 slot-5 0 }         UP    UP     ep-72-gs-adsl2plus
    { shelf-1 trunk-module-2 0 } UP    UP     e3-atm-trunk-daughter-card
```

Activating a trunk module

To activate a trunk module in the mismatched state, set the `slot-type-check` parameter to `no` and then reset the trunk using the `atmtrunkreset` *`trunknum`* command.

Suppose that a system was installed with an E3-ATM in slot 18 (slot type for slot 18 is `e3-atm-trunk-daughter-card`) and is replaced by a DS3-ATM module. The module enters a `MISMATCH` state.

```
admin> show
Shelf 1 ( master ):
Controller { first-control-module } ( PRIMARY ):
                                 Reqd  Oper   Slot Type
    { second-control-module }    UP    UP     ( SECONDARY )
    { shelf-1 slot-2 0 }         UP    UP     stngr-olim-card
    { shelf-1 slot-3 0 }         UP    UP     dadsl-atm-24-card
...
```

The following commands activate the DS3-ATM trunk module:

```
admin> read system
SYSTEM read

admin> set slot-type-check = no

admin> write
SYSTEM written

admin> atmtrunkreset 18
LOG notice, Shelf 1, Controller-1, Time: 15:57:37--
  Shelf 1, slot 18 changed from e3-atm-trunk-daughter-card to ds3-atm-trunk-
daughter-card
```

The following command confirms that the new trunk module has been activated:

```
admin> show
Shelf 1 ( master ):
Controller { first-control-module } ( PRIMARY ):
                                 Reqd  Oper   Slot Type
    { second-control-module }    UP    UP     ( SECONDARY )
   ...
    { shelf-1 trunk-module-2 0 } UP    UP     ds3-atm-trunk-daughter-card
```

Removing LIMs that use system-generated ATM addresses

In a Stinger unit enabled for Private Network-to-Network Interface (PNNI) protocol, the system generates a unique ATM address for each ATM interface via the `AtmInterfaceSoftPvcAddressTable`. These ATM addresses are used as the target address (`atmSoftPvccTargetAddress`) during the creation of a soft permanent virtual circuit (SPVC). The system generates the ATM addresses based on the LIM serial number, using the following formula:

```
SPVC address = pnni-node-prefix + LIM-serial-number + port-number
```

For details, see the *Stinger Private Network-to-Network Interface (PNNI) Supplement*.

Replacing a LIM and retaining the existing ATM addresses on the slot

If you replace a LIM and wish to retain the existing ATM addresses for the slot (whether the addresses were generated by the system or assigned explicitly), do *not* use the `slot -r` command. Simply remove the old LIM and insert the new LIM into the slot. The system recognizes the existing ATM addresses and does not generate new ones. An SPVC initiator switch can reestablish subscriber SPVCs, because the SPVC addresses have not changed.

Moving a LIM that uses system-generated ATM addresses

If you move a LIM to a slot that does not already have assigned ATM addresses, you must remove the configuration from the previous slot by using the `slot -r` command. Otherwise, when you insert the LIM into the new slot, the system generates new ATM addresses using the same formula based on the serial number of this LIM, which results in duplicate ATM addresses for the interfaces in two slots. If duplicate ATM addresses occur on multiple LIM interfaces, calls can be established only on one of the interfaces.

For example, suppose slot 4 contains a LIM that will be moved to slot *N*, and the LIM interfaces have system-generated ATM addresses based on the serial number of the LIM. Slot *N* has no addresses configured (for example, it has never been used or its configuration has been removed via `slot -r`). To move the LIM, you must follow this procedure:

1. Remove the LIM from slot 4.
2. Delete the configuration by using the `slot -r` command. For example:

   admin> **slot -r 4**
3. Insert the LIM into its new slot.
4. Save the new configuration using the `save` command.

After the move, slot 4 has no addresses configured. In slot *N*, the LIM interfaces have system-generated ATM addresses based on the serial number of the LIM. Saving the new configuration is recommended, to avoid the possibility of restoring old ATM address assignments.

Note If existing subscriber loops are connected to the LIM and you remove the configuration by using the `slot -r` command, when you insert a new LIM in that slot, the interfaces will have new ATM addresses. In that case, you must inform the SPVC initiator switch of the new ATM addresses associated with the LIM to enable the switch to reestablish the subscriber SPVCs.

Recovering from a failed module installation

If you installed a new module in a Stinger FS, Stinger FS+, Stinger LS, or Stinger RT unit before upgrading the system software, and the module does not begin operating properly, you can attempt to recover using one of the following methods:

- Use the `nvram` command.
- Remove the module.

Using the `nvram` command

Caution Using the `nvram` command resets the entire system. You cannot perform this task remotely because the `nvram` command clears the Stinger unit configuration, including its IP address. Before performing this procedure, make sure that you have access to the Stinger unit's serial port.

To recover from a failed module installation using the `nvram` command, proceed as follows:

1. Save the current system configuration. For example:

   `admin>` **`save network bonzo 971001`**

   This command saves the configuration to a file named 971001 in the TFTP home directory on a host named `bonzo`.

2. Clear the system configuration and restart the Stinger unit by entering the `nvram` command:

   `admin>` **`nvram`**

3. Restore the saved system configuration.

   You can restore the configuration through the serial port, or you can reassign an IP address and default gateway through the serial port, then use the `load` command to load the rest of the configuration, as in the following example:

   `admin>` **`load config network bonzo 971001`**

   This command restores the configuration from a file named 971001 in the TFTP home directory on a host named `bonzo`.

For a complete description of saving and restoring configurations, see Chapter 1, "Administering a Stinger System"

Removing the module

The following commands show how to recover from a failed module installation by removing the module.

1. Save the current configuration of any profiles on the module. The following command saves the configuration of all DS3-ATM profiles for this trunk module to a file named 971001 in the TFTP home directory on a host named `bonzo`.

   `admin>` **`save network bonzo 971001 ds3-atm`**

2. Stop the module's operation.

   `admin>` **`slot -d 1 1`**

   This command disables the module in shelf 1, slot 1.

3. Remove the module profile.

```
admin> slot -r 1 1
```

4 Reenable the module.

```
admin> slot -u 1 1
```

5 Restore the configuration of any profiles on the module. For the DS3-ATM trunk module in this example, you enter the following command:

```
admin> load config network bonzo 971001
```

This command restores the configuration from a file named 971001 in the TFTP home directory on a host named `bonzo`.

Enabling LIM self-testing

You can configure the system to periodically audit Ripper-based LIMs to detect lockups at the DSL or SONET interface. When a lockup occurs, the system resets the Ripper device, which prevents cells for being dropped.

This capability is supported on Ripper-based LIMs, listed below:

- 24-port ADSL LIMs (`dadsl-atm-24-card`)
- 72-port Centillium based ADSL LIMs (`stngr-72-ct-adsl-card`)
- 72-port ADSL LIM (`stngr-72-gs-adsl-card`)
- SDSL LIMs version 2 (`sdsl-atm-v2-card`)
- HDSL2/SHDSL LIMS (`hdsl2-card` and `stngr-72-shdsl-card`)
- T1 and E1 IMA LIMs (`ima-8-e1-card` and `ima-24t1-card`)

The following parameters enable LIM self testing:

Parameter	Specifies
`system:lim-self-test`	Enable or disable LIM self-testing on all LIMs, systemwide. To enable LIM self-testing systemwide, set this parameter to `enable`. By default, the `lim-self-test parameter` is set to `disable.` You must also set the `self-test` parameter in the slot's `slot-static-config` profile to `enable` to enable self-testing on a LIM.
`slot-static/{`*`shelf slot port`*`}:self-test`	Enable or disable self-test diagnostics for the switch on this slot module. This parameter is applicable only if the `lim-self-test` parameter in the `system` profile is set to `enable`. A value of `enable` indicates that the self-testing is enabled on this slot. A value of `disable` indicates that the self-testing is disabled on this slot

The following commands enable LIM self-testing systemwide:

```
admin> read system
admin> set lim-self-test = enable
admin> write
```

Configuring logging, Syslog, and call logging services

3

The Stinger unit monitors itself continuously and generates error and event messages related to its operations. It also monitors itself for alarm events, such as failures and state changes. For information about remote monitoring using SNMP, see "Administering the SNMP Agent" on page 7-1.

Configuring system logging and Syslog services

The Stinger unit generates error and event messages related to its operations. You can use the `log` profile to perform the following tasks:

- Configure how the system handles log messages that are displayed on a status window. (See also, "Setting log levels for each login" on page 1-29.)
- Enable and configure the system to save log messages to the Syslog server.

Overview of `log` profile parameters

The following parameters in the `log` profile and `auxiliary-syslog` subprofile are used to configure system logging and Syslog services. Parameter descriptions follow the profile listing.

```
[in LOG]
save-level = info
save-number = 100
software-debug = no
syslog-enabled = no
host = 0.0.0.0
port = 514
facility = local0
syslog-format = tnt
log-call-progress = no
log-software-version = no
syslog-level = info
auxiliary-syslog = [ { no info 0.0.0.0 514 local0 } { no info 0.0.0.0 514
local

admin> list auxiliary-syslog
[in LOG:auxiliary-syslog]
```

```
auxiliary-syslog[1] = { no info 0.0.0.0 514 local0 }
auxiliary-syslog[2] = { no info 0.0.0.0 514 local0 }
```

```
admin> list 1
[in LOG:auxiliary-syslog[1]]
syslog-enabled = no
syslog-level = info
host = 0.0.0.0
port = 514
facility = local0
```

Parameter	Setting
save-number	Maximum number of log messages (up to 10,000) that the Stinger unit saves for display in the status windows.
save-level	Lowest level of log messages that the Stinger unit displays in the log status window. The unit logs all messages that are at the specified level or higher. For example, if alert is specified, all messages at the alert and emergency levels are logged. Specify one of the following settings: ■ none (the default)—Displays no log messages. ■ emergency—Announces error conditions that are likely to prevent normal operation. ■ alert—Announces error conditions that do not prevent normal operation. ■ critical—Announces interface failures and security errors. ■ error—Announces error events. ■ warning—Displays unusual events that do not affect normal operation. ■ notice—Displays operational events of interest. ■ info—Displays state and status changes. ■ debug—Displays helpful debug information. The save-level parameter does not control the level of syslog records sent to a syslog server.
call-info	*Does not apply to the Stinger unit.*
syslog-enabled	Enable/disable the forwarding of log messages to a syslog server.
host	Domain Name System (DNS) hostname or address of a syslog host for the first data stream. In the auxiliary-syslog [1] subprofile, the host value specifies the host to which the unit sends syslog messages for the second data stream. In the auxiliary-syslog [1] subprofile, the host value specifies the host to which the unit sends syslog messages for the third data stream.

Parameter	Setting
port	Destination port of the syslog host that receives the first data stream. In the auxiliary-syslog [1] subprofile, the port value specifies the destination port of the syslog host that receives the second data stream. In the auxiliary-syslog [1] subprofile, the port value specifies the destination port of the syslog host that receives the third data stream.
facility	Syslog daemon facility code for messages logged from the Stinger unit. For detailed information, see the syslog.conf manual page entry on the UNIX syslog server. Specify one of the following settings: ■ local0 (the default) ■ local1 ■ local2 ■ local3 ■ local4 ■ local5 ■ local6 ■ local7 In the auxiliary-syslog [1] subprofile, the facility value applies to the second data stream. In the auxiliary-syslog [2] subprofile, the facility value applies to the third data stream. The settings in each auxiliary-syslog subprofile affect an individual syslog stream, and override the setting in the log profile.
log-call-progress	Enable/disable the unit to log incoming call-progress messages. Specify one of the following values: ■ yes—The unit logs incoming call-progress messages.s ■ no (the default)—The unit discards incoming call-progress messages.
log-software-version	Enable/disable the hourly log message reporting of the current software version to the syslog host. Specify yes to enable hourly log messages reporting the current software version or no (the default) to disable it. If debug permission is enabled, the messages are displayed on the screen (as well as sent to the syslog host).

Parameter	Setting
syslog-level	Lowest level of log messages that the Stinger unit sends to the syslog server. All levels above the level you indicate are included in syslog messages. For example, if alert is specified, messages at the emergency and alert levels are included. Values are the same as those for save-level on page 3-2. By default, syslog records with a level of debug are filtered out, and records with a level of info or above are transmitted to the syslog server. The syslog-level value in the log profile affects all data streams. The syslog-level value in each auxiliary syslog subprofile affects the individual data stream directed to the device specified by the host value, and overrides the value in the log profile.
auxiliary-syslog [1]	Subprofile that specifies the settings for the syslog server for the second data stream.
auxiliary-syslog [2]	Subprofile that specifies the settings for the syslog server for the third data stream.

Configuring system logging

The Stinger unit records system events in its status window event log. (For additional information, see "Log message information" on page 1-37.)

The save-level parameter specifies the lowest level of message to be saved for status display. The lowest possible level is none (the default). The highest level is debug. For a list of the log message levels, see the description of save-level on page 3-2.

The save-number parameter specifies the number of messages to be saved in the status display. The default is 100.

The following commands configure the Stinger unit to save 200 messages in the event log and to display emergency type messages on the status display:

```
admin> read log
admin> set save-level = emergency
admin> set save-number = 200
admin> write
```

Enabling command logging

You can configure a Stinger system to log command-line interface (CLI) commands issued by system users. You can use these command logs to determine if certain system failures are caused by user configuration errors.

The history-size parameter in the log profile enables or disables command logging for a system. To enable command logging, specify the number of commands entered by users that the system logs. Valid values are from 0 through 1000. With the default setting of zero (0), command logging is disabled for a Stinger system (the system logs no user commands). To enable command logging, set this parameter to a value greater than zero. For example, the following commands configure the system to save up to 100 commands:

```
admin> read log
admin> set history-size = 100
admin> write -f
```

If the history-size parameter is set to a value other than 0, consider saving the existing command logs before changing its value. The system deletes all existing command logs when a users resets the value of the history-size parameter. See "Saving command logs" on page 3-7 for more information. If the new setting is 0, the system deletes all existing command logs, but logs no new commands. If the new setting is a value other than 0, the system deletes all existing command logs and starts logging commands for the new history size.

Viewing command logs

To view command logs, use the history command or display the cmd-log profiles. For security reasons, consider limiting user access to the history command and the cmd-log profiles to users with System privileges. You can use a user-group profile to restrict access to the history commands and the cmd-log profiles. For more information about configuring group privileges to commands and profiles using the user-group profile, see"Specifying a command user group for a user" on page 1-25 and "Restricting access to profiles" on page 1-26.

Using the history *command*

The history command displays command logs to the terminal session.

Following is a sample output of the history command, followed by a description of the fields in the output:

```
admin> history
Date       Time     Source           User            Id Card    Command
11/13/2003 16:31:00 console          admin           01 {01 08} history
11/13/2003 16:30:52 135.17.134.39    user2           03 {01 08} quit
11/13/2003 16:30:49 135.17.134.39    user2           03 {01 08} save c log
11/13/2003 16:30:41 135.17.134.39    user2           03 {01 08} dir cmd-log
11/13/2003 16:30:32 135.17.134.39    user2           03 {01 08} help
11/13/2003 16:30:29 135.17.134.39    user2           03 {01 08} atmcacstat
11/13/2003 16:30:25 135.17.134.39    user2           03 {01 08} show
11/13/2003 16:30:16 135.17.134.39    user1           02 {01 08} quit
11/13/2003 16:30:07 135.17.134.39    user1           02 {01 08} history
11/13/2003 16:29:58 135.17.134.39    user1           02 {01 08} dir
```

Field	Indicates
Date	Date the command was entered.
Time	Time the command was entered
Source	How the user initiated the session, for example, via telnet or by connecting to the serial port.
User	The user profile associated with the user who entered the command.

Field	Indicates
Id	User session ID number.
Card	Shelf and slot number from which the command was entered.
Command	Command entered by the user.

Viewing the cmd-log profile

If command logging is enabled, the system creates a cmd-log profile for every command entered by a user. The cmd-log profile contains read-only parameters that provide details about a logged command entry.

Following is a listing of a sample cmd-log profile with an index number of 92. The description of the parameters follow the profile listing.

```
admin> read cmd-log 92
CMD-LOG/92 read

admin> list
[in CMD-LOG/92]
user = admin
session-id = 2
login-source = console
log-date = { Friday November 2003 7 }
log-time = { 6 58 12 }
information = "dir cmd-log"
index* = 92
shelf = 1
slot = 9
```

Parameter	Specifies
user	The user profile associated with the administrator who entered the command.
session-id	ID number of the user session.
login-source	How the user initiated the session, for example, by way of telnet or the serial port, and so forth.
log-date	Date the command log was generated, in the format {*Weekday Month Year Date}.*
log-time	Time the command was entered, in the format { *Hour Minute Second }.*
information	Command-line interface command entered by the user.
shelf	Shelf number on which the command issued.
slot	Slot number on which the CLI command issued.
index	Index number of the command log.

Saving command logs

You can save command log profiles to a file in the flash card or to a remote system using the save command. For example:

```
admin> save -a 1/current/cmd.log cmd-log
```

Note You cannot save cmd-log profiles with other system profiles.

For more information about using the save command, see the *Stinger Reference*.

Storing log messages across system resets

You can store log messages across system resets by saving log messages as profiles. System logs are saved in volatile memory and are erased during system resets. You can optionally save each log message as profile, which is saved in system NVRAM. These message profiles are then retained across system resets. This feature can help determine the cause of an unexpected system reset.

This feature is available only in the debug environment. That is, in the user profile, allow-debug must be set to yes.

Note Limit the use of this feature for debugging purposes only. Enabling this feature causes the system to constantly access NVRAM while creating log messages. It should not be provisioned on regular systems.

How it works

The system classifies each log message for storage purpose as one of the following types:

- boot message—log message that is generated before a device (controller card or slot module) reaches the Operational UP state.
- runtime message—log message that is generated after a device is in the Operational Up state.

Boot message logging includes all messages from system power up until slot POST is completed. After the slots are up, if a slot reverts to slot down, slot POST test, slot none or slot diagnostic states, the system collects boot log messages again until slot POST is completed.

After system initialization, to indicate the start of runtime message logging, the system generates an INFO log message. For example:

```
Post done & start runtime log.
```

If enabled, a Stinger system saves log messages generated from control modules (controllers), line interface modules (LIMs), Compact Remote units, MRT controllers and remote LIMs as profile log-entry.

Enabling the system to save log messages as profiles

The following parameters in the `log` profile enable the saving of a log message as a profile. These parameters are visible only if in the `user` profile, `allow-debug` is set to `yes`.

Parameter	Specifies
`boot-level`	Lowest level of boot log message to be saved. Valid values (shown from highest to lowest level) are: ■ `emergency`—Critical event has occured; normal operation is doubtful. ■ `alert`—Undesired event has occurred, but normal operation can probably continue. ■ `critical`—An interface is disabled or a security error has occured. ■ `error`—Unexpected event has occured. ■ `none` (the default)—No log messages are saved or displayed.
`run-time-level`	Lowest level of runtime log message to be saved. Valid values (shown from highest to lowest level) are: ■ `emergency`—Critical event has occured; normal operation is doubtful. ■ `alert`—Undesired event has occurred, but normal operation can probably continue. ■ `critical`—An interface is disabled or a security error has occured. ■ `error`—Unexpected event has occured. ■ `none` (the default)—No log messages are saved or displayed

By default, the system does not save log messages as profiles. For the system to save boot and runtime messages as profiles, set the `boot-level` and `run-time-level` parameters, respectively, to values other than `none`. For example:

admin> **`set boot-level = critical`**

admin> **`set run-time-level = critical`**

The system can store up to 1000 each of boot and runtime `log-entry` profiles and stores these profiles in circular queue. When the system has saved 100 boot messages, it discards the oldest boot log profile for every new boot log message saved.

To disable the saving of log messages, set the parameters to `none`. Saved log messages are not erased when you disable this feature.

The system automatically disables the saving of log messages 24 hours from the time you set the `boot-level` or `run-time-level` parameter to a value other than none.

If the system undergoes a reset while logging is enabled, the system disables logging during reinitialization. Note that saved logs are retained during initialization.

If you restore an saved configuration in which log saving enabled, the system will ignore the restored setting and will continue to use the existing setting.

Viewing `log-entry` profiles

You can save `log-entry` profiles to a file in the system flash card or to another device on the network. The `log` command displays log message profiles to the system user screen or saving them to a file in flash card or to a remote system.

The system does not save `log-entry` profiles to the system config file when you save system configuration. However, you can save `log-entry` profiles to a file using the specific profile option. For example:

```
admin> save -a 1/current/system.log log-entry
```

*Using the **`log`** command*

To display `log-entry` profile contents to a user terminal or to save it to a file in flash or to remote system, use the `log` command with the `-d` option. The command syntax is follows:

```
log -s [-b|-r] <target> dump log
```

Replace *target* with the `console`, `flash`, or `network` options. You can opt to display boot messages only (`-b` option) or runtime messages only (`-r` option). For example:

```
admin> log -s -b c
Date       Time      Source               Level     Description
06/04/2004 03:23:39  shelf-3/first-contro alert    Saving of system logs as
profile is disabled
```

For more information about the `log` command, see the *Stinger Reference*.

*Overview of the **`log-entry`** profile*

The contents of the `log-entry` profile have read-only access. Following is a sample listing of `log-entry` profile, followed by parameter descriptions:

```
[in LOG-ENTRY/{ boot 11 }]
log-entry-index* = { boot 11 }
date = { Sunday February 2004 8 }
time = { 8 22 17 }
level = info
shelf = shelf-1
slot = first-control-module
message = "Initialization complete, starting normal operation"

[in LOG-ENTRY/{ boot 11 }:log-entry-index]
log-type = boot
index = 11
```

Parameter	Specifies
`log-type`	Type of log message saved—`boot` for boot log messages or `run-time` for runtime log messages.

Parameter	Specifies
`index`	Instance of a particular type of log entry (boot or runtime). This value is incremented by 1 every time an instance of the type of log occurs.
`date`	Date when the log was saved.
`time`	Time when the log was saved.
`level`	Level of the log message. Reported values can be one of the following: ■ `none`—No log messages are saved or displayed. ■ `emergency`—Critical event has occurred; normal operation is doubtful. ■ `alert`—Undesired event has occurred; normal operation can probably continue. ■ `critical`—An interface is disabled or a security error has occured. ■ `error`—Unexpected event has occured.
`shelf`	Shelf number on which the message was logged. Reported values can be one of the following: ■ `any-shelf`—Special value used to specify any shelf. ■ `shelf-`*n*—Shelf number from 1 through 25.
`slot`	Slot number on which the message was logged. Reported values are: ■ `any-slot`—Any slot. ■ `slot-`*x*—Slot number from 1 through 7 or 10 through 16. ■ `first-control-module`—The control module in slot 8. ■ `second-control-module`—The control module in slot 9. ■ `trunk-module-1`—Trunk Module 1 pseudo slot. ■ `trunk-module-2`—Trunk Module 2 pseudo slot. ■ `control-module`—The control module pseudo-slot. -STNGR only
`message`	Log information.

Configuring the Stinger unit Syslog facility

By configuring the Stinger unit to report events to a `syslog` host on the local IP network, you can maintain a permanent log of events and send Call Detail Reporting (CDR) reports to a host that can record and process them.

The host running a `syslog` daemon is typically a UNIX host, but it can also be a Microsoft Windows system. If the log host is not on the same subnet as the Stinger unit, the unit must have a route to that host, either via RIP or a static route. (For information about `syslog` messages, see "Syslog messages" on page B-7.)

Note Do not configure the Stinger to send reports to a `syslog` host that can be reached only by a dial-up connection. Doing so causes the Stinger unit to dial the log host for every logged action, including hangups.

Enabling the Syslog facility on the Stinger unit

The following sample commands enable syslog reporting

```
admin> read log
admin> set syslog-enabled = yes
admin> write
```

Configuring Syslog streams

The stream of records sent by the Stinger unit to a syslog server is called a syslog *stream*. The Stinger unit supports up to three syslog servers and define an independent syslog stream for each server.

For example, you can define a syslog stream to transfer all records, another stream to transfer records with a severity level of warning or above, and a third stream to transfer records with a severity level of emergency.

The syslog-format parameter controls the format of all syslog streams. The parameters in the log profile and two auxiliary syslog subprofiles configure the syslog streams as follows:

- The syslog-level, host, port, and facility settings in the log profile affect the first data stream.
- The syslog-level, host, port, and facility settings in the auxiliary-syslog [1] subprofile affect the second data stream and override the settings in the log profile.
- The syslog-level, host, port, and facility settings in the auxiliary-syslog [2] subprofile affect the third data stream and override the settings in the log profile.

The following sample commands define the first data stream and direct the Stinger unit to send end-of-call syslog messages to the host 10.2.3.4 on port 588:

```
admin> read log
admin> set host = 10.2.3.4
admin> set port = 588
admin> set facility = local0
admin> write
```

Note After setting a log facility number, configure the syslog daemon to write all messages containing that facility number to a particular log file. This file is the Stinger log file.

Specifying a session ID base

The sessionid-base parameter in the system profile specifies the base number to use for generating a unique ID for each session. The system uses this value to identify the session to SNMP, RADIUS, or other external entities. If this parameter is set to zero, the Stinger unit sets the initial base for session IDs to the absolute clock. For details about this parameter, see the *Stinger Reference*.

Configuring the Syslog daemon

To configure the `syslog` daemon to interact with a Stinger system, you must modify the file `/etc/syslog.conf` on the host. This file specifies the action that the daemon performs when it receives messages from a particular log facility number (which represents the Stinger).

For example, if you set the `log` parameter `facility` to `local5` in the Stinger unit, and want to log its messages in `/var/log/Stinger01`, add the following line to `/etc/syslog.conf`:

```
local5.info<tab>/var/log/Stinger01
```

Note The `syslog` daemon must reread `/etc/syslog.conf` after it has been changed.

Configuring call logging

The call-logging protocol supports real-time surveillance of Stinger units using the Navis™ family of network management products. If configured, it allows NavisAccess™ 5.1 and later releases to monitor, report, and send alarms on various performance and failure information for the Stinger unit. For additional information, go to `http://www.lucent.com/products/` and search on `NavisAccess`.

Overview of call logging

The main purpose of Stinger call logging is to provide details about physical-layer line statistics to a management station for all active DSL OC3, DS3, and E3 trunk lines in a Stinger unit.

The Stinger unit uses a method called *streaming* to periodically collect call-logging data and send it to call-logging servers in an evenly distributed manner.

Once you have configured call logging, the Stinger unit sends Start Session, Stop Session, and Streaming packets to a call-logging server. A call-logging server is a local host that is configured to communicate with the Stinger, such as a host running NavisAccess™ software.

DSL statistics are generated on the DSL drivers of Stinger LIMs and trunk modules. These statistics are propagated to the management station by means of the call-logging protocol. The call-logging packets on the Stinger unit deliver ADSL, SDSL, HDSL, SHDSL, IDSL, OC3, E3, or DS3 statistics about the physical layer.

Note Call logging for the Stinger unit is supported by NavisAccess™ 5.1 or later releases.

Enabling call logging

You enable call logging on a Stinger system by setting parameter in the `call-logging` profile. For a description of the parameters in the `call-logging` profile, see the *Stinger Reference*.

The following sample commands enables call logging on a Stinger system and sends statistics to a call-logging server at the IP address `10.2.3.4` on the local network:

```
admin> read call-logging
```

```
admin> set call-log-enable = yes
admin> set call-log-host-1 = 10.2.3.4
admin> set call-log-timeout = 10
admin> set call-log-stop-only = yes
admin> set call-log-limit-retry = 3
admin> write
```

Monitoring Interfaces on LIMs and Trunk Modules

4

TAOS includes profiles and commands that enable you to gather data specific to each interface or port on a Stinger line-interface module (LIM) or trunk module and each line interface on a Stinger MRT chassis.

The examples in this chapter are from standalone Stinger units. On a hosted systems, you can use the same commands from a host to display information about interfaces on remote shelves by replacing the shelf number (usually 1 in the examples in this chapter) with the shelf number of the remote shelf.

Where to find related information

Table 4-1 lists documents that contain information related to monitoring interfaces on a Stinger system.

Table 4-1. Where to find additional information

For information about	Go to
Monitoring the ATM interfaces on a Stinger unit	"Monitoring ATM and PNNI" on page 11-1
Ethernet and IP interfaces on Stinger control modules or a Stinger MRT chassis	*Getting Started Guide* for your unit
Ethernet and IP interfaces on a Stinger T1000 module	*Stinger T1000 Module Routing and Tunneling Supplement*
Gigabit Ethernet interfaces on IP control modules	*Stinger IP Control Module Configuration Guide*

Table 4-1. Where to find additional information

For information about	Go to
Interfaces on the Fast Ethernet trunk module	*Stinger Fast Ethernet Trunk Configuration Guide*

Summary of profiles and commands for monitoring interfaces

Table 4-2 summarizes the status profiles and commands that you use to monitor the physical interfaces of Stinger LIMs, trunks, and interfaces on the Stinger MRT chassis.

Table 4-2. Summary of profiles and commands for monitoring interfaces

Device	Commands	Status profile
DS3-ATM trunk modules	`atmtrunks`	`ds3-atm-stat`
E3-ATM trunk module	`atmtrunks`	`e3-atm-stat`
OC3-ATM trunk module	`atmtrunks`	`oc3-atm-stat`
OC12-ATM trunk module	`atmtrunks`	`sonet-stat`
Trunk aggregation module (TRAM)	`atmtrunks`	`oc3-atm-stat` `ds3-atm-stat`

8-port and 24-port T1 modules
8-port and 24-port E1 modules
	`imalines`
	`imagroups`
	`ima-tpp`
		`ima-group-stat`

All *x*DSL interfaces	`dsllines`	
ADSL LIMs and Stinger MRT ADSL ports	`dmtaldsllines`	`al-dmt-stat`
32-port SHDSL/HDSL2 LIM	`hdsl2lines`	`hdsl2-stat`
48-port and 72-port SHDSL LIMs Stinger MRT SHDSL ports	`shdsllines`	`shdsl-stat`
48-port SDSL LIMs	`sdsllines`	`sdsl-stat`

Using profiles to monitor LIM and trunk interfaces

The Stinger unit creates a read-only status profile for each interface, which provides information about the status, redundancy settings, and statistical information for that interface. The following sections provide an overview of these profiles. For a detailed explanation of the parameters in these profiles and subprofiles, see the module configuration guide for your device or the *Stinger Reference*.

For example, a Stinger unit with a dual-port DS3-ATM trunk module and two 8-port T1 modules enabled for inverse multiplexing over ATM (IMA) has a status profile for each DS3 port and 16 status profiles for its T1 ports, as shown in the following examples.

```
admin> dir ds3-atm-stat
     0  02/14/2002 18:04:12  { shelf-1 trunk-module-1 1 }
     0  02/14/2002 18:04:12  { shelf-1 trunk-module-1 2 }
```

```
admin>  dir ds1-atm-stat
     0  02/09/2002 00:19:30  { shelf-1 slot-3 1 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 2 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 3 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 4 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 5 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 6 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 7 }
     0  02/09/2002 00:19:30  { shelf-1 slot-3 8 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 1 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 2 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 3 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 4 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 5 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 6 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 7 }
     0  02/09/2002 00:19:30  { shelf-1 slot-12 8 }
```

Monitoring trunk module interfaces

The `ds3-atm-stat`, `e3-atm-stat`, and `oc3-atm-stat` profiles show the physical address of the device, state of the line, redundancy settings, and error and statistic information specific to that trunk module.

The following sample commands display the `ds3-atm-stat` profile for one of the DS3 interfaces of a DS3-ATM trunk module installed in slot 17:

```
admin> read ds3-atm-stat {1 17 1}
DS3-ATM-STAT/{ shelf-1 trunk-module-1 1 } read
```

```
admin> list
[in DS3-ATM-STAT/{ shelf-1 trunk-module-1 1 }]
physical-address* = { shelf-1 trunk-module-1 1 }
line-state = active
spare-physical-address = { any-shelf any-slot 0 }
sparing-state = sparing-none
sparing-change-reason = manual
sparing-change-time = 0
sparing-change-counter = 0
vpi-vci-range = vpi-0-255-vci-32-8191
vc-switching-vpi = ""
vcc-vpi = [ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ]
f-bit-error-count = 512
p-bit-error-count = 24
cp-bit-error-count = 16
feb-error-count = 37
bpv-error-count = 22475
```

```
ezd-error-count = 45648
corrected-hec-error-count = 0
uncorrected-hec-error-count = 0
loss-of-signal = False
loss-of-frame = False
yellow-receive = False
ais-receive = False
```

For additional information about these parameters, see the *Stinger Reference*.

Monitoring LIM interfaces

The LIM status profiles shown in Table 4-2 include parameters and subprofiles that report the following information for the line or port:

- Physical address
- Status
- Redundancy settings
- Virtual path identifier (VPI) and virtual channel identifier (VCI) range
- VPI setting for virtual channel switching
- Error and statistic counters that are specific to that device
- Information specific to a particular device. For example, the status profiles for the ADSL, SDSL, SHDSL, and SHDSL/HDSL2 LIMs include the following subprofiles:
  - `physical-status` subprofile, which includes information about line and modem status, firmware version, data rates, error counts, and operational mode for the interface.
  - `physical-statistics` subprofile, which includes information about signal presence, modem integrity, operational statistics, and error statistics for the interface.

  The T1 and E1 modules enabled for IMA include the following subprofiles:
  - `ima-link-status` subprofile, which provides information about the status of an IMA link
  - `ima-link-statistic` subprofile, which provides statistics for the IMA link.
  - `ima-group-stat` subprofile, which monitors the performance of an IMA group. This subprofile is created by the system automatically once the `imagroup` profile is properly configured and associated with a DS1-ATM profile.

The following sample commands display the `al-dmt-stat` profile for port 5 on a 24-port ADSL LIM installed in slot 2:

```
admin> read al-dmt-stat {1 2 5}
AL-DMT-STAT/{ shelf-1 slot-2 5 } read

admin> list
[in AL-DMT-STAT/{ shelf-1 slot-2 5 }]
physical-address* = { shelf-1 slot-2 5 }
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 = { 38 coe loopback 0 0 0 0 none none "O69.8 " 2 1 10 init-
ok 0+
physical-statistic = { { 0 0 0 } no 0 not-done 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 }
```

The following sample commands display the `ds1-atm-stat` profile for an IMA port on a 8-port T1 module installed in slot 3.

```
admin> read ds1-atm-stat {1 3 1}
DS1-ATM-STAT/{ shelf-1 slot-3 1 } read

admin> list
[in DS1-ATM-STAT/{ shelf-1 slot-3 1 }]
physical-address* = { shelf-1 slot-3 1 }
line-mode = uni
line-state = disabled
loss-of-carrier = yes
loss-of-sync = no
ais-receive = no
yellow-receive = no
ber-receive = no
carrier-established = no
cell-delineation = no
network-loopback = no
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
ima-link-status = { not-in-group not-in-group not-in-group not-in-group no-
fail+
ima-link-statistic = { 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 }
utopia-address = 4294967295
pattern-test-status = none
status-change-time-stamp = 0
```

For a discussion about the values reported by the parameters in the status profiles, see the module configuration guide for your device or the *Stinger Reference*.

Displaying interface information

You can use commands to display status information for the interfaces of the LIMs and trunks on a Stinger unit. The `dmtaldsllines`, `hdsl2lines`, `imalines`, `sdsllines`, `shdsllines`, `imagroups`, and `atmtrunks` commands display information about interfaces of a specific type in a Stinger unit. You use these commands with one of the following options:

Option	Description
`-a`	Displays information about all interfaces of a particular type.
`-d`	Displays all disabled interfaces of a particular type.
`-f`	Displays all available interfaces of a particular type.
`-u`	Displays all interfaces of a particular type that are in use.
`-c`	(Applicable to the `atmtrunks` command.) Clears trunk statistics for a specific port, slot or all trunk statistics for a Stinger unit.

On a hosted system, to display information about interfaces on remote shelves, use the `-sh` option to identify a shelf, or the `-sl` option to identify a shelf and slot combination on the command line. These options are not order-dependent, they can appear before or after other options.

The output from `dmtaldsllines`, `hdsl2lines`, `imalines`, `sdsllines`, `shdsllines`, `imagroups`, and `atmtrunks` commands display the same fields. Table 4-3 lists the fields from the output of these commands.

Table 4-3. Field descriptions for status commands

Field	Indicates
`(dvOp)`	Operational state of the interface. `Down` indicates that the line is in a nonoperational state. `Up` indicates that the line is in normal operations mode.
`(dvUpSt)`	Status of the interface in normal operations mode. `Idle` indicates that no call is on the line. `Assign` indicates that the line is handling a call.
`(dvRq)`	Required state of the interface. `Down` indicates that the line is required to be nonoperational. `Up` indicates that the line is required to be in normal operations mode.
`(sAdm)`	Desired state of the interface. `Down` specifies that the interface should terminate all operations and enter the deactivated state. `Up` specifies that the line should be activated in normal operations mode.
`(nailg)`	Nailed-group number that this interface is assigned to
`(Imode)`	For T1 or E1 module only, the mode of operation: User-to-Network Interface (UNI) or IMA (`ATM`).

Displaying trunk port status

To display the status of the all trunk ports of a Stinger unit, use the -a option:

```
admin> atmtrunks -a
All OC3 ATM trunks:
                 OC3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 17  1 }        (Up      Assign  UP      UP     00801)
  Line    {    1 17  2 }        (Up      Assign  UP      UP     00802)
  Line    {    1 18  1 }        (Up      Assign  UP      UP     00851)
  Line    {    1 18  2 }        (Down    Idle    DOWN    DOWN   00852)

All DS3 ATM trunks:
                 DS3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 18  3 }        (Down    Idle    DOWN    DOWN   00853)
  Line    {    1 18  4 }        (Down    Idle    DOWN    DOWN   00854)
  Line    {    1 18  5 }        (Down    Idle    DOWN    DOWN   00855)
  Line    {    1 18  6 }        (Down    Idle    DOWN    DOWN   00856)

All E3 ATM trunks:
                 E3 Lines        (dvOp   dvUpSt  dvRq    sAdm    nailg)

All OC12  lines:
                                (dvOp    dvUpSt  dvRq    sAdm   nailg)
```

To display the status of the all available trunk ports on a Stinger unit, use the -f option:

```
admin> atmtrunks -f
Disabled OC3 ATM trunks:
                 OC3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 18  2 }        (Down    Idle    DOWN    DOWN   00852)

Disabled DS3 ATM trunks:
                 DS3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 18  3 }        (Down    Idle    DOWN    DOWN   00853)
  Line    {    1 18  4 }        (Down    Idle    DOWN    DOWN   00854)
  Line    {    1 18  5 }        (Down    Idle    DOWN    DOWN   00855)
  Line    {    1 18  6 }        (Down    Idle    DOWN    DOWN   00856)

Disabled E3 ATM trunks:
                 E3 Lines        (dvOp   dvUpSt  dvRq    sAdm    nailg)

Disabled OC12 lines:
                                (dvOp    dvUpSt  dvRq    sAdm   nailg)
```

To display all disabled trunk ports on a Stinger unit, use the -d option:

```
admin> atmtrunks -d
Disabled OC3 ATM trunks:
                 OC3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 18  2 }        (Down    Idle    DOWN    DOWN   00852)

Disabled DS3 ATM trunks:
                 DS3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 18  3 }        (Down    Idle    DOWN    DOWN   00853)
```

```
  Line    {    1 18  4 }        (Down    Idle    DOWN    DOWN   00854)
  Line    {    1 18  5 }        (Down    Idle    DOWN    DOWN   00855)
  Line    {    1 18  6 }        (Down    Idle    DOWN    DOWN   00856)

Disabled E3 ATM trunks:
                 E3 Lines        (dvOp   dvUpSt  dvRq    sAdm    nailg)

Disabled OC12 lines:
                                (dvOp    dvUpSt  dvRq    sAdm   nailg)
```

To display all trunk ports that are in use, enter the command with the `-u` option:

```
admin> atmtrunks -u
In-Use OC3 ATM trunks:
                 OC3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1 17  1 }        (Up      Assign  UP      UP     00801)
  Line    {    1 17  2 }        (Up      Assign  UP      UP     00802)
  Line    {    1 18  1 }        (Up      Assign  UP      UP     00851)

In-Use DS3 ATM trunks:
                 DS3 Lines      (dvOp   dvUpSt  dvRq    sAdm    nailg)

In-Use E3 ATM trunks:
                 E3 Lines        (dvOp   dvUpSt  dvRq    sAdm    nailg)

In-Use OC12 lines:
                                (dvOp    dvUpSt  dvRq    sAdm   nailg)
```

Resetting trunk statistics

To reset the trunk statistics for OC3-ATM and DS3-ATM trunk modules, use the `-c` option. The following example clears trunk statistics for all trunks:

```
admin> atmtrunks -c
Clearing ATM Trunk Statistics for All Trunks
```

The following example clears trunk statistics for a specific slot:

```
admin> atmtrunks -c 17
Clearing ATM Trunk Statistics for Slot 17
```

Displaying LIM interfaces

Following are sample commands that display information about interfaces of different LIMs.

Displaying ADSL LIM interfaces

The following sample `dmtaldsllines` commands shows information about the ADSL interfaces of a Stinger unit with a 48-port ADSL LIM in slot 3 and slot 11, and a 24-port ADSL LIM in slot 5.

The `dmtaldsllines -a` command displays the status and nailed group information for all ADSL ports in the Stinger unit. The output of the following command is abbreviated.

```
admin> dmtaldsllines -a
```

```
                                  (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1  3  1 }         (Down    Idle    DOWN    DOWN   00101)
  Line    {    1  3  2 }         (Down    Idle    DOWN    DOWN   00102)
  Line    {    1  3  3 }         (Down    Idle    DOWN    DOWN   00103)
  ...
  ...
  ...
  Line    {    1  3 46 }         (Down    Idle    DOWN    DOWN   00146)
  Line    {    1  3 47 }         (Down    Idle    DOWN    DOWN   00147)
  Line    {    1  3 48 }         (Down    Idle    DOWN    DOWN   00148)
  Line    {    1  5  1 }         (Down    Idle    DOWN    DOWN   00201)
  Line    {    1  5  2 }         (Up      Assign  UP      UP     00202)
  Line    {    1  5  3 }         (Up      Assign  UP      UP     00203)
  ...
  ...
  ...
  Line    {    1  5 22 }         (Down    Idle    DOWN    DOWN   00222)
  Line    {    1  5 23 }         (Down    Idle    DOWN    DOWN   00223)
  Line    {    1  5 24 }         (Down    Idle    DOWN    DOWN   00224)
  Line    {    1 11  1 }         (Down    Idle    DOWN    DOWN   00501)
  Line    {    1 11  2 }         (Down    Idle    DOWN    DOWN   00502)
  Line    {    1 11  3 }         (Down    Idle    DOWN    DOWN   00503)
  ...
  ...
  ...
  Line    {    1 11 46 }         (Down    Idle    DOWN    DOWN   00546)
  Line    {    1 11 47 }         (Down    Idle    DOWN    DOWN   00547)
  Line    {    1 11 48 }         (Down    Idle    DOWN    DOWN   00548)
```

The following sample command displays all available ADSL lines in the Stinger unit:

```
admin> dmtaldsllines -f
Free DMT ADSL lines:
                                (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1  3  5 }        (Up      Idle    UP      UP     00051)
  Line    {    1  5  1 }        (Up      Idle    UP      UP     00301)
```

The following sample command displays all disabled ADSL lines in the Stinger unit:

```
admin> dmtaldsllines -d
Disabled DMT ADSL lines:
                                (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1  2  2 }        (Down    Idle    DOWN    DOWN   00052)
  Line    {    1  2  3 }        (Down    Idle    DOWN    DOWN   00053)
  Line    {    1  2  4 }        (Down    Idle    DOWN    DOWN   00054)
  Line    {    1  2  5 }        (Down    Idle    DOWN    DOWN   00055)
```

The following sample command displays all the ADSL lines that are in use.

```
admin> dmtaldsllines -u
                                (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1  5  2 }        (Up      Assign  UP      UP     00202)
  Line    {    1  5  3 }        (Up      Assign  UP      UP     00203)
```

Displaying T1 and E1 interfaces

The following sample command displays information about the T1 modules installed in slot 4 and slot 6:

```
admin> imalines -a
All IMA lines:
                                (dvOp  dvUpSt  dvRq   sAdm  lMode  Nailg)
 Line  {   1  4  1 }            (Up     Assign UP     UP     ATM   00151)
 Line  {   1  4  2 }            (Down   Idle   DOWN   DOWN   ATM   00152)
...
...
...
 Line  {   1  6  6 }            (Up     Assign UP     UP     ATM   00256)
 Line  {   1  6  7 }            (Up     Assign UP     UP     ATM   00257)
 Line  {   1  6  8 }            (Up     Assign UP     UP     ATM   00258)
```

Testing IMA connectivity

To initiate a test pattern procedure that can detect improperly configured IMA connections, according to ATM Forum IMA specifications, use the `ima-tpp` command. For syntax information, see the *Stinger Reference*.

The following sample command initiates test pattern 200 on link 7 in IMA group `ima3_4` and requests a report of test results:

```
admin> ima-tpp ima3_4 7 200 yes yes
IMA TPP request sent, please wait for a response ...
admin> TPP test result:

ImaGroupName=ima3_4, ImaTppTestResult=TPP_PASSED
2 links configured in IMA group ima3_4, all passed TPP test!
```

Working with IMA groups

You can display the status of IMA groups configured on a Stinger system and configure the system to monitor and reinitialize IMA groups that are out of service.

Displaying IMA groups

The `imagroups` command displays the status of IMA groups that have been created, or those that are in use, free, or disabled on T1 or E1 modules in a Stinger unit. For example:

```
admin> imagroups -a
All IMA groups:
                                (dvOp   dvUpSt  dvRq    sAdm       nailg)
     ima101 {  1  3  9 }        (Down    Idle    UP      UP          101)
```

Reinitializing out-of-service IMA groups

You can configure the system to continuously monitor the status of an IMA group. If this feature is enabled for an IMA group, and the system detects that the IMA group is out of service, the system automatically reinitializes the IMA group and restores it to service.

You can enable this feature for an IMA group by setting the `ima-auto-restart` parameter in the `imagroup` profile to `yes`. For example:

```
[in IMAGROUP/ima1]
admin> ima-auto-restart = yes
```

Displaying DSL performance settings

The `adslmibdisplay` commands display ADSL statistics stored in MIB variables. To use the `adslmibdisplay` command, you must first open a session with an ADSL LIM using the `open` *`shelf slot`* command.

For syntax information, see the *Stinger Reference*.

Displaying the current time

The `adslmib t` *`port`* command displays the current time retrieved from the active control module. For example:

```
gs-72-1/3> adslmib t 1
Date: 06/04/2004        Time: 21:06:56
```

Displaying ADSL physical entries

The `adslmib a` *`port`* command displays basic ATU-C and ATU-R information. For example:

```
gs-72-1/3> adslmib a 1
```

<<< ATU-C Physical Entry >>>

```
           SerialNum: STGR-LIM-GSA-72
            VendorID: 000000000000000A
             Version: GO-C.12.3.2
        Noise Margin: 130
   Power Attenuation: 20
              Status: 1
            Tx Power: 80
     Attainable Rate: 21604000
```

<<< ATU-R Physical Entry >>>

```
           SerialNum:
            VendorID: FFB54753504E0007
             Version:
        Noise Margin: 50
   Power Attenuation: 50
              Status: 1
            Tx Power: 0
     Attainable Rate: 1164000
```

Displaying channel entries

The `adslmib b` *`port`* command displays ATU-C and ATU-R train-up data. For example:

```
gs-72-1/3> adslmib b 1
```

<<< ATU-C Channel Entry >>>

```
     InterleaveDelay: 16
          CurrTxRate: 20297000
          PrevTxRate: 0
        CrcBlkLength: 43131
```

<<< ATU-R Channel Entry >>>

```
     InterleaveDelay: 16
          CurrTxRate: 1018300
          PrevTxRate: 0
        CrcBlkLength: 2163
```

Displaying interval statistics for disruption of service events

The `adslmibmgr c` *port* command displays interval statistics for disruption of service events. For example:

```
gs-72-1/3> adslmib c 1
Lofs: 0
                     Loss: 0
                     Lols: 0
                     Lprs: 0
                      ESs: 0
                    Inits: 1
   Num of Valid Intervals: 13
```

Displaying interval totals for ADSL block counts

The `adslmib d` *port* command displays ADSL block statistics. For example:

```
gs-72-1/3> adslmib d 1
                   RxBlks: 617612
                   TxBlks: 638548
                 CorrBlks: 57
               UncorrBlks: 0
   Num of Valid Intervals: 13
```

Displaying disruption of service statistics

The `adslmib p` *port* command displays disruption of service statistics for the current 15-minute interval, current one-day interval, and previous one-day interval. For example:

```
gs-72-1/3> adslmib p 1
<<< ATU-C Performance Data Entry >>>
                     Lofs: 0
                     Loss: 0
                     Lols: 0
                     Lprs: 0
                      ESs: 0
                    Inits: 1
           ValidIntervals: 13
         InvalidIntervals: 0
     Curr15MinTimeElapsed: 897 sec
            Curr15MinLofs: 0 sec
            Curr15MinLoss: 0 sec
```

```
          Curr15MinLols: 0 sec
          Curr15MinLprs: 0 sec
           Curr15MinESs: 0 sec
         Curr15MinInits: 0
    Curr1DayTimeElapsed: 12597 sec
           Curr1DayLofs: 0 sec
           Curr1DayLoss: 0 sec
           Curr1DayLols: 0 sec
           Curr1DayLprs: 0 sec
            Curr1DayESs: 0 sec
          Curr1DayInits: 1
       Prev1DayMoniSecs: 0 sec
           Prev1DayLofs: 0 sec
           Prev1DayLoss: 0 sec
           Prev1DayLols: 0 sec
           Prev1DayLprs: 0 sec
            Prev1DayESs: 0 sec
          Prev1DayInits: 0
<<< ATU-R Performance Data Entry >>>
                   Lofs: 0
                   Loss: 0
                   Lols: 0
                   Lprs: 0
                    ESs: 0
                  Inits: 0
         ValidIntervals: 13
       InvalidIntervals: 0
   Curr15MinTimeElapsed: 897 sec
          Curr15MinLofs: 0 sec
          Curr15MinLoss: 0 sec
          Curr15MinLols: 0 sec
          Curr15MinLprs: 0 sec
           Curr15MinESs: 0 sec
         Curr15MinInits: 0
    Curr1DayTimeElapsed: 12597 sec
           Curr1DayLofs: 0 sec
           Curr1DayLoss: 0 sec
           Curr1DayLols: 0 sec
           Curr1DayLprs: 0 sec
            Curr1DayESs: 0 sec
          Curr1DayInits: 0
       Prev1DayMoniSecs: 0 sec
           Prev1DayLofs: 0 sec
           Prev1DayLoss: 0 sec
           Prev1DayLols: 0 sec
           Prev1DayLprs: 0 sec
            Prev1DayESs: 0 sec
          Prev1DayInits: 0
```

Displaying ADSL block counts

The `adslmib q` *`port`* command displays ADSL block counts for the current 15-minute interval, current one-day interval, and previous one-day interval. For example:

```
gs-72-1/3> adslmib q 1
<<< ATU-C Channel Performance Data Entry >>>
                   RxBlks: 675786
                   TxBlks: 698694
                 CorrBlks: 60
                 UcorBlks: 0
           ValidIntervals: 14
         InvalidIntervals: 0
     Curr15MinTimeElapsed: 154
          Curr15MinRxBlks: 7729
          Curr15MinTxBlks: 7991
        Curr15MinCorrBlks: 0
        Curr15MinUcorBlks: 0
      Curr1DayTimeElapsed: 12754
           Curr1DayRxBlks: 675786
           Curr1DayTxBlks: 698694
         Curr1DayCorrBlks: 60
         Curr1DayUcorBlks: 0
         Prev1DayMoniSecs: 0
           Prev1DayRxBlks: 0
           Prev1DayTxBlks: 0
         Prev1DayCorrBlks: 0
         Prev1DayUcorBlks: 0

<<< ATU-R Channel Performance Data Entry >>>
                   RxBlks: 698694
                   TxBlks: 675786
                 CorrBlks: 869
                 UcorBlks: 0
           ValidIntervals: 14
         InvalidIntervals: 0
     Curr15MinTimeElapsed: 154
          Curr15MinRxBlks: 7991
          Curr15MinTxBlks: 7729
        Curr15MinCorrBlks: 11
        Curr15MinUcorBlks: 0
      Curr1DayTimeElapsed: 12754
           Curr1DayRxBlks: 698694
           Curr1DayTxBlks: 675786
         Curr1DayCorrBlks: 1015
         Curr1DayUcorBlks: 0
         Prev1DayMoniSecs: 0
           Prev1DayRxBlks: 0
           Prev1DayTxBlks: 0
         Prev1DayCorrBlks: 0
         Prev1DayUcorBlks: 0
```

Displaying performance data interval

The `adslmib i` *`port interval-offset`* command displays disruption of service statistics for the specified 15 minute interval. For example:

```
gs-72-1/3> adslmib i 1 1
<<< ATU-C Interval Performance Data Entry >>>
                   Number: 13
                     Lofs: 0 sec
                     Loss: 0 sec
                     Lols: 0 sec
                     Lprs: 0 sec
                      ESs: 0 sec
                    Inits: 0
                ValidData: 1
```

<<< ATU-R Interval Performance Data Entry >>>

```
                   Number: 13
                     Lofs: 0 sec
                     Loss: 0 sec
                     Lols: 0 sec
                     Lprs: 0 sec
                      ESs: 0 sec
                    Inits: 0
                ValidData: 1
gs-72-1/3> adslmib i 1 2
```

<<< ATU-C Interval Performance Data Entry >>>

```
                   Number: 12
                     Lofs: 0 sec
                     Loss: 0 sec
                     Lols: 0 sec
                     Lprs: 0 sec
                      ESs: 0 sec
                    Inits: 0
                ValidData: 1
```

<<< ATU-R Interval Performance Data Entry >>>

```
                   Number: 12
                     Lofs: 0 sec
                     Loss: 0 sec
                     Lols: 0 sec
                     Lprs: 0 sec
                      ESs: 0 sec
                    Inits: 0
                ValidData: 1
```

Displaying ADSL block statistics (channel performance) intervals

The `adslmib j` *`port interval-offset`* command displays channel performance (ADSL block statistics) for the specified interval.

For example, the following command shows ADSL block statistics for the last completed 15-minute interval:

```
gs-72-1/3> adslmib j 1 1
```

```
<<< ATU-C Interval Channel Performance Data Entry >>>
                  Number: 14
                recvBlks: 49560
                  txBlks: 51240
                corrBlks: 3
              uncorrBlks: 0
               ValidData: 1

<<< ATU-R Interval Channel Performance Data Entry >>>
                  Number: 14
                recvBlks: 51240
                  txBlks: 49560
                corrBlks: 63
              uncorrBlks: 0
               ValidData: 1
```

The following sample command shows ADSL block statistics for the second to last completed 15-minute interval:

```
gs-72-1/3> adslmib j 1 2
```

```
<<< ATU-C Interval Channel Performance Data Entry >>>
                  Number: 13
                recvBlks: 50445
                  txBlks: 52155
                corrBlks: 3
              uncorrBlks: 0
               ValidData: 1

<<< ATU-R Interval Channel Performance Data Entry >>>
                  Number: 13
                recvBlks: 52155
                  txBlks: 50445
                corrBlks: 58
              uncorrBlks: 0
               ValidData: 1
```

Displaying service traps sent

The `adslmib m` *port* command displays statistics about the number of disruption of service traps sent. For example:

```
gs-72-1/3> adslmib m 1
          Monitor Seconds: 13233
        Enable Old Status: 1
    Enable Current Status: 1
           Lofs Trap Sent: 0
           Loss Trap Sent: 0
           Lprs Trap Sent: 0
           Lols Trap Sent: 0
            ESs Trap Sent: 0
   Rate Changed Trap Sent: 0
```

```
    Init Fail Trap Sent: 0
```

Displaying time and interval information

The `adslmib z` *`port`* command displays time and interval information. For example:

```
gs-72-1/3> adslmib z 1
  Interval Elapsed Second: 305
   Elapsed Interval Count: 15
  Elapsed Second In A Day: 13805
      Adjusted One Second: 1000
```

Displaying initialization failure statistics

The `adslmib f` *`port`* command displays initialization failure counts. For example:

```
gs-72-1/3> adslmib f 1
           Data Init Fail: 0
         Config Init Fail: 0
       Protocol Init Fail: 0
          No Peer Seconds: 0
```

Monitoring LIM and LIM port redundancy

You can configure a redundant line interface module (LIM) that you can manually activate—or configure a Stinger unit to automatically activate—when a previously active LIM or LIM port goes offline.

A fast-restore capability enables Stinger units with redundant control modules to restore the data path of cross-connections within about 10 seconds following a failover of the primary control module. The fast-restore operation restores the data path of cross-connections (virtual circuits that use `atm-circuit` encapsulation) in the application-specific integrated circuit (ASIC) switching fabric while TAOS call-control mechanisms are reestablishing connections.

Terminating connections (virtual circuits that use `atm` encapsulation), OAM data paths, and soft permanent virtual circuits (SPVCs) are not affected by the fast-restore operation. Those connections are reestablished in the usual time frame via TAOS call control.

For configuration instructions for redundant LIMs and ports, see the module guide for your particular device.

To determine the status of LIMs and ports configured for redundancy, use the following profiles and commands:

- `lim-sparing-status` profile and numbered subprofiles, which indicate redundancy status on the Stinger unit and the current configuration
- Individual LIM line status profiles, which indicate port redundancy status for the selected port and information about the spare LIM
- `rearslotshow` command
- `splimports` command

Overview of port redundancy parameters

The status profile for each interface indicates whether redundancy is enabled and provides other useful information about the status of the redundancy function on a LIM (see "Using profiles to monitor LIM and trunk interfaces" on page 4-2). Following is an overview of the parameters that report redundancy information.

Parameter	Specifies
spare-physical-address	Shelf, slot, and port number of spare LIM.
sparing-state	State of the redundancy function. If redundancy is not enabled, sparing-none is the value. If redundancy is enabled and the LIM slot contains a primary LIM, the value can be primary-active or primary-inactive. If redundancy is enabled and the LIM slot contains the secondary LIM, the value can be secondary-active or secondary-inactive.
sparing-change-reason	How redundancy is activated. Valid values are inactive, manual, and automatic.
sparing-change-time	Time that the last change in redundancy state occurred.
sparing-change-counter	Number of redundancy changes (for example, primary to secondary or secondary to primary). The counter is reset to zero each time the Stinger unit is turned on.

Verifying port redundancy status

The following sample commands display the status of redundancy operations on an active line:

```
admin> read sdsl-stat { 1 4 6}
SDSL-STAT/{ shelf-1 slot-4 6 } read

admin> list
[in SDSL-STAT/{ shelf-1 slot-4 6 }]
.....
spare-physical-address = { shelf-1 slot-16 6 }
sparing-state = primary-inactive
sparing-change-reason = manual
sparing-change-time = 309108872
sparing-change-counter = 1
.....
```

Verifying slot configuration redundancy status

The rearslotshow command shows the status of all slots used for line protection modules (LPMs), path selector modules (PSMs), and copper loop test (CLT) modules. It also reports on the status of the midplane sparing bus.

For example, suppose that a Stinger FS is equipped with ADSL LIMs and SDSL LIMs. The 24-port ADSL LIM in slot 1 has failed and is being replaced by the 24-port ADSL LIM in slot 14. The rearslotshow command reports the following.

```
admin> rearslotshow
[ 1 ] 91 24 port Enhanced LPM
[ 2 ] 0 Empty ( IRM, LPM )
[ 3 ] 0 Empty ( IRM, LPM )
[ 4 ] 92 48 port Enhanced LPM)
[ 5 ] 0 Empty ( IRM, LPM )
[ 6 ] 0 Empty ( IRM, LPM )
[ 7 ] 0 Empty ( IRM, LPM )
[ 10 ] 0 Empty ( IRM, LPM )
[ 11 ] 0 Empty ( IRM, LPM )
[ 12 ] 0 Empty ( IRM, LPM )
[ 13 ] 0 Empty ( IRM, LPM )
[ 14 ] 93 Path Selector Module ( PSM )
[ 15 ] 0 Empty ( IRM, LPM )
[ 16 ] 94 Copper Loop Tester ( CLT )

 Midplane sparing bus usage :

   7            6           5            4   3
 2109 8765 4321 0987 6543 2109 8765 4321 0987
 .... .... .... .... .... .... .... .... ....

        3            2           1
 6543 2109 8765 4321 0987 6543 2109 8765 4321
 .... .... .... .... .... .... .... .... ....
 Test Bus usage : not applicable
```

Note Slots that are equipped with interface redundancy modules (IRMs) or LPMs with redundancy (LPM-Rs) in older Stinger units are reported as `Empty` by the `rearslotshow` command.

Note When a copper loop is being tested on a Stinger LS with a PSM or a CLT module, the `rearslotshow` command does not display any midplane sparing bus usage.

Displaying redundancy or ignore-lineup settings for LIM ports

The `splimports` command displays ports that are enabled for automatic or manual redundancy or the ignore-lineup feature. (This feature allows the unit to accept calls on a port whether the line state is UP or DOWN, as long as the slot is operational and the port is enabled.) To display syntax information, enter the command without any arguments or see the *Stinger Reference*.

The following sample command displays ports in slot 7 that are enabled with the systemwide setting for the ignore-lineup feature:

```
admin> splimports -i -s 7
Line            Type
--------------------
1-7-2           ADSL
1-7-7           ADSL
1-7-11          ADSL
...
...
```

```
...
1-7-22          ADSL
1-7-23          ADSL
1-7-24          ADSL
```

The following sample command displays all ports that are disabled for the ignore-lineup feature:

```
admin> splimports -i -n
Line            Type
--------------------
1-7-1           ADSL
1-7-4           ADSL
1-7-5           ADSL
1-7-6           ADSL
1-7-9           ADSL
1-7-14          ADSL
1-16-21         HDSL2
1-16-22         HDSL2
1-16-23         HDSL2
```

The following sample command displays all ports that are configured for automatic or manual redundancy:

```
admin> splimports -s
Line            Type        Sparing Mode
----------------------------------------
1-3-1           SDSL        Manual
1-3-2           SDSL        Auto
1-3-3           SDSL        Manual
1-7-4           ADSL        Auto
1-7-5           ADSL        Manual
1-7-6           ADSL        Auto
```

The following sample command displays ports that are configured for automatic redundancy:

```
admin> splimports -s -a
Line            Type        Sparing Mode
----------------------------------------
1-3-2           SDSL        Auto
1-7-4           ADSL        Auto
1-7-6           ADSL        Auto
```

Monitoring redundant trunk groups

To display information about the Stinger unit's trunk port redundancy operations, use the `-s` option with the `atmtrunks` command. The following sample command shows the output of the `atmtrunks -s` command.

```
admin> atmtrunks -s
 Group   Primary         Sparing         State   SparingChangeTime
1   18 -  1         17 -  1         Auto_S  410719627
```

Monitoring Network Processor operations

5

Monitoring network processor operations

The system constantly collects traffic, rate, and error statistics for network processor operations. You can use the `stats` command to collect and display network processor operations on IP control modules and the Fast Ethernet Trunk module.

A set of debug command, `info np`, also provide information about IP control modules and Fast Ethernet trunk modules. For more information about using the `info np` commands, see "Control module debugging" on page A-25.

Displaying network processor bandwidth allocation

To enable you to configure NP port managers and to check their status, the system creates the following profiles at startup or when a port first becomes active (such as when a module is first installed):

- `np-port`—Configuration profile used to specify a requested fixed bandwidth rate.
- `np-port-stat`—Read-only status profile that indicates the actual bandwidth allocated by the NP port manager.

For a discussion about how the system allocates bandwidth on a Stinger system, see the *Stinger IP Control Module Guide* and the *Stinger ATM Configuration Guide*.

The `np-port-stat` profile contains the following parameters, shown with representative values for a LIM in slot 1. This profile is read-only—it cannot be modified manually.

```
[in NP-PORT-STAT/{ shelf-1 slot-1 0 }]
port-address* = { shelf-1 slot-1 0 }
allocated-fixed-bandwidth = 152576
bandwidth-allocation-status = bandwidth-serviced
```

Parameter	Setting
`port-address`	Address of the LIM slot, or of the individual Gigabit Ethernet or trunk port, associated with an NP port manager.

Parameter	Setting	
allocated-fixed-bandwidth	Fixed-rate bandwidth that has been allocated for the interface.	
bandwidth-allocation- status	Indicates whether the system was able to fully allocate the requested fixed-rate bandwidth.	
	bandwidth-serviced	The requested fixed-rate bandwidth is fully allocated.
	bandwidth-starved	The allocated bandwidth is less than the requested fixed-rate bandwidth.

For example, the following commands show the requested fixed rate for a trunk port in slot 17, and display the bandwidth allocation status:

```
admin> get np-port { 1 17 1 }
[in NP-PORT/{ shelf-1 trunk-module-1 1 }]
port-address* = { shelf-1 trunk-module-1 1 }
requested-fixed-bandwidth = 152576
admin> get np-port-stat { 1 17 1 }
[in NP-PORT-STAT/{ shelf-1 trunk-module-1 1 }]
port-address* = { shelf-1 trunk-module-1 1 }
allocated-fixed-bandwidth = 152576
bandwidth-allocation-status = bandwidth-serviced
```

Viewing bandwidth allocation

The `info np pm` (port managers) debug command displays nonfixed rates and bandwidth distribution.

The `info np pm bwdist` command displays the requested bandwidth from the `np-port` profile and allocated bandwidth from the `np-port-stat` profile. If the requested bandwidth is fully allocated, the status reports `BW SERVICED` and reports `BW STARVED` if bandwidth is not fully allocated. For example:

```
admin> info np pm bwdist
NP PM Bandwidth Distribution
 System Aggregate Allocated BW : 3997620
   Aggregate User Requested BW : 4469304
   Available system BW : 2380

  Port    Requested   Allocated   Status
 {1 1 0}   100000   100128   BW SERVICED
 {1 2 0}   300000   152576   BW STARVED
 {1 3 0}   152576   152576   BW SERVICED
 {1 4 0}   152576   152576   BW SERVICED
 {1 5 0}   152576   152576   BW SERVICED
 {1 6 0}   152576   152576   BW SERVICED
 {1 7 0}   152576   152576   BW SERVICED
 {1 10 0}   152576   152576   BW SERVICED
 {1 11 0}   152576   152576   BW SERVICED
 {1 12 0}   152576   152576   BW SERVICED
 {1 13 0}   152576   152576   BW SERVICED
 {1 14 0}   152576   152576   BW SERVICED
```

```
 {1 16 0}   152576   152576   BW SERVICED
 {1 17 1}   41408   41377   BW SERVICED
 {1 17 2}   41408   41377   BW SERVICED
 {1 18 1}   152576   152576   BW SERVICED
 {1 18 2}   152576   152576   BW SERVICED
 {1 0 2}   1000000   999936   BW SERVICED
 {1 0 3}   1000000   675738   BW STARVED
```

The `info np pm rates` command displays nonfixed rates. For example:

```
admin> info np pm rates
NP Get PM Rate Command
Port{1 1 0} NonFixedRate :100000
Port{1 2 0} NonFixedRate :609375
Port{1 3 0} NonFixedRate :152343
Port{1 4 0} NonFixedRate :152343
Port{1 5 0} NonFixedRate :152343
Port{1 6 0} NonFixedRate :152343
Port{1 7 0} NonFixedRate :152343
CM#8  NonFixedRate :15820
CM#9  NonFixedRate :15820
Port{1 10 0} NonFixedRate :609375
Port{1 11 0} NonFixedRate :152343
Port{1 12 0} NonFixedRate :609375
Port{1 13 0} NonFixedRate :609375
Port{1 14 0} NonFixedRate :152343
Port{1 15 0} NonFixedRate :609375
Port{1 16 0} NonFixedRate :609375
Port{1 17 1} NonFixedRate :41210
Port{1 17 2} NonFixedRate :41210
Port{1 18 1} NonFixedRate :152343
Port{1 18 2} NonFixedRate :152343
Port{1 0 2} NonFixedRate :992592
Port{1 0 3} NonFixedRate :674074
PCI  NonFixedRate :13281
```

Monitoring network processor operations on IP control modules

For IP control modules, the `stats` command enables you to collect and display statistics for the following:

- APP driver statistics.
- IP QoS statistics.
- Connection
- FPP
- Global RSP
- Logical port traffic
- Scheduler

The command syntax is as follows:

```
stats [enable|disable]|traffic|rate|error|clear np option
```

For complete syntax information, see the *Stinger Reference*.

Enabling and disabling statistics collection

The `stats enable/disable` command is applicable only for IP QoS statistics. For all other network processor operations, statistics monitoring is always enabled.

Monitoring IP QoS

To collect IP QoS statistics, determine the WAN interface number for the connection for which you would like to monitor IP QoS. Then, enable the system to start monitoring IP QoS for the VLAN traffic.

You can then use the debug command `info np` to display information about IP QoS monitoring and the `stats` command to display various statistics.

For examples on how to use monitor IP QoS, see the *Stinger IP Control Module Configuration Guide.*

Enabling the system to start monitoring IP QoS traffic

The following sample command enables the system to start monitoring IP QoS for the VLAN circuit. For example:

```
admin> stats enable np ipqos 18
IP QOS monitoring information for IF 18
IP QOS profile                :bir-flow
CLASSIFICATION & FLOW
  Default classification      :provided
  Number of classified DID    :8
  Number of class rules       :6
  Number of multicast IP flow :1
    Multicast IP flow 1
      Configuration ID        :1
      Group matching the flow :0
      Destination IP address  :224.1.1.0
      Destination IP netmask  :255.255.255.0
      Priority                :7
  Number of unicast IP flow   :2
    Unicast IP flow 1
      Configuration ID        :2
      Flow ID                 :10
      CIR (Kbps)              :100
      CBS (bytes)             :3000
      EBS (bytes)             :30000
      Green Priority/Cos ID   :5/3
      Yellow Priority/Cos ID  :4/4
      Red Priority/ Cos ID    :-1/0
    Unicast IP flow 2
      Configuration ID        :3
      Flow ID                 :11
      CIR (Kbps)              :200
      CBS (bytes)             :3000
      EBS (bytes)             :3000
      Green Priority/Cos ID   :3/5
      Yellow Priority/Cos ID  :-1/0
      Red Priority/ Cos ID    :-1/0
```

```
PRIORITIES
  Number of priority          :5
  Lowest priority             :0
  Mapping priority/COS        :P[0]=6 P[1]=x P[2]=x P[3]=5 P[4]=4 P[5]=3
P[6]=x P[7]=2
SCHEDULING
  Line Rate                   :150015
  Data queue Id               :8276
  Scheduler ID                :2
  PDU type                    :cell
  Number of COS queues        :6
  ATM service category        :VBR non real time
  PCR (cell per sec)          :1885
  SCR (cell per sec)          :1649
  MBS                         :100
  TS parameters               :00 b8 64 05 00 d2 52 00
  TM parameters               :06 4b 00 c8 00 c8 00 00
Main DID list
ID       ID (Hex)     Qid      COS     Type
505      0x1f9         8277     1      exp
43518    0xa9fe        8282     6      ucast
43528    0xaa08        8282     6      arp
Classified DID list
ID       ID (Hex)     Qid      COS     Type
43520    0xaa00        8278     2      ucast
43522    0xaa02        8279     3      ucast
43524    0xaa04        8280     4      ucast
43526    0xaa06        8281     5      ucast
43530    0xaa0a        8278     2      arp
43532    0xaa0c        8279     3      arp
43534    0xaa0e        8280     4      arp
43536    0xaa10        8281     5      arp
```

Displaying IP QoS monitoring information

To display IP QoS information for an interface, enter the `info np ipqos` command and specify an interface number. For example:

```
admin> info np ipqos 1
IP QOS monitoring start for IF 1
IP QOS profile                :default
CLASSIFICATION & FLOW
  Default classification      :provided
  Number of classified DID    :0
  Number of class rules       :0
  Number of multicast IP flow :1
    Multicast IP flow 1
      Group matching the flow :0
      Destination IP address  :224.0.0.0
      Destination IP netmask  :224.0.0.0
      Priority                :1
  Number of unicast IP flow   :0
PRIORITIES
```

```
  Number of priority         :2
  Lowest priority            :0
  Mapping priority/COS       :P[0]=3 P[1]=2 P[2]=x P[3]=x P[4]=x P[5]=x
P[6]=x P[7]=x
SCHEDULING
  Line Rate                  :1000000
  Data queue Id              :8286
  Scheduler ID               :0
  PDU type                   :packet
  Number of COS queues       :3
  Scheduling priority        :3
  Peak Rate (Kbps)           :49997
  TS parameters              :00 13 01 0c 00 00 00 00
  TM parameters              :06 0f 09 19 05 dc 00 00
```

Displaying IP QoS monitoring counters

To display the IP QoS monitoring traffic statistics, enter the `stats traffic np ipqos` command. For example:

```
admin> stats traffic np ipqos 18
FPP counters for IF 18
Priority     COS     Counter
  drp        -         348
  exp        1         3
  7          2         0
  5          3         1870
  4          4         8
  3          5         0
  0          6         0
Flow counters for IF 18
Flow     Flow ID     Priority     Green         Yellow             Red
  2        10          5          1870          8                  348
  3        11          3          0             0                  0
TM counters for IF 18
Priority     COS      MTU drop     Queue drop    Sched drop    Port drop
exp          1        0            0             0             0
7            2        0            0             0             0
5            3        0            0             0             0
4            4        0            0             0             0
3            5        0            0             0             0
0            6        0            0             0             0
```

Clearing IP QoS monitoring statistics

To clear the IP QoS monitoring counters, enter the `stats clear np ipqos` command. For example:

```
admin> stats clear np ipqos 15
IP QOS monitoring. Counter cleared for IF 15
```

Disabling IP QoS monitoring

To disable IP QoS monitoring, enter the `stats disable np ipqos` command. For example:

```
admin> stats disable np ipqos 15
IP QOS monitoring. display counter for IF 15
QoS monitoring direction: downstream
Counter COS 2 :917
Counter COS 3 :0
IP QOS monitoring ended for IF 15
```

Monitoring statistics for a connection

You can use the `stat traffic|error np conn` *`slot ifnum`* command to display traffic and error statistics for network processor connections.

Optional arguments are:

- *`slot`*—Display statistics only for the specified slot.
- *`slot ifnumber`*—Display statistics only for the specified interface. You must also specify a slot number.

Displaying traffic statistics for a connection

The `stats traffic np conn` *`slot ifnum`* command displays statistics for a connection. You must specify a slot and interface number. For example:

```
admin> stats traffic np conn 7 21
Interface Statistics for IF 21:
--------------------------------
Byte received                   0    Bytes transmitted             36564
Unicast packet received         0    Unicast packet transmitted     653

Statistics for Spoof:
----------------------
Spoof Discard Count: 0
```

Displaying error statistics for a connection

To display error statistics for a connection, use the `stats error np conn` *`slot ifnum`* command. For example the following command displays statistics for interface 21 of slot 7:

```
admin> stats error np conn 7 21
Interface Statistics for IF 21:
--------------------------------
Input Packet discarded          0    Output packet discarded       0
Input errored packet            0    Output errored packet         0
Input unknown protocol          0

Statistics for Spoof:
----------------------
Spoof Discard Count: 0

Queue Discard:
```

```
----------------
Discard for Queue 291   :0x0000
Discard for Queue 293   :0x0000
Discard for Queue 294   :0x0000
Discard for Queue 295   :0x0000
```

Clearing statistics for a connection

To clear statistics for a connection, enter the `stats clear np conn` *`slot ifnum`* command. For example:

```
admin> stats clear np conn 7 21
Connection counters cleared
```

Monitoring FPP statistics

You can use the `stats traffic|error np fpp` command to display FPP traffic and error statistics. For information about how to adjust FPP compaction, see "Adjusting network processor FPP memory compaction" on page 5-20

Displaying FPP traffic statistics

The `stats traffic np fpp` command displays FPP statistics. For example:

```
admin> stats traffic np fpp
Statistics for Ethernet Filters:
---------------------------------
Forwarded Packets  : 0
Total Packets      : 0

Statistics for FPP timeout counts:
------------------------------------
FPP PDU timout count      : 0x000000
FPP PDU overflow count    : 0x000000
FPP PDU rq overflow count : 0x000000
```

Displaying FPP errors

To show FPP errors, use the `stats error np fpp` command. For example:

```
admin> stats error np fpp
stats error np fpp

Pass#1 Error:
--------------
Input framer error count: 0
P1 Framer error count: 0
P1 error cells count: 0

Pass#2 Error:
--------------
Discarded ATM (mcast not configed): 0
Discarded Ether (mcast not configed): 0
AAL5 CRC error count: 0
IP header checksum error count: 0
```

```
IP TTL expiry count: 0
IP Header version error count: 0
GE IP Header checksum error count: 0
Unrecognized Tag error count: 0
P2 Framer error count: 0
P2 VLAN error count: 0
IN Filter Discard: 0
OUT Filter Discard: 0
Ethernet Filter Discard: 0
```

Clearing FPP statistics

The following command clears FPP statistics:

```
admin> stats clear fpp
FPP counters cleared
```

Global RSP statistics

You can use the `stats traffic|error np rspglobal` command to Route Switch processor's traffic and error statistics.

To display global RSP traffic statistics, enter the `stats traffic np rspglobal` command. For example:

```
admin> stats traffic np rspglobal
RSP [1]
PDUs passed                   :    2270691
Time-to-Transmit Passed(TM)   :    2270692
blocks Passed(TM)             :    2270691
total memory blocks           :     131072
memory blocks in use          :          0
```

To display global RSP error statistics, enter the `stats error np rspglobal` command. For example:

```
admin> stats error np rspglobal
RSP [1]
PDUs Discarded(FPL DID == 0)  :         10
PDUs Discarded(TM param 0==0) :          0
PDUs Discarded(TM param 0==1) :          0
PDUs Discarded(QID==0)        :    2274347
Time-to-Transmit Discarded(TM):          0
blocks Discarded(TM)          :          0
blocks Discarded(ROB)         :    2274377
```

Clearing global RSP statistics

To clear global RSP statistics, enter the `stats clear np rspglobal` command. For example:

```
admin> stats clear np rspglobal
Rsp Global stats cleared
```

Monitoring logical port traffic

You can use the `stats traffic|error lport` *`lport`* [*`count`*|*`count rspslot`*] command to monitor logical port traffic and error statistics.Logical port statistics.

lportNum is the logical port number, a value from 1 through 16.

count specifies the number of entries to display. Valid values are from 1 through 16. If you specify 3 for *lport* and 4 for *count*, the output shows entries for logical ports 3, 4, 5, and 6. If you specify 14 for *lport* and 5 for *count*, the output is truncated to show ports 14, 15, and 16. If no value is specified, the output displays information only for the logical port specified.

rspslot is the RSP slot number—1 or 2. When you specify an RSP slot number, you must also set a nonzero value for *count*. If you do not specify a value for *rspslot*, the system uses the default RSP slot number.[1] If you specify an RSP slot number, you must also set a nonzero value for *count*.

Displaying logical port traffic statistics

To display logical port traffic statistics, enter the `stats traffic lport` *lport* command. For example, the following command displays traffic statistics for logical port 0. The value specified for `count` is 16. Because no RSP slot is specified, the system uses the default RSP slot.

```
admin> stats traffic np lport 0 16
lportID   blkRemain    tttPass tttDiscard    pduPass pduDiscard     Thresh
      0           0          0          0          0          0       8170
      1           0        290          0        280          0       8170
      2           0          0          0          0          0       8170
      3           0          0          0          0          0       8170
      4           0          0          0          0          0       8170
      5           0          0          0          0          0       8170
      6           0          0          0          0          0       8170
      7           0       4126          0       4126          0       8170
      8           0     791725          0     791725          0       8170
      9           0          0          0          0          0       8170
     10           0          0          0          0          0       8170
     11           0          0          0          0          0       8170
     12           0          0          0          0          0       8170
     13           0          0          0          0          0       8170
     14           0          0          0          0          0       8170
     15           0          0          0          0          0       8170
```

Displaying logical port error statistics

The `stats error np lport` *portnum* command reports statistics about logical port errors. For example, the following command displays traffic statistics for logical port 1. The value specified for *count* is 3. Because no RSP slot is specified, the system uses the default RSP slot.

```
admin> stats error np lport 1 3
lportID   blkRemain    tttPass tttDiscard    pduPass pduDiscard     Thresh
      1           0        263          0        262          0       8170
      2           0          0          0          0          0       8170
```

1. To determine the default RSP slot, use the debug command `nphw rspslot [`*rspslot*`]`.

```
      3            0          0          0          0          0       8170
```

Note You cannot clear RSP logical port statistics.

Scheduler traffic and error statistics

You can use the `stats traffic|error np sch` *sid* [*count*|*count rspslot*] command to report scheduler traffic and error information. The `traffic` and `error` options report the same output.

sid is the scheduler ID. *count* specifies the number of entries to display. Valid values are from 1 through 16. If you specify 3 for *lport* and 4 for *count*, the output shows entries for logical ports 3, 4, 5, and 6. If you specify 14 for *lport* and 5 for *count*, the output is truncated to show information for logical ports 14, 15, and 16. If no value is specified, the output displays information only for the logical port specified.

rspslot is the RSP slot number—1 or 2. When you specify an RSP slot number, you must also set a nonzero value for *count*. If you do not specify a value for *rspslot*, the system uses the default RSP slot number.

Sample output is shown below:

```
admin> stats traffic np sch 1 2
   schedId  tttPassed blksRemain tttDiscard    pduPass pduDiscard
         1          0          0          0          0          0
         2          0          0          0          0          0
```

Note You cannot clear RSP scheduler statistics.

Displaying APP driver statistics

You can use the `stats traffic|error np app` command to display APP traffic error statistics. The `traffic` and `error` options report the same output. Sample output is shown below:

```
admin> stats traffic np app
read32 count   :     277169   write32 count   :    4891823
Rx queue size  :    1048576   Tx queue size   :    1048576
Rx PDU count   :          0   Tx PDU count    :          0
Rx byte count  :          0   Tx byte count   :          0
Rx max Q depth :          0   Tx max Q depth  :          0
Rx max PDU size:          0   Tx max PDU size:           0
Rx interrupts  :          0   Tx interrupts   :          0
```

Note You cannot clear APP driver statistics.

Monitoring network operations on the Fast Ethernet Trunk module

The `stats` command enables you to collect and display AAL5, ATM, or Ethernet statistics for the Fast Ethernet Trunk module. The syntax for the `stats` command is as follows:

```
stats enable|disable|traffic|rate|error|clear aal5|atm|ether [port|conn-id|all]
```

To use these commands, you must first open a session with the Fast Ethernet Trunk module.

Enabling, disabling, and clearing statistics collection

To enable statistics collection on Ethernet ports, use the `stats enable ether` command, and then specify if you would like statistics on all ports or for a specific Ethernet port.

For example, the following command enables statistics collection on all the Ethernet ports:

```
fet-1/17> stats enable ether all
Statistics collection enabled for ether port 1
Statistics collection enabled for ether port 2
```

The following sample command enables statistics collection on a specific Ethernet port, in this example, Ethernet port 1:

```
fet-1/17> stats enable ether 1
Statistics collection enabled for ether port 1
```

If statistics collection is already enabled on a port, and you attempt to enable it, the system displays the following message:

```
Statistics collection status unchanged : port 1
```

You can disable the system from collecting statistics for all Ethernet ports or for a specific Ethernet port.

For example, the following command disables statistics collection from all Ethernet ports:

```
fet-1/17> stats disable ether all
Statistics collection disabled for ether port 1
Statistics collection disabled for ether port 2
```

The following sample command disables statistics collection on a specific Ethernet port, in this example, port 1:

```
fet-1/18> stats disable ether 1
Statistics collection disabled for ether port 1
```

If you attempt to disable statistics collection on a port for which this feature is already disabled, the system generates the following message:

```
Statistics collection status unchanged for ether port 1
```

Clearing Ethernet statistics

You can clear statistics obtained for all Ethernet ports by using the `stats clear ether all` command, or for a specific Ethernet port by using the `stats clear ether` *`port`* command.

For example, the following command clears statistics for all Ethernet ports:

```
fet-1/17> stats clear ether all
Port 1 Cleared
Port 2 Cleared
```

The following sample command clears statistics only for Ethernet port 1:

```
fet-1/17> stats clear ether 1
```

```
Port 1 Cleared
```

Displaying Ethernet traffic and error statistics and traffic rates

You can display Ethernet traffic and error statistics and traffic rates for all Ethernet ports or for a specific port. When you display statistics for all ports, the output is summarized. You can obtain detailed information by displaying statistics for a specific port.

Ethernet traffic statistics

To display traffic statistics on all ethernet ports, enter the `stats traffic ether` command. For example:

```
fet-1/17> stats traffic ether
Port  Rx Pkts    Tx Pkts    Rx Mcs     Tx Mcs     Rx Bytes   Tx Bytes
1     21647      21222      2          2          1385748    1443416
2     5          5          2          2          660        660
```

To display traffic statistics on a specific Ethernet port, append the port number to the `stats traffic ether` command. For example:

```
fet-1/17> stats traffic ether 1
Rx frames          : 21647      Tx frames              : 21222
Rx bytes           :1385748     Tx bytes               : 1443416
Rx multicast       :2           Tx multicast           : 2
Rx broadcast       : 21642      Tx broadcast           : 21217
Rx MAC pause       : 0          Tx MAC pause           : 0
Rx IW frames       : 30271      Tx control             : 0
Rx Host frames     : 5          Tx Host frames         : 5
```

Error statistics

You can display Ethernet error statistics for all Ethernet ports or for a specific port. When you display error statistics for all ports, the output is summarized. You can obtain detailed error statistics by displaying statistics for a specific port.

To show the error statistics on all ethernet ports, enter the `stats error ether` command. For example:

```
fet-1/18> stats error ether
PORT Rx FCS    Tx FCS    Rx Drop   Tx Drop   Rx Mac    Tx SColl
1    0         0         0         0         0         0
2    0         0         0         0         0         0
```

To display error statistics for a specific Ethernet port, append the port number to the `stats error ether` command. For example:

```
fet-1/18> stats error ether 1
Rx FCS error            : 0            Tx FCS error            : 0
Rx dropped              : 0            Tx dropped              : 0
Rx MAC address error    : 0            Tx single collision     : 0
Rx MAC control          : 0            Tx multi collision      : 0
Rx Error alignment      : 0            Tx late collision       : 0
Rx Error length         : 0            Tx excess collision     : 0
Rx under size           : 0            Tx under size           : 0
Rx over size            : 0            Tx over size            : 0
```

```
Rx fragments          : 0          Tx fragments          : 0
Rx jabber             : 0          Tx jabber             : 0
Rx error overrun      : 0          Tx underrun           : 0
Rx Error code         : 0          Tx defer              : 0
Rx false carrier      : 0          Tx excess defer       : 0
Rx error max SDU      : 0
Rx IW overrun         : 0
Rx error MRU          : 0
```

Displaying Ethernet traffic rates

You can display Ethernet rates for all Ethernet ports by entering the `stats rate ether` command and specifying a port number(s).

Note that entering the `stats rate ether` *`port`* command toggles the display of rate statistics, regardless of the port number that you specify.

For example, the following command displays the rate for Ethernet ports 1 and 2:

```
fet-1/17> stats rate ether 1  2
1     5          4          0          0          320        272
2     0          0          0          0          0          0
Port  Rx Pkts    Tx Pkts    Rx Mcs     Tx Mcs     Rx Bytes   Tx Bytes
2     0          0          0          0          0          0
1     89         90         0          0          5696       6120
2     0          0          0          0          0          0
1     90         89         0          0          5760       6052
2     0          0          0          0          0          0
1     89         90         0          0          5696       6120
2     0          0          0          0          0          0
1     90         90         0          0          5760       6120
2     0          0          0          0          0          0
1     90         89         0          0          5760       6052

Port  Rx Pkts    Tx Pkts    Rx Mcs     Tx Mcs     Rx Bytes   Tx Bytes
2     0          0          0          0          0          0
1     89         90         0          0          5696       6120
2     0          0          0          0          0          0
1     90         90         0          0          5760       6120
2     0          0          0          0          0          0
1     90         89         0          0          5760       6052
2     0          0          0          0          0          0
```

The following sample command displays the rate only for Ethernet port 1:

```
fet-1/17> stats rate ether 1
Port  Rx Pkts    Tx Pkts    Rx Mcs     Tx Mcs     Rx Bytes   Tx Bytes
1     89         89         0          0          5696       6052
1     90         90         0          0          5760       6120
1     90         89         0          0          5760       6052
1     89         90         0          0          5696       6120
1     90         90         0          0          5760       6120
1     90         89         0          0          5760       6052
1     89         90         0          0          5696       6120
1     90         90         0          0          5760       6120
```

```
Port  Rx Pkts    Tx Pkts    Rx Mcs     Tx Mcs     Rx Bytes   Tx Bytes
1     90         89         0          0          5760       6052
1     89         90         0          0          5696       6120
1     90         90         0          0          5760       6120
1     89         89         0          0          5696       6052
```

Displaying ATM statistics—Fast Ethernet Trunk module

You can use the `stats traffic|error|rate atm` command to display ATM statistics for the interface of the Fast Ethernet Trunk module. In this release, the system is always enabled to collect ATM statistics. If you attempt to disable it, the system generates the following message:

```
Disabling of atm statistics not supported
```

ATM traffic statistics

You can display ATM traffic statistics for all ATM ports or for a specific ATM port. When you display traffic statistics for all ATM ports, the output is summarized. To obtain detailed information, display statistics for a specific ATM port.

To display the traffic statistics of all ATM ports, enter the `stats traffic atm` command. For example:

```
fet-1/17> stats traffic atm
Port Rx Cells  TxCells   Rx CLP1   Tx ClP1   Rx OAM    Tx OAM    Rx GFC
0    177467    177466    0         0         0         0         0
```

To display the traffic statistics of a particular ATM port, append an ATM port number to the `stats traffic atm` command. For example, the following command displays ATM traffic statistics for port 0:

```
fet-1/17> stats traffic atm 0
Utopia port          : 0
Rx cells             : 182075       Tx Cells               : 182074
Rx CLP1 Cells        : 0            Tx CLP1 Cells          : 0
Rx EFCI Cells        : 0            Tx EFCI Cells          : 0
Rx OAM Cells         : 0            Tx OAM Cells           : 0
Rx Rm Cells          : 0            Tx Rm Cells            : 0
Rx GFC  Cells        : 0
Rx Last Unknownaddr  : 2082
```

ATM error statistics

You can display ATM traffic statistics for all ATM ports or for a specific ATM port. To display the error statistics of all ATM ports, enter the `stats error atm` command without any options. For example:

```
fet-1/17> stats error atm
Port  Rx Err Len  Rx Addr Miss
0     0           40932
```

To display the error statistics of a particular ATM port, enter the `stats error atm` command with the port number. For example:

```
fet-1/17> stats error atm 0
Port  Rx Err Len  Rx Addr Miss
```

```
0     0           40932
```

Clearing ATM statistics

You can clear ATM statistics for all ports by using the `stats clear atm all` command or for a specific port by using appending the port number to the `stats clear atm` command.

For example, the following command clears ATM statistics for all ports:

```
fet-1/17> stats clear atm all
Atm statistics cleared for utopia port 0
```

The following sample command clears ATM statistics only for port 0:

```
fet-1/17> stats clear atm 0
Atm statistics cleared for utopia port 0
```

Displaying ATM traffic rate

The `stats rate atm port` command displays traffic statistics per second (rate). For example, the following command displays the rate of ATM traffic for port 0:

```
fet-1/17> stats rate atm 0
Port Rx Cells  TxCells   Rx CLP1   Tx ClP1   Rx OAM    Tx OAM    Rx GFC
0    180       178       0         0         0         0         0
0    179       180       0         0         0         0         0
0    179       178       0         0         0         0         0
0    180       180       0         0         0         0         0
0    178       180       0         0         0         0         0
0    180       178       0         0         0         0         0
0    180       180       0         0         0         0         0
0    178       180       0         0         0         0         0

Port Rx Cells  TxCells   Rx CLP1   Tx ClP1   Rx OAM    Tx OAM    Rx GFC
0    180       178       0         0         0         0         0
0    180       180       0         0         0         0         0
0    178       180       0         0         0         0         0
0    180       178       0         0         0         0         0
0    180       180       0         0         0         0         0
0    178       180       0         0         0         0         0
```

Obtaining AAL5 statistics

Using the `stats` command, you can enable the system to collect AAL5 statistics from the Fast Ethernet Trunk module and then display traffic and error information.

Enabling and disabling AAL5 statistics collection

You can enable the system to collect AAL5 statistics on all connections or for specific connections. If statistics collection is enabled for all AAL5 channels, it will also be enabled for any newly created channel.

For example, the following command enables the system to collect statistics from all AAL5 channels:

```
fet-1/17> stats enable aal5 all
Statistics collection enabled : connection 0
```

```
Statistics collection enabled : connection 16
Statistics collection enabled : connection 19
Statistics collection enabled : connection 22
```

With the following command, the system collects AAL5 statistics only for a specific connection, in this example, channel 22:

```
fet-1/17> stats enable aal5 22
Statistics collection enabled : connection 22
```

Similarly, if you disable the system from collecting AAL5 statistics on all connections, statistics collection will also be disabled for any newly created channel.

The following sample command disables AAL5 statistics collection for all channels:

```
fet-1/17> stats disable aal5 all
Statistics collection disabled : connection 0
Statistics collection disabled : connection 16
Statistics collection disabled : connection 19
Statistics collection disabled : connection 22
```

Displaying AAL5 traffic statistics

You can display a summary of AAL5 statistics for all connections using the `stats traffic aal5` command, or a detailed report for a specific connection by appending the connection ID to the `stats traffic aal5` command.

For example, the following command displays a summary of AAL5 statistics for all connections:

```
fet-1/17> stats traffic aal5
ConId Rx Frames Tx Frames Abort     CLP       Iw Frames Rx CLP0   Rx CLP1
0     0         0         0         0         0         0         0
16    0         0         0         0         0         0         0
19    0         0         0         0         0         0         0
22    0         110641    0         0         110638    221276    0
```

The following command displays AAL5 traffic statistics only for connection 22:

```
fet-1/17> stats traffic aal5  22
Rx frames              : 0           Tx frames              : 110641
Aborted frames         : 0
CLP frames             : 0
L3 Iw Frames           : 110638
Rx CLP0 Cells          : 221276
Rx CLP1 Cells          : 0
```

Displaying AAL5 error statistics

The `stats error aal5` command displays AAL5 error statistics for the Fast Ethernet Trunk module.

Without any arguments, the `stats error aal5` command displays statistics for all connections. For example:

```
fet-1/17> stats error aal5
ConnID CRC        SIZE-ERR   UNDERFLOW  MAXSDU     IWUNDRUN   IW MAXMRU
0      0          0          0          0          0          0
16     0          0          0          0          0          0
```

```
19     0          0          0          0          0          0
22     0          0          0          0          0          0
```

To display AAL5 error statistics only for a specific connection, append the connection ID to the `stats error aal5` command. For example:

```
fet-1/17> stats error aal5 22
ConnID CRC        SIZE-ERR   UNDERFLOW  MAXSDU     IWUNDRUN   IW MAXMRU
22     0          0          0          0          0          0
```

Clearing AAL5 statistics

The `stats clear aal5` command clears AAL5 statistics.

To clear all statistics, use the `all` argument with the command. For example:

```
fet-1/17> stats clear aal5 all
statistics cleared for connection : 0
statistics cleared for connection : 16
statistics cleared for connection : 19
statistics cleared for connection : 22
```

To clear statistics only for a specific connection, append the connection ID to the command. For example:

```
fet-1/17> stats clear aal5 22
statistics cleared for connection :22
```

Displaying AAL5 traffic statistics per second (rate)

The `stats rate aal5` *`connection-id`* command displays AAL5 traffic statistics per second. For example, the following command displays statistics for connection 22:

```
fet-1/17> stats rate aal5 22
ConId Rx Frames Tx Frames Aborts    CLP Frms  Iw Frames Rx CLP0   Rx CLP1
22    0         89        0         0         90        180       0
22    0         90        0         0         90        180       0
22    0         90        0         0         89        178       0
22    0         89        0         0         90        180       0
22    0         90        0         0         90        180       0
22    0         90        0         0         89        178       0
22    0         89        0         0         90        180       0
22    0         90        0         0         90        180       0

ConId Rx Frames Tx Frames Aborts    CLP Frms  Iw Frames Rx CLP0   Rx CLP1
22    0         90        0         0         89        178       0
22    0         89        0         0         90        180       0
```

Optimizing system performance

The following sections describe recommendations for optimizing performance on systems installed with an IP control module.

Optimizing performance with filters and flow classification

When `filter` or `packet-flows` profiles have been configured, the Stinger system software must communicate resulting changes in traffic processing requirements to the underlying system hardware. These updates to the hardware are typically time intensive, so creating a batch of these requests is recommended to improve the overall performance of the system (system performance) and to control the rate at which connections or service is restored to end-users (call performance).

If only ATM PVC or SPVC connections are configured on the system, or if the system does not support an IP control module, the batch processing parameters are of no consequence.

For IP traffic that terminates in the Stinger system, filters are applied to the interface are active as soon as the interface is active.

Overview of `system` profile settings

To enable administrators to batch filter and flow classification updates, the following parameters, shown with default values, have been added to the `system` profile:

```
[in SYSTEM]
np-update-time = 0
np-default-filtering-policy = forward
```

Parameter	Specifies
`np-update-time`	Interval (in seconds) at which to communicate filtering or flow classification updates to the underlying hardware. Valid values are from 0 to 20. **Note** The default value is set to 0 seconds for backward compatibility, but a setting of between 10-20 seconds is strongly recommended, particularly when a large number of filter and/or classification rules are configured on the system. With a value of 10, updates to the underlying hardware occur every 10 seconds, so from the time a filtering or flow classification configuration change is made, a delay of at most 10 seconds occurs before the change becomes effective in the underlying hardware.
`np-default-filtering-policy`	The default filtering policy (`forward` or `drop`) to be used at the input side of the interface during the `np-update-time` interval, before the batched hardware update has been done. Using the `drop` policy has an impact on random access memory size, because the system must create a forwarding rule for non-filtered connections. So, if `np-update-time` is set to zero, it is strongly recommended to use the `forward` policy. **Note** A system reset is required for a new value of this parameter to take effect.

Configuration recommendations

Setting `np-update-time` to between 10-20 seconds is strongly recommended, particularly when a large number of filter and/or classification rules are configured on the system. With the default zero value, system response time and call performance are noticeably impacted when many updates must be communicated to the underlying hardware, as would occur, for example, after a system reset. A setting between 10-20 seconds allows a greater number of configuration changes to be batched together, which results in improved overall system and call performance. The trade-off is the delay before filter and/or flow classification configurations become effective.

Table 5-1 shows how call performance varies with different values of `np-update-time` when 300 IPoA/BIR calls are configured. with six `filter` profiles (having six input and six output rules) and two `packet-flows` profiles (having 16 classification rules for IPoA calls and 6 classification rules for BIR calls) applied to the calls.

Table 5-1. Sample call performance statistics

`np-update-time` value (in seconds)	**Time required for 300 sample calls to come up (in minutes)**
0	20
15	4
20	2

System response time also improves dramatically when `np-update-time` is non-zero.

For example, the following configuration specifies a delay of 10 seconds for filter and flow classification updates, with the default `forward` filtering policy to be applied during the 10-second update interval:

```
admin> read system
admin> set np-update-time = 10
admin> write -f
```

Adjusting network processor FPP memory compaction

Frequent operations inside the Fast Pattern Processor (FPP) memory component of the IP control modules can result in memory fragmentation. The system routinely performs compaction to retrieve the fragmented memory.

The `np-fpp-compact-timer` parameter in the `system` profile controls the time interval (in seconds) between FPP memory compaction. By default, this interval is set to 3600 seconds (60 minutes). That is, the system performs FPP compaction every 60 minutes.

When the current FPP memory approaches the maximum of 8MB, administrators set the `np-fpp-compact-timer` parameter to a lower value to increase the frequency of compaction. (The debug command `pmem sta fppmem` displays the current FPP memory.) Valid settings for the `np-fpp-compact-timer` parameter are from 0 to 86400 seconds. For example

```
admin> set np-fpp-compact-timer = 1800
```

The changes to the `np-fpp-compact-timer` parameter takes effect immediately. You need not reset the system for the new setting to take effect.

Configuring queue size from controller to LIM

On Stinger systems installed with an IP control module, you can modify the per-queue thresholds for traffic from the controller to a LIM. This adjustment might be helpful in situations where there is bursty traffic for a connection.

The `scheduler-queue-size` parameter in the `system` profile controls the per-queue threshold. By default, this parameter is set to 200. Valid values are from 100 through 10000. You can increase the setting for the `scheduler-queue-size` parameter to enable the system to tolerate more bursty traffic for that queue.

Caution Under normal situations, you would not need to modify the default setting of this parameter. The default setting of this parameter has been fine tuned to work for normal traffic conditions. Changing this value might result in random data traffic being discarded in extreme data traffic conditions.

When you change the setting for the `scheduler-queue-size` parameter, the new setting will apply only to new connections that come up after this change. You must must reset active connections for the new settings to apply.

Maintaining ASIC Integrity

A Stinger unit includes mechanisms for maintaining the integrity of ATM cell-processing application-specific integrated circuits (ASICs) for control modules and line-interface modules (LIMs).

Because the ATM cell-processing application-specific integrated circuits (ASICs) are so central to the unit's performance, error detection and correction mechanisms are supported for both the control module and LIM ASICs.

The default `system-integrity` profile configuration for control modules enables continuous background testing of the control module ASIC. Lucent Technologies recommends that you do not disable this default.

The default `system-integrity` configuration for LIM testing is a periodic integrity test for those LIMs that support it, and a periodic reset for earlier LIMs that are not equipped for integrity testing (STGR-LIM-AD-12 and STGR-LIM-SH-48). You can configure the control module to perform LIM integrity testing centrally, as described in “Enabling centralized integrity checks” on page 5-24.

Checking the defaults for control module self-tests

If a problem occurs in the control module's ATM ASIC, the unit might stop switching data traffic. To prevent this possibility, by default, the system performs background integrity tests of the control module ASIC at a specified interval of 100 milliseconds. The system keeps track of the past 20 integrity tests, and verifies after each test how many failures have occurred in the previous 20 tests. If this failure rate is higher than the configured correction factor, the control module performs a correction by resetting its ASIC.

Following are the `integrity-config` subprofile settings, shown with default values for a control module in slot 8. With the default configuration, continuous checking is enabled, and Lucent Technologies recommends that you keep this default.

```
[in SYSTEM-INTEGRITY:integrity-config[8]]
enable-continuous-detection = yes
```

```
detection-interval = 100
only-one-correction = yes
correction-factor = 5
auto-correction-enable = yes
interval-auto-correction = 600000
```

Parameter	Setting
enable-continuous-detection	Enable/disable detection and correction in continuous mode. The default of yes is recommended for the control modules.
detection-interval	Detection interval in milliseconds. When continuous detection is enabled, the control module performs integrity tests at defined intervals. Valid values are from 0 to 65535. **Note** The default value of 100ms is recommended for control modules.
only-one-correction	Enable/disable multiple corrections in a row. The default yes value causes the system to apply the ASIC correction only once. Only one correction is recommended.
correction-factor	Number of problems that must be detected in the previous 20 integrity tests to cause a correction. With the default value of 5, a correction results if the system detects five problems in its history of 20 previous tests. Valid values are from 1 to 20.
auto-correction-enable	*Does not apply to control modules.*
interval-auto-correction	*Does not apply to control modules.*

LIM automatic correction settings

By default, detection and correction of the LIM ASICs are performed every few hours or at a specified interval. For earlier LIMs that are not equipped for integrity testing (STGR-LIM-AD-12 and STGR-LIM-SH-48), the ASIC is simply reset automatically. For recent LIMs that can perform integrity testing, instead of an automatic correction, an integrity test is performed every few hours and the ASIC is corrected only if a problem is detected.

Following are the `integrity-config` settings for LIM ASIC integrity testing, shown with default values for a LIM in slot 1:

```
[in SYSTEM-INTEGRITY:integrity-config[1]]
enable-continuous-detection = no
detection-interval = 100
only-one-correction = yes
correction-factor = 5
```

```
auto-correction-enable = yes
interval-auto-correction = 600000
```

Parameter	Setting
enable-continuous-detection	Enable/disable detection and correction in continuous mode. The default value is no for LIM slots, which allows sufficient correction for most LIMs while conserving system resources.
detection-interval	Detection interval in milliseconds. The default value is 100ms. Valid values are from 0 to 65535. When continuous detection is enabled, the LIM performs integrity tests at the defined interval.
only-one-correction	Enable/disable multiple corrections in a row. If the unit is configured to perform only one correction, after resetting the ASIC, the control module erases the previous 20 tests and begins again. This mechanism prevents multiple resets if the past few tests have failed continuously, and is the recommended setting.
correction-factor	Number of problems that must be detected in the previous 20 integrity tests to cause a correction. Valid values are from 1 to 20. The default is 5.
auto-correction-enable	Enable/disable automatic correction for the LIM. With the default yes value, the LIM performs an integrity test (for LIMs equipped for integrity testing) or performs a correction at the interval specified by the interval-auto-corection parameter. If this parameter is set to no, the LIM performs these actions every 2 to 3 hours.
interval-auto-correction	Number of milliseconds between LIM automatic correction actions. The default is 600000ms (10 minutes). Valid values are from 0 to 2147483647.

For example, the following commands verify that a 12-port SDSL LIM resides in slot 14 and change the automatic correction interval for that LIM to 1 hour:

```
admin> show
Controller { first-control-module } ( PRIMARY ):
                              Reqd  Oper   Slot Type
 { shelf-1 slot-3 0 }         UP    UP     dadsl-atm-24-card
 { shelf-1 slot-14 0 }        UP    UP     sdsl-atm-card
 { shelf-1 trunk-module-1 0 } UP    UP     ds3-atm-trunk-daughter-card
 { shelf-1 trunk-module-2 0 } UP    UP     oc3-atm-trunk-daughter-card

admin> read system-integrity
SYSTEM-INTEGRITY read

admin> set integrity-config 14 interval-auto-correction = 3600000

admin> write
SYSTEM-INTEGRITY written
```

Enabling centralized integrity checks

In addition to the periodic automatic correction performed by the LIMs, you can enable centralized detection, which causes the control module to perform integrity tests on every LIM in the unit that is equipped for ASIC testing. If a LIM requires correction, the control module sends a message causing the LIM to reset its ASIC. If the LIM problem is not corrected within 5 minutes, the control module resets the LIM ASIC again and also resets its own ASIC. Resetting both the control module and LIM ASICs at the same time clears most problems.

Note By default, all LIMs are corrected every few hours, which is typically sufficient for most LIMs.

Following are the relevant parameters, shown with default values:

```
[in SYSTEM-INTEGRITY]
enable-centralized-detection = no
ratio-centralized-detection = 5
```

Parameter	Setting
`enable-centralized-detection`	Enable/disable centralized error detection. This option is disabled by default. If the parameter is set to yes, the control module is required to perform LIM testing using its own failure ratio and correction setting. If a LIM requires a reset of the ASIC, the control module sends a message to the LIM to initiate the reset. If the reset does not correct the detected problem within 5 minutes, the control module initiates a second LIM reset and simultaneously resets its own ASIC.
`ratio-centralized-detection`	If centralized detection is enabled, this parameter specifies the ratio of problem detection between the control module and all other modules. For example, if the ratio is 5, the control module performs five self-tests before triggering centralized LIM tests. Values can be from 0 to 65535. The default is 5.

For example, the following commands enable centralized detection and specify a ratio of 100. Because the control module self-tests are performed every 100ms by default, this ratio causes the control module to perform LIM testing every 10 seconds.

```
admin> read system-integrity
SYSTEM-INTEGRITY read

admin> set enable-centralized-detection = yes

admin> set ratio-centralized-detection = 100

admin> write
SYSTEM-INTEGRITY written
```

Managing System Configuration and Memory

6

This chapter describes how to manage system configuration and memory, including the transfer of configuration files

The system's configuration is stored in the onboard nonvolatile random access memory (NVRAM). The configuration can be saved, restored, or cleared as needed. The `nvram` command provides functions for managing and clearing onboard memory. For syntax information, see the *Stinger Reference*.

Saving system configuration

The `save` command saves all configured profiles, all profiles of a specified type, a specific profile to a file on a local disk or to a file on a network host. You can then use that file to restore the Stinger unit's configuration. To maintain redundancy functionality, copy the configuration on the primary control module to the configuration on the secondary control module. For syntax information, see the *Stinger Reference*.

Note To save passwords, you must have sufficient permissions to view password fields. (For a discussion of permissions, see “Understanding command permissions” on page 1-22.) Without this permission, passwords are not properly saved.

Saving the configuration to a local file

To save the Stinger configuration to a file on the system you are using to access the Stinger unit, enable the capture function in your VT100 emulation software, and enter the `save` command as follows:

```
admin> save -a console
```

The `-a` option saves all parameters, even those that are set to their default values. You might want to print a copy of the configuration for later reference.

The entire configuration is written to the specified file. This method allows you to cut and paste the configuration to other devices.

Saving the configuration to a network host

To save the configuration on a network host, specify the hostname and the full path of a filename. In the following example, `host1` is the network host and `saved.cfg` is the filename:

```
admin> save -a network host1 saved.cfg
configuration being saved to host 10.65.212.19 file saved.cfg...
connection saved.
```

Saving the configuration in GZIP compressed format

You can save the configuration file of a Stinger unit in gzip compressed format. The GZIP compressed format enables you to reduce the size of the configuration file, reduce the time required to save the file over a low bandwidth administrative link, improve performance when Stinger management is done using configuration file exchange with NAVIS™ management software.

If you use the `-z` option with the `save` command, configuration output is compressed before being sent to a network storage location via TFTP. If you use the `-z` option with the `-e` option, the configuration output is compressed first and then encrypted.

The following sample command saves all fields, even those with default parameters, to a gzip compressed file on a network host at `192.168.1.1`, under the file name `saved.cfg`.

```
admin> save -a -z network 192.168.1.1 saved.cfg
```

The `load` command automatically processes configuration files that have been saved in the gzip compressed format.

Timing the saving of profiles

You can configure the system to pause before it executes the next command-line interface command. This feature is useful for provisioning connection profiles using the NavisAccess™ management software. It enables the system to completely delete an old configuration profile before using a new profile with the same name.

The `sleep` command specifies the number of seconds the system pauses before it executes the next command. You can specify a value between `0` and `60` seconds. The default setting is 5 seconds. NavisAccess™ management software users can introduce this command in a configuration file sent to a Stinger unit to time the saving of configuration profiles.

The syntax of the sleep command is as follows:

`sleep` *[**seconds**]*

From the command-line interface, the following sample command configures the system to pause for 10 seconds before it executes the next command-line interface command:

```
admin> sleep 10
```

Displaying NVRAM usage statistics

To display NVRAM usage information, specify the `-u` option:

```
admin> nvram -u
Not Using Extended profiles
NVRAM seg[0]:start 80bb9728 size 262136 avail 199480 used 62656 cmpct 0
NVRAM seg[1]:start 80bf9728 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[2]:start 80c39728 size 262136 avail 262136 used 0 cmpct 1
```

Clearing system configuration

To clear NVRAM, restoring the single or primary control module to its initial, unconfigured state, enter the NVRAM command without specifying an option:

```
admin> nvram
Clear configuration and reboot? [y/n]
```

To clear NVRAM and enter debug mode, use the `-t` option:

```
admin> nvram -t
```

To clear NVRAM and reset both control modules with no confirmation, proceed as follows:

```
admin> nvram -f -r both_controllers
Please standby. System reset in progress.
```

Note You must reset the Stinger unit after clearing NVRAM.

Retaining configuration information after clearing NVRAM

You can store minimal system configuration information in a file called `default.cfg` to enable the system to start up with some configuration information, even after you issue the `nvram` command. This feature enables setups with requirements for inband management to clear nonvolatile RAM (NVRAM) and restart the Stinger unit with minimal configuration, such as Ethernet and some ATM connections, so that inband management can proceed.

How it works

You save the system IP address and other basic configuration that you would like to be restored for your system to the `default.cfg` file. You must save the `default.cfg` file to `root directory` or to `root directory/current` in flash memory. After you issue the `nvram` command, the system reboots the control module(s) and looks to NVRAM for configuration information.

The system looks for the `default.cfg` file in the flash directories of the control module in following order:

1 `root directory/`

2 `root directory/current`

On a redundant Stinger unit, the system looks for the `default.cfg` file only in the primary control module. If the system finds a `default.cfg` file, it loads the saved configuration to NVRAM and then restarts with the configuration information that was saved to the `default.cfg` file. If you save more than one `default.cfg` file in the flash directories, the software processes the first `default.cfg` file that it finds based on the order listed earlier in this section. If the system finds no `default.cfg` file, then no configuration file is loaded from flash and the system restarts without any configuration.

On Stinger units with dual control modules, you can issue the `nvram` command from the primary control module only.

Note You must upgrade both the control module boot code and the control module software to the current software version to use the `default.cfg` feature.

Loading a `default.cfg` file from the TFTP server

The following sample command loads a `default.cfg` file from the TFTP server to the primary controller and then transfers a copy to the secondary control module:

```
admin> load file network IPaddress default.cfg
loading code from IPaddress
file default.cfg...
done.
Attempting to write image(s) to other controller
Trying device 1 of remote controller first
Transferring 1/current/default.cfg ...
done.
1 image successfully transferred
```

Note On a redundant system, depending on the software version your Stinger unit is running, the system automatically copies the `default.cfg` from the primary control module to the secondary control module.

Verifying that the `default.cfg` is saved to the desired directories

Use the `ls` command to verify that you have successfully saved the `default.cfg` file to the desired directories on the control modules.

On the primary control module, enter the `ls` command. For example:

```
admin> ls
Controller { first-control-module } ( SECONDARY ):
```

```
                                 Reqd  Oper   Slot Type
    { second-control-module }    UP    UP     ( PRIMARY )
Slot state information is not available for secondary controller
admin> ls
ls Flash card 1:
/:
  current/                        0 Tue Sep 24 22:27:14 2002
/current:
  stngrima.ffs               872522 Wed Jun 30  9:39:18 2004 Version 9.7.1
  stngrcm2.ffs              4827612 Wed Jun 30  9:40:42 2004 Version 9.7.1
  stngrctdmt72.ffs        1136044 Wed Jun 30  9:41:22 2004 Version 9.7.1
  stngrshdsl.ffs          1114989 Wed Jun 30  9:41:02 2004 Version 9.7.1
  config                  340926 Fri Nov 15 16:09:38 2002
  stngrrsdsl.ffs           988688 Wed Jun 30  9:39:04 2004 Version 9.7.1
  cm2_trap.ffs           4782094 Wed Jun 30 0:18:10 2004 Version 9.7.1
  cm_0617_2.ffs          4439012 Tue Jun 29 17:48:24 2004 Version 9.7.1
  default.cfg               292 Mon Jul 4 22:11:12 2004

Total space:   31997952 bytes
       used:   30900224 bytes
       free:    1097728 bytes
```

On a redundant system, open a session with the secondary control module and enter the `ls` command. Verify that the `default.cfg` file has been saved to the desired directories. In the following example, the primary control module is in slot 8 and the secondary control module is in slot 9.

admin> **open 1 9**

```
admin> ls
ls Flash card 1:
/:
  current/                        0 Wed Apr  7 18:47:34 2004
/current:
  9.7.1 872522 Wed Jun 30  9:38:04 2004 Version 9.7.1
  stngrcm2.ffs              4827612 Wed Jun 30Jun 30  9:37:26 2004 Version
9.7.1
  stngrctdmt72.ffs        1136044 Wed Jun 30  9:38:24 2004 Version 9.7.1
  stngrshdsl.ffs          1114989 Wed Jun 30  9:38:44 2004 Version 9.7.1
  stngrrsdsl.ffs           988688 Wed Jun 30  9:37:50 2004 Version 9.7.1
  default.cfg                292 Tue Jun 29 22:11:12 2004

Total space:   31997952 bytes
       used:   19693568 bytes
       free:   12304384 bytes
```

Note If the `default.cfg` file has not been saved to the flash memory of the secondary control module, use the `loadmate` command to copy the `default.cfg` file from one control module to another.

For example, to copy the `default.cfg` from PCMCIA flash card 1 of the primary control module to flash card 1 of the secondary control module, enter the following command from the primary control module:

admin> **loadmate file 1 1 /current/default.cfg**

Enter the `ls` command from the secondary control module to verify that the `default.cfg` file has been saved to the desired directories on the secondary module.

Issuing the `nvram` command on a system with a `default.cfg` file

On a system configured with a `default.cfg` file, after you issue the `nvram` command, the system undergoes two reboot cycles.

If the system detects a default configuration after an `nvram` command, it displays the following sample message:

```
******  WARNING ***** WARNING ****** WARNING ****** WARNING ******* WARNING
   System Integrity checking in restoring from default.cfg will take
   a few minutes. User must not make changes to system profile(s) at
   this time.
******  WARNING ***** WARNING ****** WARNING ****** WARNING ******* WARNING
configuration being restored from flash file 1/current/default.cfg...
configuration loaded from flash.
```

Restoring or updating system configuration

You can restore a full configuration that you saved with the `save` command by means of the `load` command. The `load` command uploads a code image to flash or runs a remote configuration script. The code image or script can be located on the disk of the PC you are using for the terminal session with the Stinger unit, on a network host that supports TFTP, or on the PCMCIA flash card file system of the control module.

For syntax information, see the *Stinger Reference*.

Note You must reset the Stinger unit after reloading a configuration.

Restoring from a local file

Before you start the restore procedure, verify that your terminal emulation program has an autotype (or ASCII file upload) feature. Autotype allows your emulator to transmit a text file over its serial port. You must also verify that the data rate of your terminal emulation program is set to 9600 baud or lower and that the `term-rate` parameter in the `system` profile is set to the same rate. Speeds higher than 9600 baud might cause transmission errors.

To restore a configuration from a file on the system you are using to access the Stinger unit, set your VT100 emulation software to send the file, and enter the `load` command as follows:

```
admin> load config console
```

Restoring from a network host

To restore a configuration from a file on a network host, enter the `load` command as follows:

```
admin> load config network hostname filename
```

Replace `hostname` with the name of the host and `filename` with the name of the file in which the configuration is stored.

For example, to load a configuration file named `unit.cfg` from network host 10.8.7.2 to the PCMCIA flash card in slot 1, proceed as follows:

```
admin> load config network 10.8.7.2 /unit.cfg
```

To load the `unitrel.tar` file from a network host named `host1`, proceed as follows:

```
admin> load tar network host1 unitrel.tar
```

Updating the configuration

You can use the `load` command to upload code for any module to a PCMCIA flash card. For example, to load the Stinger control module image `stngrtcm.ffs` from a TFTP server `pclab-20` to the secondary control module, proceed as follows:

```
admin> load -t cm network pclab-20 stngrtcm.ffs
loading code from 207.137.197.90
file stngrtcm.ffs...
done.
Attempting to write image(s) to other controller
Trying device 1 of remote controller first
Transferring 1/current/stngrtcm.ffs ...
done.
1 image successfully transferred
```

To load the Stinger tar image `stngrrel.tar` from TFTP server `pclab-20` and copy all images to the secondary control module, proceed as follows:

```
admin> load -t tar network pclab-20 stngrrel.tar
loading code from 207.137.197.90
file stngrrel.tar...
untaring and loading image for...
cm (stngrcm/stngrcm.ffs)...
sdsl-atm-card (stngrcsdsl/stngrcsdsl.ffs)...
al-dmtadsl-atm-card (stngrcaldsl/stngrcaldsl.ffs)...
done.
Attempting to write image(s) to other controller
Trying device 1 of remote controller first
Attempting to transfer all loads
Transferring 1/current/stngrcm.ffs ...
done.
Transferring 1/current/stngrcsdsl.ffs ...
done.
Transferring 1/current/stngrcaldsl.ffs ...
done.
3 images successfully transferred
```

Note You can set parameters in the `load-select` profile to specify which control module images to load to flash when you use a `load tar` command. However, an explicit `load` command for a particular module type overrides the settings in the `load-select` profile.

Extended profiling on control modules v2 or higher

To prevent Stinger systems from exhausting available NVRAM, you can configure the system to use extended NVRAM (also known as *extended profiling*) on control module versions v2 or higher.

(See Table 3-3 on page 3-3 for a listing of product codes for control modules v2 and v2.1).

When to enable extended profiling

Extended profiling is required on hosted Stinger systems with 4000 or more connections (PVCs). Administrators should enable extended profiling before NVRAM space is exhausted.

Note Extended profiling is unnecessary for standalone systems.

How it works

To enable extended profiling, enter the `nvram -e` command from the primary control module. When you extend NVRAM on a control module v2 or higher, an additional megabyte of NVRAM is made available for storing configured profiles.

On a redundant system, if both controllers are installed when you enter the `nvram -e` command, the system automatically extends NVRAM on the secondary control module. If the secondary module was uninstalled when you entered the `nvram -e` command, you must enter the `nvram -e` command again from the primary control module to enable extended profiling on the secondary control module.

If extended profiling is enabled for your system, be aware that then when you replace a control module, you must also enable extended profiling on the new control module. In addition, when you enter the `nvram -f` command (that is, if you clear your system configuration), you must enter the `nvram -e` command again to enable extended profiling.

You can restore NVRAM to its original configuration (that is, disable extended profiling), if necessary. You must ensure that the size of configured profiles do not exceed available NVRAM, and then save your system's configuration to another system. You can then use the `nvram -f` command to clear your system configuration.

Enabling extended profiling

To enable extended profiling on control modules v2 or higher, proceed as follows:

1 Use the `nvram -u` command to verify that software running on your Stinger system supports extended profiling. (A message indicating that extended profiles is not in use appears.)

```
BOOT> nvram -u
Not Using Extended profiles
NVRAM seg[0]:start 8187be68 size 262136 avail 257448 used 4688 cmpct 0
NVRAM seg[1]:start 818bbe68 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[2]:start 818fbe68 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[3]:start 8193be68 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[4]:start 8197be68 size 262136 avail 262136 used 0 cmpct 1
```

```
NVRAM seg[5]:start 819bbe68 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[6]:start 819fbe68 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[7]:start 81a3be68 size 262136 avail 262136 used 0 cmpct 1
NVRAM seg[8]:start 81a7be68 size 262136 avail 262136 used 0 cmpct 1
```

2 Enter the `nvram -e` command from the primary control module. For example:

admin> **nvram -e**

The system displays the following messages and a prompt:

```
Warning 1, Note this command will RESET THE SYSTEM.
Warning 2, if your boot load does not support
  extended profiles, you WILL Lose your configuration!
Warning 3, once you switch to extended segments
  it is difficult to switch back.
  Switching back from Extended segments will require
  backup the profiles, clearing the flash,
  reseting the system, and reloading the configuration.
Warning 4, Both Primary and Secondary controllers .
  will be effected by this command
Are you sure you want to switch to Extended NVRAM?  [y/n] y
Compacting NVRAM storage...
...compact segment 0 done
...compact segment 1 done
...compact segment 2 done
...compact segment 3 done
...compact segment 4 done
...compact segment 5 done
...compact segment 6 done
...compact segment 7 done
...compact segment 8 done

Please stand by.  System reset in progress...
System resetting due to user request...
```

On a system with dual control modules, the system also extends NVRAM for the secondary control module. The system generates the following message:

```
admin>
Nvram extend, clear and reset by Primary Controller, please stand by ...
Primary request for nvram -e
Creating extended segment
please stand by ...
Compacting NVRAM storage...
...compact segment 0 done
...compact segment 1 done
...compact segment 2 done
...compact segment 3 done
...compact segment 4 done
...compact segment 5 done
...compact segment 6 done
...compact segment 7 done
...compact segment 8 done
nvram_if.c:588 nvram_if_init - Size=3670016 Offset=3145728,
Nvram=3407872, Seg=1
3
```

```
System resetting due to user request...
```

Once this operation is completed, the system will reset the control module(s). All existing profiles are preserved on the newly created NVRAM space.

Restoring default NVRAM configuration

The following procedure restores NVRAM to its original configuration.

1. Ensure that the number of profiles configured will fit into available NVRAM.
   a. Delete unwanted profiles.
   b. Use the `nvram -c` command to compact the NVRAM.
   c. Use the `nvram -u` command to verify that no NVRAM space above segment 8 is being used.
2. Save the current configuration to another system.
3. From the primary control module, enter the `nvram -f` command. This command restores NVRAM to its default configuration and clears your system's configuration.
4. Restore the saved configuration.

Transferring code images between control modules

On a Stinger FS, Stinger FS+, Stinger LS, or Stinger RT unit with dual control modules, you can transfer code images from one control module to the other using the `loadmate` command. Both control modules must be running TAOS 7.11.2 or later releases.

The `loadmate` command can perform the following operations:

- Transfer all images from one control module's PCMCIA flash card to the other control module's flash card.
- Transfer a specific code image, such as a load for a particular module, from one control module to another.
- Transfer a specific boot image from one control module to another.
- Transfer generic files. If the directory structure does not exist on the other control module, it is created.

The `loadmate` command supports all load types supported by the `load` command, with the exception of `config` and `tar`. You can use the command from either the primary control module or the secondary control module, in both boot or operational images. Images are copied from the control module from which the command is issued.

For the syntax of the `loadmate` command, see the *Stinger Reference*.

For example, to copy the control module's image from PCMCIA flash card 1 of the control module in slot 8 to flash card 1 of the control module in slot 9, enter the following command on the control module in slot 8:

admin> **loadmate cm 1 1**

To copy boot image 2 on the control module in slot 8 to the onboard flash memory of the control module in slot 9, enter the following command on the control module in slot 8:

```
admin> loadmate boot
```

To transfer all images of any known load type on flash card 1 of the control module in slot 9 to flash card 2 of the control module in slot 8, enter the following command on the control module in slot 9:

```
admin> loadmate 1 2
```

You cannot run a `load` and `loadmate` operation or two `loadmate` operations simultaneously.

Troubleshooting the restore process

If the system terminates the process of loading a tar file, one of the following messages might appear:

```
load aborted: not a tar image
load aborted: a tar image, inconsistent with the specified load-type.
load aborted: invalid/unknown image header.
load aborted: mismatched image for the specified load-type.
load aborted: invalid image, unsupported by load tar command.
```

The `load` command supports type checking to verify that the load type specified on the command line matches the image header. The preceding messages indicate that the type checking process discovered inconsistencies between the load type and the image header. Check your command line and, if necessary, download the tar file again.

The following warning message does not terminate the load operation, but indicates that you are not loading the most recent software version:

```
load: warning: old image header version detected, load continued...
```

Finally, the following error messages can also appear when you use the `load` command to upload an image to a PCMCIA flash card on a Stinger unit:

Message	Explanation
`load: error: flash card write failed: card full`	The flash card currently has no space available to load software.
`load: error: specified flash card not present`	No flash card is detected in the specified slot (1 or 2).
`load: error: specified flash card not formatted`	You must use the `format` command to format the flash card before loading the software.
`load: error: specified flash card has obsolete format`	You must use the `format` command to format the flash card, because a 1.3A file system was detected.
`load: error: specified flash card is write-protected`	The flash card's write-protect switch is set.
`load: error: specified flash image is currently in use`	A controller module in the LOAD state is currently accessing the flash card.

Using FTP to transfer files

You can use the File Transfer Protocol (FTP) client to transfer files larger than the TFTP limit of 16MB. FTP is also a more reliable file transfer protocol than TFTP. You can start up the FTP client by entering the `ftp` command along with command line options. Alternatively, you can specify an FTP URL in the command line to initiate FTP.

To use the FTP client capability, your unit must have a file allocation table (FAT)-formatted flash memory card in its PCMCIA slot.

The FTP client supports active connections only. In addition, you cannot cancel an FTP download or upload that is already in progress.

FTP client command-line interface

The command interface to the TAOS FTP client consists of a subset of the FTP service commands defined in RFC 959, *File Transfer Protocol (FTP)*. You use these commands to set the FTP file transfer type and working directory, to transfer files, and to otherwise manipulate FTP as you require.

To launch the FTP client, enter the `ftp` command at the command line prompt. The command has the following syntax:

ftp [***options***] [***hostname***] [***port***]

In this TAOS version, you can replace `options` with the following:

-s *Source IP Address*

Replace `hostname` with the name of an FTP server. You can specify a value for `port` if the FTP server is running on a nondefault FTP port. The default port is 21.

If you provide a hostname, the FTP client attempts to connect and log in to the remote host. If you do not provide a hostname, the system displays the following prompt:

```
ftp>
```

At this prompt, you can enter the FTP service command `open` to connect to a particular FTP host. For a description of `open` and the other FTP service commands, see the *Stinger Reference*.

Typical command-line FTP file transfer

The following example shows a File Transfer Protocol connecting to a FTP server, logging in with a name and password, changing the current working directory on the server, changing the local current working directory, switching to binary transfer mode, downloading a binary file, and quitting the application.

```
admin> ftp 111.11.26.12
220 ds2 FTP server (SunOS 5.6) ready.
Name:ddoug
331 Password required for ddoug.
Password:
230 User ddoug logged in.

ftp> cd /tftpboot/ddoug
250 CWD command successful.
```

```
ftp> lcd current
Local directory now 1/current
ftp> binary
200 Type set to I.
ftp> get stngrcm.ffs
200 PORT command successful.
150 Binary data connection for stngrcm.ffs
(149.52.26.125,7018) (2258239 bytes).
2258239 bytes recieved in 30 seconds
226 Binary Transfer complete.
ftp> quit
221 Goodbye.
```

The following command shows how to connect to an FTP server and specify a source IP address of 1.1.1.1:

```
admin> ftp -s 1.1.1.1 60.60.60.1
220 dsl-snmp FTP server (SunOS 5.6) ready.
Name:mmahendra
331 Password required for mmahendra.
Password:
230 User mmahendra logged in.
```

The following command specifies a source IP address of 1.1.1.1:

```
ftp> set -s 1.1.1.1
Source IP Address set to : 1.1.1.1
ftp> open 60.60.60.1
220 dsl-snmp FTP server (SunOS 5.6) ready.
Name:mmahendra
331 Password required for mmahendra.
Password:
230 User mmahendra logged in.
```

FTP client URL interface

The URL interface to the TAOS FTP client is based on the interface defined in RFC 1738, *Uniform Resource Locators (URLs)*. With the TAOS implementation, the colon is replaced with a space after `ftp`, and includes a local directory name. You can use the URLs in file transfer scripts.

To use the FTP protocol to transfer a file, place a URL with the following syntax in your Stinger command line:

ftp [*options*] *//username*:*password@hostname*:*port/url-path/filename*;type=a|i *local-dir*

For details about the preceding syntax, see the *Stinger Reference*.

Username and password details

If a username or password includes any of the following characters, you must encode them using the hex values listed in the table that follows.

Character	**Hex value**
Slash (/)	2F
At sign (@)	40 (forty)
Colon (:)	3A
Semi-colon (;)	3B

Note All hex values need to be proceeded by a percent (%) symbol in the URL, for example, `%2F`, `%3A`.

To specify *no* username or password, enter the URL with no characters between the double slash (//) and the hostname. For example:

```
ftp //host.com
```

To specify an *empty* username (rather than no username) and no password, enter the URL with an *at* (@) sign between the double slash and the hostname. For example:

```
ftp //@host.com
```

Note An internal FTP server may not require the user to enter a username, or password.

To specify a username and an empty password, enter the URL with the username followed by a colon and an *at* sign. For example:

```
ftp //samwise:@host.com
```

URL path details

The URL path actually includes the following FTP URL elements:

`url-path/filename;``type=a|i`

If any directory within the URL path contains a slash (/) or semicolon (;), you must encode them.

To represent a slash, use the following code:

```
%2F
```

For example, the following URL transfers via FTP file `motd` from URL path `/etc` on remote system `host.com`:

```
ftp //host.com/%2Fetc/motd
```

Typical FTP URLs

The following examples show how to transfer files by means of URLs.

Sample FTP URL with complete syntax

The following URL performs the following tasks:

`ftp //foo:bar@135.254.196.191/%2Fhome%2Ftest/ftptest.txt;type=a current`

1. Changes the directory on the Stinger unit to `current` in the first PCMCIA slot with a FAT-formatted flash card
2. Opens an FTP session with host 135.254.196.191
3. Logs in with username `foo` and password `bar`
4. Changes the remote system’s directory to `/home/test/`
5. Switches to ASCII mode
6. Downloads file `ftptest.txt` to `current`
7. Exits FTP

Sample FTP URL with no URL path or local directory

The following URL performs the following tasks:

`ftp //foo:bar@135.254.196.191//ftptest.txt;type=a`

1. Opens an FTP session with host 135.254.196.191
2. Logs in with username `foo` and password `bar`
3. Switches to ASCII mode
4. Downloads file `ftptest.txt` to the `root` directory of the first PCMCIA slot that contains a FAT-formatted flash card on the Stinger unit
5. Exits FTP

Sample FTP URL with no username or password

This URL performs the following tasks:

`ftp //@135.254.196.191/%2Fhome%2Ftest/stngrcm.ffs;type=i current`

1. Changes the directory on the Stinger unit to `current` in the first PCMCIA slot with a FAT-formatted flash card
2. Opens an FTP session with host 135.254.196.191
3. Logs in, prompting for a username and password
4. Changes the remote system’s directory to `/home/test/`
5. Switches to binary mode
6. Downloads file `stngrcm.ffs` to `current`
7. Exits FTP

Sample FTP URL by specifying a source IP Address

The following URL performs the following tasks:

`ftp -s 1.1.1.1 //foo:bar@60.60.60.1/%2Ftmp%2Ftest/testfile;type=i`

1. Sets the source IP Address to 1.1.1.1
2. Opens an FTP session with host 60.60.60.1
3. Logs in with username `foo` and password `bar`
4. Changes the remote system's directory to `/tmp/test/`
5. Switches to BINARY mode
6. Downloads file `testfile`
7. Exits FTP

Using a script to configure a Stinger unit

The TAOS command-line interface allows you to create configuration scripts with a simple text editor and a Telnet client program with a Text Upload feature. This section briefly describes how you can use a script to make changes to the Stinger configuration.

Following are the basic steps:

1. Create a text file that contains the configuration commands as you normally enter them in the TAOS command-line interface.
2. Log into the Stinger unit with sufficient permissions to change the configuration.
3. To upload the file to the Stinger unit, use the upload file feature of your Telnet terminal software.

Following is an example of a text file that configures an SDSL line in shelf 1, slot 7:

```
new SDSL
set name = SF
set physical-address shelf = {shelf-1 slot-7 1 }
set enabled = yes
set line-config = { 0 1 static { any-shelf any-slot 0 } singlebaud 784000 coe
}
write -f
;
```

Note The `write -f` command causes the script to overwrite an existing configuration without prompting.

You can use this file as a basis for configuring all 28 lines on a DS3-ATM trunk module by changing the parameters, such as Item-Number, as required. Carefully review your text file to make sure it is correct.

Use an ASCII text upload to upload the text file directly to the Stinger unit prompt. Carefully review your changes through the console.

Reloading profiles from RADIUS

Use the `refresh` command to open a connection to a RADIUS server and retrieve the latest configuration information. For syntax information, see the *Stinger Reference*.

When you use the `-n` option, the Stinger unit requests a reload of all nailed profiles from the RADIUS server. For example:

```
admin> refresh -n
```

You can specify how dedicated (nailed) connections are handled following an entry of `refresh -n` by using the `perm-conn-upd-mode` parameter in the `system` profile:

- If `perm-conn-upd-mode` is set to `all` (the default), all existing permanent connections are broken and then reestablished (along with any new connections) following the update. This setting causes a service interruption every time any nailed profile is updated or added.
- If `perm-conn-upd-mode` is set to `changed`, only new connections are created, and only those with modified attribute values are reestablished.

Loading specific module images

To access a specific control module, you can either Telnet to its configured IP address or connect by way of the control module's serial port. Once you have connected to the control module, you can use the `load-select` profile to load specific module images and images for newly released modules previously unknown to the system, from tar files. Using the `load` and `loadmate` commands, you can also load an extracted code image or transfer code images between control modules on redundant systems.

If the Stinger FS, Stinger FS+, Stinger LS, or Stinger RT unit contains two control modules, you must always load the same version of software to both control modules. Also, unless you specify otherwise, the system defaults to using the PCMCIA flash card in slot 1 of each control module.

Using the `load-select` profile

The `load-select` profile enables you to specify which module images to load to flash when you use a `load tar` command. For example:

```
admin> load tar network IPaddress stgrel.tar flash-card-2
```

After you reset a system, the system creates the `load-select` profile if it is not present. Each parameter in the `load-select` profile represents a supported module image and an intended load action for each module type, when the image is present in a tar file. It also contains an `unknown-cards` parameter, which represents new modules that were not supported in the previous TAOS release.

When loading the tar file, the system uses settings in the `load-select` profile to load only specific module images. For a listing of the parameters in the `load-select` profile, see the *Stinger Reference*. Each parameter in the profile represents a type of module installed on a Stinger FS, Stinger FS+, Stinger LS, Stinger RT unit, or port functions on a Stinger MRT.

The setting of the parameter for each module specifies the action that the system takes when the code image is present in a tar file. The `load-select` profile does not list the control module code, because that image is always loaded from the updated tar file. Specify one of the following settings:

- `auto` (the default)—Load images for modules that are installed in the Stinger unit and skip images for modules that are not installed.
- `load`—Load the image for the module, even if no module of that type is installed.
- `skip`—Skip the image for the module, even if a module of that type is installed.

The system determines a module to be present if a `slot-type` profile exists for that module type. It creates a `slot-type` profile when it first detects the presence of a module. If you remove that module, the system does not delete the `slot-type` profile for that module unless you use the `slot -r` command or clear NVRAM. To ensure that the system does not load unnecessary images, use `slot -r` to remove `slot-type` profiles for modules that are no longer installed in the system. For details, see "Removing a module and its configuration" on page 2-17.

Loading images for unknown modules

The `unknown-cards` parameter represents any module that was not supported in the previous release. If you install a new type of module into the Stinger unit before loading the tar file, the system loads all code images for all unknown modules, which can cause an overflow in the PCMCIA flash card or built-in flash memory. To prevent a flash overflow, use the following procedure:

1 Set the `unknown-cards` parameter in the `load-select` profile to `skip`.

```
admin> read load-select
admin> set unknown-cards = skip
admin> write
```

2 Save the current configuration to a TFTP server.

3 Load the new boot-loader from a TFTP server (or from the console). For example:

```
admin> load boot-cm network 10.10.10.10 stgcmb.bin
```

4 Load the tar file from a TFTP server (or from the console). For example:

```
admin> load tar network 10.10.10.10 stgrel.tar
```

5 Reset the system.

6 Install the new module.

7 Load the tar file again to delete the images that are not required. For example:

```
admin> load tar network 10.10.10.10 stgrel.tar
```

Loading an extracted code image

You can override the settings in the `load-select` profile by using the `load` command after you have extracted the tar file. For example, if the `sdsl-atm` parameter in the `load-select` profile is set to `skip`, you can load the image for that module by entering the following `load` command:

```
admin> load sdsl-atm network 10.10.10.10 stngrcsdsl.ffs
```

For additional information about the `load` command, see the *Stinger Reference*.

Using the `load configuration` command with an ATM VCC

If you are using an ATM virtual channel connection (VCC) as an inband management channel, be careful when downloading a configuration file with the `load configuration` command**.**

A `connection` profile and an associated `atm-qos` profile define each management channel. If the management channel's `connection` profile or `atm-qos` profile stored in the Stinger is different from the profile defined in the configuration file, the inband management channel might be disconnected during the load.

If the connection profile and associated `atm-qos` profile are different, proceed as follows to load the configuration successfully:

1 Delete the `connection` profile and associated `atm-qos` profile from the configuration file.

2 Load the modified configuration file.

3 Using the command-line interface, change the `connection` profile and associated `atm-qos` profile to match the profiles that were in the original configuration file.

If there is no difference between the profiles, then no special action is needed.

Managing PCMCIA flash cards

Each control module on a Stinger FS, Stinger FS+, Stinger LS, and Stinger RT unit supports up to two PCMCIA flash memory cards. The Stinger MRT chassis contains built-in flash memory. Currently, the flash cards contain code for the modules and the control module. The system configuration is stored in the onboard NVRAM. (

To access a specific control module, you can either telnet to its configured IP address or connect by way of the control module's serial port. Once you have connected to the control module, you must consider if you need to format a flash card or flash memory, display its contents, or check the file system.

Formatting a flash card

Before using a PCMCIA flash card in the Stinger unit, you must format it. First insert the card into slot 1 or slot 2 in the control module, then use the `format` command. Following are examples of formatting the card in slot 1:

```
admin> format flash-card-1
```

or

```
admin> format 1
```

For details of the command-line options for the `format` command, see the *Stinger Reference*.

Displaying the contents of flash

To check the Stinger module images stored in the flash card code directory, use the `dircode` command, as shown in the following example:

```
admin> dircode
Card 1, format FAT, capacity 30MB
/current:
  ima-24t1-card             872522 Wed Jun 30  9:38:04 2004 Version 9.7.1
  cm-v2                    4827612 Wed Jun 30  9:37:26 2004 Version 9.7.1
  stngr-72-ct-adsl-card   1136044 Wed Jun 30  9:38:24 2004 Version 9.7.1
  shdsl-card               1114989 Wed Jun 30  9:38:44 2004 Version 9.7.1
  sdsl-atm-v2-card         988688 Wed Jun 30  9:37:50 2004 Version 9.7.1

Total space:   31997952 bytes
       used:   19693568 bytes
       free:   12304384 bytes
```

The information displayed by this command includes the flash card number (1 or 2) and the size of the code directory. It also shows the following information about each code module:

- Type of Stinger module supported
- Size of the code
- Date the code was loaded to the flash card or flash memory
- Code version

Compressing and uncompressing files on a flash card

To compress an existing file on a flash card, use the `gzip` command. To uncompress a file on the flash card that have been compressed by the `gzip` command, use the `gunzip` command. The system-level `gzip` and `gunzip` commands function just like the UNIX `gzip` and `gunzip` commands. For syntax information, see the *Stinger Reference*.

Note Due to differences in implementation, files compressed with the TAOS `gzip` command may not be identical to files compressed with the UNIX `gzip` command. However, the compressed output files are completely compatible.

The following example compresses and replaces a file named `save.conf` in the `zz` subdirectory of flash card number 1 at the best level of compression. The resulting file is named `save.conf.gz`.

```
admin> gzip -9 1/zz/save.conf
```

The following sample command uncompresses and replaces a file named `save.conf.gz` in the `zz` subdirectory of flash card number 1. The resulting uncompressed file is saved as `save.conf`.

```
admin> gunzip 1/zz/save.conf.gz
```

To view file sizes after compressing and uncompressing files, use the ls command. for example:

```
admin> ls
ls Flash card 1:
/:
  current/                     0 Mon Jul 4 16:40:50 2004
  z/                           0 Mon Jul 4 16:42:18 2004
/current:
  stngrcm.ffs            4477734 Mon Jul 4 10:00:24 2004 Version 9.7.1
  stngrrsdsl.ffs         1013721 Mon Jul 4 10:00:40 2004 Version 9.7.1
  stngrt1000.ffs         1314833 Mon Jul 4 1 10:01:02 2004 Version 9.7.1
/z:
  save.conf              1439600 Wed Jun 30 16:45:56 2004

Total space:   31997952 bytes
       used:    8347648 bytes
       free:   23650304 bytes
```

Checking the file system

If the `dircode` command shows a code status other than `good` or if you suspect inconsistencies in the flash card files, use the `fsck` command to check the code directory. The `fsck` command checks inconsistent conditions in the code directory as well as file contents on a PCMCIA flash card or flash memory.

If errors are detected, they are reported but not fixed. If the `fsck` command reports errors, you must reformat the flash card and then load the code again. If necessary, download the code file again from the Lucent Technologies FTP server.

To check the file system on the flash card in PCMCIA slot 1, or built-in flash memory, use the `fsck` command as shown in the following example:

```
admin> fsck 1
Volume Stats:
```

```
    Block Size: 512 (typical: 512)
    Blocks Per Cluster: 4 (typical: 1, may be powers of 2 up to 16)
    Reserved Blocks: 1 (typical: 1, but may be 0 - hundreds)
    Number of FATs: 2 (must be 2)
    Number of Root Directory Entries: 128 (typically betwn 32 and 224)
    Total Blocks: 13824
    Media Descriptor: f0 (ignored)
Volume Info calculated from values above:
    Blocks Per Fat: 11
    Fat Start Block: 1
    Root Dir Start Block: 23
    Data Start Block: 31
    Number of Root Dir Blocks: 8
    Number of Clusters: 3448
    FAT Type: Fat12
Cluster Usage
    Usable Clusters: 3446
    Free Clusters: 3446
    Clusters lost during interrupted writes: 0
    Other reserved clusters: 0
```

For details of the command-line options for the `fsck` command, see the *Stinger Reference*.

Optional firmware (Centillium-based LIMs)

You can dynamically load optional firmware onto ADSL LIMs. This feature is useful for that systems might require the use of firmware other than the firmware provided in the LIM binary. This capability is supported only on Centillium-based 72-port ADSL LIMs and Stinger MRT-2 units. For a listing of ADSL Centillium-based devices, see the firmware section of the current Stinger TAOS release note.

Optional firmware is available to customers only upon request. Optional firmware is stored in a file called `cte2adsla.fw` and is not in any tar image.

Using optional firmware

To use optional firmware, proceed as follows:

1. Load optional firmware onto flash memory using the `load` command. For example:

   ```
   admin> load file n 135.254.196.188 cte2adsla.fw
   ```

2. Verify that the file `cte2adsla.fw` has been loaded successfully by entering the `ls` command. In the following sample output, the line in bold type shows that the file `cte2adsla.fw` is contained in flash:

   ```
   admin> ls
   ls Flash card 1:
   /:
     current/                        0 Thu Oct 28 16:44:28 2004
   /current:
     stngrcm.ffs              4777408 Wed Nov 24 18:41:30 2004 Version 9.7-2
     stngrctdmt72.ffs          1315999 Tue Nov 30 10:56:00 2004 Version 9.7-2
     cte2adsla.fw               125696 Mon Nov 29 17:21:38 2004 Version 0273
   ```

```
...
```

3 Reset the LIM to force the system to load optional firmware onto the LIM. For example:

```
admin> reset
```

After resetting the LIM, as the LIM initializes, the system checks the flash device first for any firmware binary. If the `cte2adsla.fw` file is available from flash, the system loads that firmware from flash. If no firmware file available on the flash, it loads the default firmware from the LIM binary.

Verifying firmware version of a LIM

The `fwfile` command displays the version of firmware running on the ADSL LIM or device and the default firmware for the device. The syntax for the `fwfile` command is as follows:

```
fwfile -s|t
```

Option	Specifies
s	Show the running and default versions of firmware.
t	Toggle firmware file download debugs.

To display the running and current versions of firmware for a LIM, open a session with the LIM and enter the command. For example:

```
dadsl-atm-72a-1/2> fwfile -s
Running version of the firmware is 0273
Default version of the firmware is 0278
```

You can also verify the firmware version of a LIM by displaying the setting for the `firmware-ver` parameter in the `AL-DMT-STAT/{ shelf-1 slot-3 1 }:physical-status` subprofile. For example:

```
[in AL-DMT-STAT/{shelf-1 slot-3 1 }:physical-status]
if-group-index = 699
...
firmware-ver = 0278
```

Caveats with current implementation

In this software version, no validation is provided for the compatibility of the optional firmware version with the LIM binary. If the firmware version is incompatible with the LIM binary or if the firmware file is incomplete, corrupted, or is in a wrong format, the LIM fails POST and the system might generate fatal error messages. To recover from this situation, manually remove the firmware file from flash and activate the LIM using the default firmware from the LIM binary.

Log messages for firmware download events

The following log messages report events related to the download of optional firmware:

Event	Log message
Optional firmware was successfully loaded onto flash.	`LOG notice, Shelf 1, Slot 2, Time: 12:40:18-- Firmware 0278 loaded successfully`
Optional firmware was obtained from flash.	`LOG info, Shelf 1, Slot 3, Time: 05:59:35-- loading firmware 0278 obtained from flash`
No optional firmware is available from flash.	`LOG info, Shelf 1, Slot 3, Time: 06:03:52-- Firmware from flash not available, loading 0278 from internal arrays`

Administering the SNMP Agent 7

To set up the Stinger unit as a Simple Network Management Protocol (SNMP) agent to work with SNMP managers, you must enable and configure the agent, establish its relationship and communications with remote managers, and manage SNMP interfaces from the TAOS command line, including establishing naming conventions for TAOS profiles configured via SNMP.

For information about SNMP management of Stinger ATM features, including the ATM Forum Private Network-to-Network Interface (PNNI) software, see the *Stinger SNMP Management of the ATM Stack Supplement*.

Overview of Stinger SNMP support

The Stinger unit supports Simple Network Management Protocol (SNMP), which is a standard way for computers to share networking information. An SNMP management system includes one or more *managers* and *agents* that communicate management information by means of SNMP.

Stinger unit as an SNMP agent

As an SNMP agent, a Stinger unit performs the network-management functions requested by an SNMP manager. An SNMP manager is a utility that runs on a network host. If an SNMP manager uses supported management information bases (MIBs), an administrator can use `get` or `set` commands to query, administer, and configure the Stinger unit. When polled, the Stinger unit can send a message called a trap packet data unit (PDU) to inform the manager of network events. In addition, when certain system events occur, the Stinger unit can use trap PDUs to send unsolicited information to the manager.

Requirement for a soft IP address

For an SNMP manager to access the Stinger SNMP agent, you must configure the Stinger unit with an IP address in the `ip-global` profile. For Stinger FS, Stinger FS+, Stinger LS, and Stinger RT units with redundant control modules, if you are using NavisAccess™ software, you must also configure a soft IP address for a backup connection. For information about configuring IP addresses, see the *Getting Started Guide* for your unit.

Overview of the snmp profile

The `snmp` profile contains the parameters that you use to activate and configure the Stinger SNMP agent. Following is a listing of the parameters in the `snmp` profile, shown with their default values:

```
admin> list
[in SNMP]
read-access-hosts = [ 0.0.0.0 0.0.0.0 0. 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 0+
write-access-hosts = [ 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 +
engine-id = 80:00:02:11:03:00:c0:7b:4f:8a:56:00
engine-boots = 21
```

Table 7-1 lists parameters in the `snmp` profile and how you might use them to enable or configure SNMP features.

Table 7-1. SNMP parameters and associated tasks

Parameter	Task
`enabled`	Enabling/disabling the Stinger SNMP agent.
■ `read-community` ■ `read-write-enabled` ■ `read-write-community`	Enabling/disabling read-write access to the SNMP agent and set community strings. See "Enabling read-write access and setting community strings" on page 7-4 for additional information.
`enforce-address-security`	Enabling/disabling host address security. See "Configuring host address security" on page 7-4 for additional information.
■ `contact` ■ `location`	Identifying the contact information for and location of the SNMP device. See the *Stinger Reference* for additional information.
`queue-depth`	Specifying the maximum size of the queue for SNMP requests. Valid settings are from `0` through `1024`. The default setting `0` (zero) prevents the Stinger unit from dropping packets, no matter how far behind the SNMP subsystem gets. If a queue grows too large in a heavily loaded routing environment, the system can ultimately run out of memory.
`csm-modem-diag`	*Does not apply to the* Stinger *unit.*

Table 7-1. SNMP parameters and associated tasks (Continued)

Parameter	Task
snmp-message-type	Specifying the version of SNMP used by the Stinger SNMP agent. Specify one of the following values: ■ v1-and-v3 (the default)—The SNMP agent uses both SNMPv1 and SNMPv3 protocols. ■ v1-only—The SNMP agent uses only the SNMPv1 protocol and discards any other types of messages. ■ v3-only—The SNMP agent use only the SNMPv3 protocol and discards other types of messages. See "Configuring SNMPv3 USM privacy" on page 7-6 for additional information.
security-level	Specifying the level of security to use when generating messages. See "Configuring SNMPv3 USM privacy" on page 7-6 for additional information.
enable-vacm	Enabling/disabling the view-based access control model (VACM) on the Stinger unit. See "Configuring view-based access control" on page 7-13 for additional information.
notification-log-age-out	Specifying the number of minutes to keep a notification in a log before it is automatically removed. The default is 1440 minutes (24 hours). Specifying 0 (zero) keeps notifications in a log indefinitely. See the *Stinger Reference* for additional information.
bit-strings-allowed	Enabling/disabling the Stinger SNMP agent to report bits-type data in either bits format or numeric format. With the default setting of yes, the Stinger SNMP agent reports in bit string format. With the no setting, the Stinger SNMP agent reports in numeric format. See the *Stinger Reference* for additional information.
alarm-clear-table-limit	Specifying the maximum number of alarms that can be stored in alarmClearTable. See "Configuring alarm settings for the alarm MIB" on page 8-12.

Activating the SNMP agent

You activate the SNMP agent by setting the enabled parameter in the snmp profile, as in the following example:

```
admin> read snmp
admin> set enabled = yes
admin> write
```

Securing the SNMP agent

TAOS provides the following means to secure the SNMP agent in the Stinger unit against unwanted access from remote SNMP managers, to specify the type of access granted to SNMP managers, and to configure encryption and authentication for the communications between the agent and managers:

- Ability to specify community strings when you enable read-write access.
- Enforcement of SNMP manager host authentication.
- Configuration of SNMPv3 messaging features such as authentication and encryption between the SNMP agent and manager. (This capability requires the network management software license.)
- Configuration of view-based access control model (VACM) features to control different types of access to various objects in the system. Control is applied on the basis of the security name in the request, the security level specified for the request, or the context name and object identifier (OID) of the object for which access is being attempted.

Enabling read-write access and setting community strings

Caution For security reasons, Lucent Technologies recommends that when you enable read-write access, you change the read-write community string from the well-known `write` value. By default, read-write access is disabled.

To set the community strings and enable read-write access, proceed as in the following example:

```
admin> set read-community = !3gtest0
admin> set read-write-enabled = yes
admin> set read-write-community = @456test!
admin> write
```

Configuring host address security

You can also enforce host address authentication before the agent accepts SNMP requests. Address security is optional but recommended. By enabling the `enforce-address-security` parameter in the SNMP profile, you exclude SNMP access from host SNMP manager addresses other than those you have specified. You can create an `snmp-manager` profile to grant read and write access for an *unlimited* number of SNMP managers that use either SNMPv1 or SNMPv3.

Enabling host address security

To configure the unit to enforce host address security, proceed as follows:

```
admin> read snmp
admin> set enforce-address-security = yes
admin> write
```

Configuring the snmp-manager profile

You create an snmp-manager profile to identify the address of the host SNMP manger that sends SNMP requests to the SNMP agent and to define the type of access that is granted to the host.

Following is a listing of an unconfigured snmp-manager profile, shown with default settings:

```
[in SNMP-MANAGER/"" (new)]
name* = ""
active= no
write-access = no
snmp-message-type = v1-and-v3
```

Parameter	Setting
name	Name (up to 31 characters) or IP address (in dotted decimal notation) of the host SNMP manager that sends SNMP requests to the Stinger SNMP agent. If the Domain Name System (DNS) or Network Information Service (NIS) is supported, the system uses this name to look up the LAN address.
active	Enable/disable the processing of SNMP messages from a particular SNMP manager. Specify yes or no (the default).
write-access	Enable/disable write access for the SNMP manager. This parameter applies only if the active parameter is set to yes in the same snmp-manager profile. Specify one of the following settings: ■ yes—The SNMP manager has read and write access. ■ no (the default)—The SNMP manager has read-only access.
snmp-message-type	Whether the unit accepts SNMPv1 messages only, SNMPv3 messages only, or both SNMPv1 and SNMPv3 messages. This parameter applies only if the active parameter is set to yes in the same snmp-manager profile. Specify one of the following settings: ■ v1—Accept SNMPv1 messages only. ■ v3—Accept SNMPv3 messages only. ■ v1-and-v3 (the default)—Accept SNMPv1 and SNMPv3 messages. Stinger units support SNMPv3 user-based security model (USM) privacy and authentication. For more information, SNMPv3 USM authentication and privacy features, see “Configuring SNMPv3 USM privacy” on page 7-6.

Example of configuring host address security

The following example configures the Stinger unit to enforce host address security and grants a an SNMP manger called remote1 read and write access to the unit by means of SNMPv3 only:

admin> **read snmp**

```
admin> set enforce-address-security = yes
admin> write

admin> new snmp-manager
admin> set name = remote1
admin> set active = yes
admin> set write-access = yes
admin> set snmp-message-type = v3-only
admin> write
```

Configuring SNMPv3 USM privacy

Stinger units support SNMPv3 user-based security model (USM) privacy and authentication. SNMPv3 USM is described in RFC 2574, *User-based Security Model for SNMPv3*.

Enabling privacy causes the Stinger unit to accept encrypted requests from an SNMP manager and send responses in encrypted format. The encryption uses a 64-bit Data Encryption Standard (DES) algorithm. The system uses your privacy password to generate a private key for the encryption.

To use SNMPv3 USM, you must have the network management software license installed on your Stinger unit.

Verifying the SNMPv3 license is enabled

The following command verifies that the network management license has been enabled on the system:

```
admin> get base network-management
[in BASE:network-management-enabled]
network-management-enabled = yes
```

If the network-management license is not enabled, the Stinger unit silently discards incoming queries if the SNMP message is version 3. For information about software licenses, contact your Lucent Technologies sales representative.

SNMPv3 USM features

SNMPv3 security management provides Stinger units with the following features:

- Authentication—Provides data integrity and data origin authentication. The message authentication is coded with either the message digest 5 (MD5) or the secure hash algorithm (SHA) function. See “Generating authentication keys” on page 7-9.
- Privacy—Protects messages from being copied and interpreted by unauthorized listeners on the network. “Generating privacy keys” on page 7-9.
- Timeliness—Protects against message delay or replay.
- Discovery—Allows an SNMP manager to obtain sufficient information about the Stinger units’ SNMP agent to establish communication between an SNMP manager station and the Stinger units.

- GetBulkRequest—Added from SNMPv2 to allow the SNMPv3 manager to minimize the number of protocol exchanges required to retrieve a large amount of management information. The GetBulkRequest protocol data unit (PDU) allows an SNMPv3 manager to request as large a response as possible.

Enabling SNMPv3 USM privacy

The `security-level` parameter in the `snmp` profile specifies the security level of the SNMP agent when SNMPv3 is in use.

When configuring SNMPv3 USM privacy support, set the `security-level` parameter in the `snmp` profile to `auth-priv`, as the shown in the following example:

```
admin> read snmp
SNMP read
admin> set security-level = auth=priv
admin> write
```

With this setting, the system rejects all user transmissions with a security level of `none` or `auth-nopriv` by sending the error message `Unsupported Security Level`.

Using the `snmpv3-usm-user` profile

The `snmpv3-usm-user` profile contains the parameters that support SNMPv3 USM privacy. You create and edit user profiles in the `snmpv3-usm-user` profile. The following example lists the contents of the `snmp-usm-user` profile, shown with default settings:

```
[in SNMPV3-USM-USER/groupz]
name* =groupz
password = feow4873re
active-enabled = no
read-write-access = no
auth-protocol = md5-auth
priv-protocol = no-priv
auth-key =
priv-key =
```

Parameter	Setting
`name`	Username of an SNMP management station. Messages sent to or from the SNMP station on behalf of this name use the security parameters specified in this profile. Enter a string of up to 23 characters. You can include special characters by using the *\xNN* format with the ASCII code for the character. For example, the value `test\x20\x21` represents the following string: `test !`

Parameter	Setting
`password`	A password, up to 20 characters in length, which maps to a 16-octet or 20-octet key in compliance with RFC 2574. Passwords are case sensitive and can include special characters if you use the *\xNN* format with the ASCII code for the character. For example, the value `test\x20\x21` represents the following string: `test !` This setting is required if `auth-protocol` is set to a value other than `no-auth`.
`active-enabled`	Enable/disable SNMPv3 user-based security model (USM) features for this user. The default value is `no`.
`read-write-access`	Enable/disable read-write access to the Stinger unit's MIBs for this user. With the default value `no`, the user has read access only, which enables viewing but not modification of the MIBs.
`auth-protocol`	Enable/disable authentication of messages sent on behalf of this user to or from the SNMP engine, and if enabled, the type of authentication protocol to be used. If this parameter is set to a value other than `no-auth`, the `password` parameter must specify the password to be used. Specify one of the following values: ■ `no-auth`—Disables authentication for this user. ■ `md5-auth` (the default value)—Enables authentication using the MD5 protocol. ■ `sha-auth`—Enables authentication using the SHA protocol.
`priv-protocol`	Enable/disable encryption of messages sent on behalf of the user to or from the SNMP engine, and if enabled, the type of privacy protocol to be used. Specify one of the following values: ■ `no-priv` (the default)—No encryption is required and privacy is disabled. ■ `des-priv`—DES-based privacy is required. Incoming messages that are DES-encrypted are interpreted, and outgoing responses are encrypted using DES. Note that outgoing reports are not encrypted.
`auth-key`	Authentication key for SNMPv3 USM users. In most cases, you do not set this string directly. Instead, use the `snmpauthpass` command to generate the value. If you have permission to view passwords, the authentication key appears as a string with escape sequences for save and restore purposes. Otherwise, the authentication key appears as a row of asterisks. The default is null. For more information, see the *Stinger Reference*.

Parameter	Setting
priv-key	Privacy key for SNMPv3 USM users. In most cases, you do not set this string directly. Instead, use the snmpprivpass command to generate the value. If you have permission to view passwords, the privacy key appears as a string with escape sequences for save and restore purposes. Otherwise, the privacy key appears as a row of asterisks. The default is null. For more information, see the *Stinger Reference*.

Generating authentication keys

You use the `snmpauthpass` command to automatically generate an authentication key for an SNMPv3 USM user. This command, which can be entered only from the primary control module, uses the following syntax:

snmpauthpass ***username password***

Replace *username* with the SNMPv3 USM user for whom an authentication key is being generated, and *username* with the password used for generating the authentication key.

Note The password you specify is not stored in the system. It is used to generate an authentication key when the user is authenticated. The key is stored in the system.

To generate an authentication key of the user `robin` with the password `abc123`**,** proceed as follows:

```
admin> snmpauthpass robin abc123
```

Generating privacy keys

The `snmpprivpass` command can be used to automatically generate a privacy key for an SNMPv3 USM user. The command uses the following syntax:

snmpprivpass ***username password***

Replace *username* with the SNMPv3 USM user for whom a privacy key is being generated, and *password* with the password used for generating the privacy key.

Note The password you specify is not stored in the system. It is used to generate a privacy key when the user is authenticated. The key is stored in the system.

To generate the privacy key of the user `robin` with the password `abc123, proceed as follows`:

```
admin> snmpprivpass robin abc123
```

Example of SNMPv3 USM configuration

To configure the USM features for a user, specify a name for the profile and set the `active-enabled` parameter to `yes`. You must also specify a password if the `auth-protocol` parameter is set to anything but `no-auth`.

The following commands specify the use of MD5 authentication for messages sent on behalf of a user named `testv3` to or from the SNMP engine. The user is assigned read-write access to the Stinger unit's MIBs.

```
admin> new snmpv3-usm-user testv3
SNMPV3-USM-USER/testv3 read

admin> set active-enabled = yes

admin> set read-write-access = yes

admin> set priv-protocol = des-priv

admin> write
SNMPV3-USM-USER/testv3 written

admin> snmpauthpass testv3 abc123

admin> snmpprivpass testv3 abc123

admin> read snmpv3-usm-user testv3

SNMPV3-USM-USER/testv3 read
admin> list

[in SNMPV3-USM-USER/testv3]
name* = testv3
active-enabled = yes
read-write-access = yes
auth-protocol = md5-auth
priv-protocol = des-priv
auth-key = \xfd\xcd\xb2V\xa7\x81\xa7\x89n"\xd5\x02\x8b\xb2\xe7K
priv-key = \xfd\xcd\xb2V\xa7\x81\xa7\x89n"\xd5\x02\x8b\xb2\xe7K
```

Restricting the agent to SNMPv3

The following commands cause the SNMP agent to use only SNMPv3 and to check a user's security level before allowing access:

```
admin> read snmp

admin> set snmp-message-type = v3-only

admin> set security-level = auth-nopriv

admin> write
```

SNMPv3 notifications

The Stinger unit authenticates and encrypts protocol data units (PDUs) as required by SNMPv3, and generates traps in SNMP version 2 (SNMPv2) Trap2 format. Depending on your configuration, a Stinger unit can send PDUs in SNMPv2 format or formats supported by TAOS 9.0-126 and earlier releases. You can specify the destinations for traps and the format of outgoing trap PDUs. The corresponding MIBs are `snmp-target-mib` and `snmp-notification-mib`.

SNMPv3 notifications support enables you to configure the Stinger unit to perform the following tasks:

- Send SNMPv1 traps (trap PDUs) or SNMPv2 traps (Trap2 PDUs).
- Send traps to a specified IP address and port.
- Send Trap2 PDUs with different levels of security.
- Send Trap2 PDUs with different usernames.

The SNMPv3 notifications feature follows the specifications in RFC 2573.

Configuring SNMPv3 notifications support

To set up SNMPv3 notifications supports from the command-line interface, perform the following tasks:

1. Create an `snmpv3-notification` profile, and set a tag to the profile. (See “Configuring an snmpv3-notification profile” on page 7-11.)
2. Create an `snmpv3-target-param` profile. (See “Configuring an snmpv3-target-param profile” on page 7-12.)
   - Set the message-processing model to the `v1` or `v3` option
   - Set the security model to the `v1` or `v3-usm` option. If the `v3-usm` option is selected, set the `security-name` parameter to a valid `snmpv3-usm-user` profile name.
3. Create a `trap` profile. For additional information about creating a trap profile, see “Configuring the trap profile” on page 8-14.
   - Set the name, destination IP address, and destination port
   - Add tag values to the `notify-tag-list` parameter. This tag list must contain tags that were set in the `snmpv3-notification` profile. You can configure multiple tags in this tag list, separated by spaces.
   - Set `target-params-name` to the name of the `snmpv3-target-param` profile. All the notification profiles in the system will find `trap` profiles with matching tags. The parameters in the `trap` profiles are used to send traps to the network.

Note When you upgrade to software that supports the SNMPv3 notifications feature, the system automatically creates an `snmpv3-notification` profile and an `snmpv3-target-param` profile; both are called `default`. Therefore, SNMPv1 traps configured in an earlier version of the software are still generated when you upgrade. You need not create new profiles. However, removing or modifying the `default` profiles might affect the transmission of SNMPv1 traps.

Configuring an `snmpv3-notification` profile

Following are the `snmpv3-notification` parameters and their default settings:

```
[in SNMPV3-NOTIFICATION/"" (new)]
name* = ""
active-enabled = no
tag = ""
type =
```

Parameter	Setting
`name`	Unique name for the profile, up to 16 characters.
`active-enabled`	Enable/disable generation of notifications. Specify `yes` to use this profile to generate notifications. The default value, `no`, specifies that the profile is not used to generate notifications.
`tag`	Value linking the `snmpv3-notification` profile with the `trap` profile that specifies the host address to which notification messages are sent. Specify up to 255 characters. The default is null.

Parameter	Setting
type	*Not currently implemented.*

Configuring an snmpv3-target-param profile

Following are the snmpv3-target-param profile parameters and their default settings:

```
[in SNMPV3-TARGET-PARAM/""]
name* = ""
active-enabled = no
msg-proc-model = v1
security-model = v1
security-name =
security-level = none
```

Parameter	Setting
name	Unique name for the profile, up to 16 characters. The default is null.
active-enabled	Enable/disable generation of notifications. Specify yes to use this profile for generating notifications. The default value, no, specifies that the profile is not used to generate notifications.
msg-proc-model	Message-processing model to use when generating SNMP messages. The default setting, v1, specifies SNMP version 1. Specify v3 for SNMPv3 notifications support.
security-model	Security model to use when generating SNMP messages. Specify one of the following values: ■ v1 (the default)—SNMPv1 security model. This setting is valid only if msg-proc-model is set to v1. ■ v3-usm—SNMPv3 USM. For SNMPv3 notifications support, specify v3-usm. This setting is valid only if msg-proc-model is set to v3. For the snmpv3-target-param profile to have any effect when security-model is set to v3-usm, the name parameter in the snmpv3-usm-user profile must match the security-name parameter in the snmpv3-target-param subprofile.
security-name	Security name of up to 22 characters that identifies the user on whose behalf SNMPv3 USM messages are generated. The default is null. For the security-name parameter to apply, set security-model to v3-usm.
security-level	Level of security to use when generating messages. Specify one of the following values: ■ none (the default)—No authentication and no privacy. ■ auth-nopriv—Authentication and no privacy. ■ auth-priv—Authentication and privacy. For the auth-priv to apply, you must set the priv-protocol and priv-password parameters in the snmpv3-usm-user profile.

Configuring view-based access control

As described in RFC 2575, the view-based access control model (VACM) defines a mechanism for SNMP entities to determine whether a specific type of access (read, write, or notify) to a particular object is allowed. RFC 2575 defines a structured configuration that can check accessibility for each `get` or `set` request received and `notify` request sent.

With VACM enabled, you can configure the system to control different types of access to various objects in the system on the basis of the security name in the request, the security level specified for the request, or the context name and object identifier (OID) of the object for which access is being attempted. You can select read (`get`), write (`set`), and notify (`trap` or `trap2`) access.

You configure VACM at the command-line interface by performing the following tasks:

1. Enable VACM by setting the `enable-vacm` parameter to `yes` in the `snmp` profile.
2. Map a security name and security model in an incoming or outgoing message to a security group by setting the parameters in the `vacm-security-group` profile.
3. Specify view names for different kinds of access (read, write, notify) by setting parameters in the `vacm-access` profile. A view specifies whether a given OID is accessible.
4. Define views by setting parameters in the `vacm-view-tree` profile.

Enabling VACM

To enable VACM, set the `enable-vacm` parameter to `yes` in the `snmp` profile. With this setting, each object in each incoming request (GET/SET/GETNEXT/GETBULK) and each object in the sysTrapOID of each outgoing trap (TRAP2) is verified for VACM access.

The default value of `no` disables VACM, allowing access to all objects in the system. However, the unit still uses security based on SNMPv1 community strings and SNMPv3 USM (if enabled) to determine access.

Mapping a security name and security model to a security group

To map a security name and security model to a security group, set the parameters in the `vacm-security-group` profile. Following is a listing of the profile's default values:

```
[in VACM-SECURITY-GROUP/{ v1 "" } (new)]
security-properties* = { v1 "" }
active = no
group-name = ""

[in VACM-SECURITY-GROUP/{ v1 "" }:security-properties (new) (changed)]
security-model = v1
security-name = ""
```

Parameter	Setting
`active`	Enable/disable VACM. Specify `yes` to enable VACM or `no` (the default) to disable it.
`group-name`	Group name. The default is null.

Parameter	Setting
security-properties:security-model	Security model in use for an incoming or outgoing message: ■ v1 (the default)—The SNMPv1 security model. ■ v3-usm—SNMPv3 USM. For VACM support, specify v3-usm.
security-properties:security-name	USM username associated with an incoming or outgoing message. The default is null.

For example, the following commands configure SNMPv3 USM for a USM user called joe and a group called groupNY:

```
admin> new vacm-security-group
VACM-SECURITY-GROUP/{ v1 "" } read

admin> list
[in VACM-SECURITY-GROUP/{ v1 "" } (new)]
security-properties* = { v1 "" }
active = no
group-name = ""

admin> set active = yes

admin> set group-name = groupNY

admin> list security-properties
[in VACM-SECURITY-GROUP/{ v1 "" }:security-properties (new) (changed)]
security-model = v1
security-name = ""

admin> set security-model = v3-usm

admin> set security-name = joe
(New index value; will save as new profile VACM-SECURITY-GROUP/{ v3-usm joe
}.)

admin> write
VACM-SECURITY-GROUP/{ v3-usm joe } written
```

Specifying view names for different types of access

To map a group name, context prefix, context name, security model, and security level to a view name, set parameters in the vacm-access profile. Following is a listing of the profile's default values:

```
[in VACM-ACCESS/{"" "" v1 none }]
access-properties* = { {"" "" v1 none } }
active = no
match-method = exact-match
read-view-name = ""
write-view-name = ""
notify-view-name = FullView

admin> list access-properties
group-name = ""
context-prefix = ""
```

```
security-model = v1
security-level = none
```

Parameter	Setting
active	Enable/disable the view. Specify yes to enable the view or no (the default) to disable it.
group-name	Group name. The default is null.
match-method	Context-match method. exact-match (the default) specifies that the entire context name must be matched. prefix-match specifies that only the prefix specified by context-prefix must be matched.
read-view-name	Name of the view for read access. The default is null.
write-view-name	Name of the view for write access. The default is null.
notify-view-name	Name of the view for notify access. The default is null.
access-properties:context-prefix	Prefix for a given context. The default is null. The setting for the match-method parameter determines whether the context name is matched exactly or the prefix alone is matched.
access-properties:security-model	Security model in use. ■ v1 (the default)—The SNMPv1 security model. ■ v3-usm—SNMPv3 USM. For VACM support, specify v3-usm.
access-properties:security-level	Security level. Specify one of the following values: ■ none (the default)—No authentication and no privacy. ■ auth-priv—Authentication and privacy. ■ auth-nopriv—Authentication and no privacy.

For example, to specify a view for read access for a group called groupSF with SNMPv3 USM authentication, and privacy enabled, enter the following commands:

```
admin> new vacm-access
VACM-ACCESS/{ "" "" v1 no+ } read

admin> list
[in VACM-ACCESS/{ "" "" v1 no+ } (new)]
access-properties* = { "" "" v1 no+ }
active = no
match-method = exact-match
read-view-name = ""
write-view-name = ""
notify-view-name = ""

admin> set active = yes

admin> set read-view-name = view1

admin> list access-properties
[in VACM-ACCESS/{ "" "" v1 no+ }:access-properties (new) (changed)]
group-name = ""
context-prefix = ""
```

```
security-model = v1
security-level = none
admin> set group-name = groupSF
admin> set security-model = v3-usm
admin> set security-level = auth-priv
admin> write
VACM-ACCESS/{ groupSF "" v3-usm auth-priv } written Defining views
```

Defining views

To define a view, set parameters in the vacm-view-tree profile. Following is a listing of the profile's default values:

```
[in VACM-VIEW-TREE/{ "" "" }]
tree-properties* = { "" "" }
active = no
tree-mask = ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff
tree-type = included
view-name = ""
view-tree-oid = ""
```

To define a view, set the following parameters:

Parameter	Setting
active	Enable/disable the view. Specify yes to enable the view or no (the default) to disable it.
tree-mask	Mask (in hexadecimal format) for comparing subidentifiers in the OID. To disable the comparing of a subidentifier, set the corresponding mask bit to 0 (zero).
tree-type	Whether the OID is accessible. For the OID to be accessible, specify included (the default). If you specify excluded, the OID is not accessible.
tree-properties: view-name	Name of the view. The default is null. The system determines whether the view contains a given OID by comparing it with view-tree-oid.
tree-properties: view-tree-oid	OID in dotted decimal format. The default is null.

For example, to define a view called view1 with an OID of 1.3.6.1.4.1.529, enter the following commands:

```
admin> new vacm-view-tree
VACM-VIEW-TREE/{ "" "" } read
admin> list
[in VACM-VIEW-TREE/{ "" "" } (new)]
tree-properties* = { "" "" }
active = no
tree-oid-mask = ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff
tree-type = included
```

```
admin> set active = yes

admin> list tree-properties
[in VACM-VIEW-TREE/{ "" "" }:tree-properties (new) (changed)]
view-name = ""
view-tree-oid = ""

admin> set view-name = view1

admin> set view-tree-oid = 1.3.6.1.4.1.529
(New index value; will save as new profile VACM-VIEW-TREE/{ view1
1.3.6.1.4.1.529 }.)

admin> write
VACM-VIEW-TREE/{ view1 1.3.6.1.4.1.529 } written
```

Managing SNMP interfaces

The Stinger unit supports the Interface MIB based on RFC 2233, which supersedes the `interfaces` group of the SNMP MIB-II, defined in RFC 1213. The interface table contains only the system's physical interfaces and dedicated (nailed) interfaces.

The SNMP index value of an interface does not change following a system reset. Moreover, if an entry is removed from the interface table dynamically, its index value is not reused until the management station has been reinitialized. The interface table does not contain virtual circuit interfaces, such as a frame relay data link configured on a channelized DS1 interface.

Verifying SNMP state

The Stinger unit allocates SNMP interfaces when it initializes a module for the first time. Because `admin-state` profiles are stored in NVRAM to retain state information during system resets, a physical device keeps the same SNMP interface number when the system resets or a power failure occurs.

Each physical interface in the system has an associated `admin-state-phys-if` profile, and each dedicated (nailed) connection has an associated `admin-state-perm-if` profile. These profiles store the object's desired state and SNMP interface number.

At system startup, the Stinger unit reads the `admin-state` profiles. If the addressed device is not present in the system and has been replaced by a device of another type, the Stinger unit deletes that profile and creates a new one, with a new SNMP interface number. However, the previous device's SNMP interface number does not become available until next time the system is reset or power to the unit is turned off and then turned back on, the old device's SNMP interface number becomes available for reassignment. Removing a module does not free up interface numbers. When you reinstall the module, the same interface number is assigned.

Using the `admin-state-perm-if` profile

The `admin-state-perm-if` profile holds information about Stinger unit nailed interfaces. The system creates a profile for an active nailed interface and assigns it an interface index. For example:

```
admin> dir admin-state-perm
    20  06/10/1999 14:25:32  con4-1
    20  06/10/1999 14:25:32  con4-2
```

```
    20  06/10/1999 14:25:32  con4-3
    20  06/10/1999 14:25:32  con4-4
    20  06/10/1999 14:25:32  con4-5
```

The admin-state-perm-if profile contains the following parameters, shown with sample values:

```
[in ADMIN-STATE-PERM-IF/con4-1]
station* = con4-1
snmp-interface = 28
desired-state = admin-state-up
desired-trap-state = trap-state-enabled
inet-profile-type = 1
```

Parameter	Setting
station	Name of a nailed profile, which can be a local connection profile or a RADIUS profile.
snmp-interface	Interface table index assigned to the nailed interface whose state is stored in this profile. The system assigns a numeric value.
desired-state	Desired administrative state of the addressed device. The system sets this parameter to admin-state-down if you disable this device, or to admin-state-up if you attempt to enable the device in normal operations mode. You can change the administrative state by using SNMP set commands, or the slot or if-admin commands.
desired-trap-state	Enable/disable link state traps for the interface. The system sets this parameter to trap-state-enabled if you specify that traps are to be generated for the interface, or to trap-state-disabled if an operator specifies that traps are not to be generated for the interface.
inet-profile-type	Whether the nailed profile is a local profile (0) or a RADIUS profile (1).

Using the admin-state-phys-if profile

The admin-state-phys-if profile holds information about the system's physical interfaces. For example:

```
admin> dir admin-state-phys
    24  04/17/2003 13:35:11  { shelf-1 slot-2 1 }
    24  04/17/2003 13:35:11  { shelf-1 slot-2 2 }
    24  04/17/2003 13:35:11  { shelf-1 slot-2 3 }
    ...
    ...
    ...
    25  04/17/2003 13:35:21  { shelf-1 slot-7 70 }
    25  04/17/2003 13:35:21  { shelf-1 slot-7 71 }
    25  04/17/2003 13:35:21  { shelf-1 slot-7 72 }
    25  04/17/2003 13:19:25  { shelf-1 first-control-module 32768 }
    24  04/17/2003 13:19:25  { shelf-1 first-control-module 1 }
```

```
25  04/17/2003 13:19:25  { shelf-1 first-control-module 32769 }
24  04/17/2003 13:19:25  { shelf-1 first-control-module 2 }
25  04/17/2003 13:19:25  { shelf-1 first-control-module 32770 }
24  04/17/2003 13:19:25  { shelf-1 first-control-module 3 }
25  04/17/2003 13:19:25  { shelf-1 first-control-module 32771 }
25  04/17/2003 13:19:25  { shelf-1 first-control-module 32772 }
25  04/17/2003 13:19:25  { shelf-1 first-control-module 32773 }
26  04/17/2003 14:19:42  { shelf-1 first-control-module 32774 }
25  04/17/2003 13:19:25  { shelf-1 first-control-module 32775 }
...
25  04/17/2003 13:19:26  { shelf-1 slot-16 22 }
25  04/17/2003 13:19:26  { shelf-1 slot-16 23 }
25  04/17/2003 13:19:26  { shelf-1 slot-16 24 }
24  04/17/2003 13:35:10  { shelf-1 trunk-module-1 1 }
24  04/17/2003 13:35:10  { shelf-1 trunk-module-1 2 }
24  04/17/2003 13:35:10  { shelf-1 trunk-module-2 1 }
24  04/23/2003 22:52:02  { shelf-1 trunk-module-2 2 }
24  04/17/2003 13:19:25  { shelf-1 trunk-module-2 3 }
24  04/17/2003 13:19:25  { shelf-1 trunk-module-2 4 }
24  04/17/2003 13:19:25  { shelf-1 trunk-module-2 5 }
24  04/23/2003 21:03:28  { shelf-1 trunk-module-2 6 }
```

The Stinger unit creates a profile for each of its physical interfaces. The `admin-state-phys-if` profile contains the following parameters, shown here with sample values:

```
[in ADMIN-STATE-PHYS-IF/{ shelf-1 slot-4 1 }]
device-address* = { shelf-1 slot-4 1 }
slot-type = al-dmtadsl-atm-card
snmp-interface = 4
modem-table-index = 0
desired-state = admin-state-up
desired-trap-state = trap-state-enabled
```

Parameter	Setting
`device-address`	Physical slot address within the system.
`slot-type`	Type of module at that address.
`snmp-interface`	Interface table index assigned to the device whose state is stored in this profile. The system assigns a numeric value, which does not change as long as the interface is present in the system. If you remove the module and or delete its profiles, (for example, through the use of a `slot -r` command), the index number is freed for future use.
`modem-table-index`	Modem table index assigned to the device whose state is stored in this profile. The system assigns a numeric value. Because the Stinger unit does not support modems, the value is always `0`.

Parameter	Setting
`desired-state`	Desired administrative state of the addressed device. The system sets this parameter to `admin-state-down` if you disable the device or to `admin-state-up` if you attempt to enable the device in normal operations mode. You can change the administrative state by using SNMP `set` commands or the `slot` or `if-admin` commands.
`desired-trap-state`	Desired `linkUp-linkDown` trap state of the interface. The system sets this parameter to `trap-state-enabled` if you specify that linkUp and link Down traps are generated for the interface, or to `trap-state-disabled` if you specify that link Up and link Down traps are not generated for the interface.

Viewing SNMP interface numbers

To display SNMP interface numbers, use the `if-admin` command. To see a list of available SNMP interface numbers, use the `-a` option:

```
admin> if-admin -a
Available SNMP interface numbers
        95 - 142
       391 - 404
       414 - 448
       589 - infinity
```

To see a list of all SNMP interface numbers assigned by the system, use the `-l` option:

```
admin> if-admin -l
 SNMP-IF   DEVICE ADDRESS   STATUS
     1   -   {  1  9  1 }     active
     2   -   {  1  9  4 }     active
     3   -   {  1  9 32768 }     active
     4   -   {  1  9 32769 }     active
     5   -   {  1  9 32770 }     active
     6   -   {  1  9 32771 }     active
     7   -   {  1  9 32772 }     active
     8   -   {  1  9 32773 }     active
     9   -   {  1  9  2 }     active
    10   -   {  1  9 32775 }     active
    11   -   {  1  9  3 }     active
    12   -   { ATM-IF:2449 }     active
    13   -   {  1 17  1 }     active
    14   -   {  1 17  2 }     active
    15   -   { ATM-IF:801 }     active
    16   -   { ATM-IF:802 }     active
    17   -   {  1 18  1 }     active
    18   -   {  1 18  2 }     active
    19   -   {  1 18  3 }     active
    20   -   {  1 18  4 }     active
    21   -   {  1 18  5 }     active
    ...
```

Initiating interface state changes

To enable or disable an SNMP interface, use the `if-admin` command with the `-d` option, and specify the interface number. For example:

```
admin> if-admin -d 2
interface 2 state change forced
```

To reenable a disabled device, use the `if-admin` command with the `-u` option, and specify the interface number. For example:

```
admin> if-admin -u 2
interface 2 state change forced
```

Resetting the SNMP interface table sequentially

By default, the SNMP interface table is built as modules are installed in the Stinger unit. The `if-admin` command `-r` option enables you to reset the order of the table to be sequential based on slot number. For example:

```
admin> if-admin -r
SNMP interface mappings reset.
Reset system in order to take effect.
```

You must reset the Stinger unit for the new order to take effect.

Note If the `if-admin -r` command fails, reenter it. If the command fails a second time, disable all modules with the `slot -d` command, remove the configuration from all modules by using `slot -r`, reset the system, and run the `if-admin -r` command again.

Naming convention for SNMP-configured profiles

To configure an ATM circuit via SNMP, you create an entry in the virtual circuit cross-connect table if the two virtual links are virtual channel links (VCLs), or in the virtual path cross-connect table if the links are virtual path links (VPLs). A cross-connect entry identifies its two ATM interfaces by `ifIndex` value. The two sides of the circuit are distinguished as the high `ifIndex` (the interface with a higher number in the `ifTable`, such as 25) and the low `ifIndex` (the interface with a lower number in the `ifTable`, such as 5).

For example, the following sample entry shows `ifIndexA` and `ifIndexB` as the low and high `ifIndex` values for a cross-connect:

```
atmVcCrossConnectIndex            = entry-index
atmVcCrossConnectLowIfIndex       = ifIndexA
atmVcCrossConnectLowVpi           = VpiA
atmVcCrossConnectLowVci           = VciA
atmVcCrossConnectHighIfIndex      = ifIndexB
atmVcCrossConnectHighVpi          = VpiB
atmVcCrossConnectHighVci          = VciB
atmVcCrossConnectAdminStatus      = down
atmVcCrossConnectRowStatus        = createAndGo
```

Default naming convention

For each cross-connect entry you create via SNMP, the system creates a `connection` profile and assigns the profile a name that specifies the slot and port with the low `ifIndex` value first, followed by the slot and port with the higher `ifIndex` value. Following is the format of this naming convention:

low interface index slot **:** *port-vpi-vci* **x** *high interface index slot* **:** *port-vpi-vci*

For example, the following listing shows two LIM-to-trunk cross-connects from slot 1 to slot 17, created via SNMP:

```
admin> dir connection
147  11/25/2001 18:28:05  17:1-0-50x1:1-0-50
146  11/25/2001 18:36:25  17:1-15x1:1-15
```

Configurable naming convention

You can configure the system to use command-interface identifiers instead of the low and high interface indexes in the SNMP ifTable. When command-interface identifiers are configured and you create a cross-connect entry via SNMP, the system creates a `connection` profile and assigns the profile a name that specifies the slot and port of the first side of the ATM circuit (the interface specified in the `connection atm-options` subprofile), followed by the slot and port of the second side of the ATM circuit (the interface specified in the `atm-connect-options` subprofile). Following is the syntax of the new configurable naming convention:

atm-options-if-slot **:***port-vpi-vci***x***atm-connect-options-if-slot* **:***port***-***vpi***-***vci*

For example, the following listing shows two LIM-to-trunk cross-connects created via SNMP:

```
admin> dir connection
147  11/25/2001 18:28:05  1:1-0-50x17:1-0-50
146  11/25/2001 18:36:25  1:1-15x17:1-15
```

Selecting the naming convention for `connection` profiles

Following is the parameter, shown with its default value, for configuring the naming convention for `connection` profiles:

```
[in SYSTEM]
connection-profile-auto-naming-convention = lower-interface-number-first
```

Watchdogs, Alarms, and Traps

8

Stinger systems routinely monitor certain aspects of its operation, major and minor alarm conditions. In response to certain events and alarm conditions, the system illuminates appropriate status lights on the chassis. In addition, you can connect audio and visual alarms (normally open, or normally closed) to monitor the unit remotely for these conditions.

Alarm relays operate during loss of power, during hardware failure, or whenever a system being reset, such as during its power-on self test (POST). During normal operation, the alarm relays remain idle.

Configuring SNMP watchdogs

An SNMP *watchdog* is a software routine that monitors the status of a particular aspect of a Stinger unit—for example, the temperature of a module. You can enable or disable the warning trap for each individual watchdog and specify a watchdog name by means of the TAOS command-line interface or SNMP. Once configured, the settings persist across system resets.

Each `watchdog-config` profile is identified by an index in the format {*Type Location Unit-identifier*}. On a standalone Stinger unit, *unit-identifier* is `1`. On hosted Stinger systems, the value of `unit-identifier` for a `watchdog-config` profile for a remote shelf is determined as follows:

Unit identifier on the master = (*ShelfNumber*) x 1000 + unit identifier for the remote shelf.

For example, the fantray on remote shelf 4 is determined by multiplying 4 by 1000 and adding 1. On the host system the `watchdog-config` profile is identified as `{ fan fantray 4001 }`. From the remote shelf, the same `watchdog-config` profile appears as `{ fan fantray 1 }`.

To list the watchdog routines available for your system, use the `dir watchdog` command. For example, on a standalone unit, a sample output can be:

```
admin> dir watchdog-config
28  11/19/2001 23:26:39  { fan fantray 1 }
28  11/19/2001 23:26:39  { fan fantray 2 }
```

```
28  11/19/2001 23:26:39  { fan fantray 3 }
36  11/19/2001 23:26:46  { relay cm-input-relay 1 }
36  11/19/2001 23:26:46  { relay cm-input-relay 2 }
36  11/19/2001 23:26:46  { relay cm-input-relay 3 }
36  11/19/2001 23:26:46  { relay cm-input-relay 4 }
36  11/19/2001 23:26:46  { relay cm-input-relay 5 }
36  11/19/2001 23:26:46  { relay cm-input-relay 6 }
36  11/19/2001 23:26:46  { relay cm-input-relay 7 }
34  11/19/2001 23:26:41  { cbus shelf-controller 0 }
```

On a hosted Stinger system, the `dir watchdog-config` command lists all available watchdog routines, including those for remote shelves. In the following sample command issued from a host, the `watchdog-config` profiles with a unit identifier of `400`*x* are for the remote shelf 4:

```
admin> dir watchdog-config
    31  11/05/2003 21:29:06  { fan fantray 1 }
    31  11/05/2003 21:29:06  { fan fantray 2 }
    31  11/05/2003 21:29:06  { fan fantray 3 }
    24  11/06/2003 00:22:27  { fan fantray 4001 }
    33  11/06/2003 00:24:08  { relay cm-input-relay 4001 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4002 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4003 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4004 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4005 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4006 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4007 }
    37  11/05/2003 21:29:07  { cbus shelf-controller 0 }
    40  11/06/2003 00:22:27  { over-temperature cm-input-relay 4001 }
    34  11/06/2003 00:22:27  { external-fan cm-input-relay 4001 }
    26  11/06/2003 00:22:27  { door cm-input-relay 4001 }
```

Profiles corresponding to a remote shelf are created or deleted on the host Stinger unit depending on the operational state of the `remote-shelf-stat` profile for that remote shelf. If the operational state of the shelf is UP and the corresponding remote shelf is in the operational state, the `remote-shelf-stat` profile is synchronized to the host from the remote. If the operational changes from UP to any other state, the system deletes the remote shelf `watchdog-config` profiles.

Settings in a `watchdog-config` profile

The contents of a `watchdog-config` profile is as follows:

Parameter	Specifies
`watchdog-index`	Type of watchdog, the device, and unit identifier for the device. This parameter is read-only. Possible index values can be: ■ `fan fantray` *N* ■ `thermal shelf-controller` *N* ■ `relay cm-input-relay` *N* ■ `over-temperature cm-input-relay` *N* ■ `external-fan cm-input-relay` *N* } ■ `door cm-input-relay N`
`watchdog-trap`	With the default `yes` setting, the system generates a trap for a watchdog routine. Specify `no` to disable the system from generating a trap for a watchdog routine.
`watchdog-name`	Name of an SNMP watchdog routine—up to 80 characters. By default, the system assigns a standard name. The value of the `watchdog-name` parameter is sent to the SNMP manager when the watchdog event causes a trap.
`system-created-slave-profile`	If the `watchdog-config` profile is system-created for a Compact Remote shelf, this parameter is set to `yes`. This read-only parameter can be useful in preventing a user from deleting a system-created `watchdog-config` profile. This parameter is available only to users with debug privileges (that is, in the user's profile, the parameter `allow-debug` is set to `yes`).

Enabling a watchdog to monitor fan failure

Stinger systems create `watchdog-config` profiles for each fantray assembly. On standalone Stinger FS, Stinger FS+, Stinger LS, or Stinger RT units the system creates three. On Stinger MRT units, a single `watchdog-config` profile is created.

To enable a watchdog routine for monitoring fan failures, create an `alarm` profile with the `event` field set to `fan-failure` and specify the list of actions that the system will take when this alarm is raised. For example:

```
admin> new alarm fan1
admin> set enabled = yes
admin> set event = fan-failure
admin> set action alarm-led-minor = on
admin> write alarm fan1
```

By default, `watchdog-config` profiles for fantrays are enabled. You can optionally set a name by setting a value for the watchdog-name parameter. For example:

```
admin> read watchdog {fan fantray 1 }
```

```
admin> set watchdog-name = fan1
```

Watchdog routines for input relays

Stinger units installed with revision 2 control modules A, B, A-J, or C can monitor the status of up to seven devices. A Stinger MRT unit can monitor up to four remote devices. To verify that your system supports this capability, see the *Getting Started Guide* for your unit at `http://www.lucentdocs.com/ins`.

The watchdog config profiles for input relays have the index {`relay cm-input-relay` *`N`*}. On a standalone system or host Stinger unit, the value for N (the device identifier) is 1.

A system with an ALARM RELAY connector has outputs that allow it to be monitored remotely by another device. This connector also has inputs for monitoring from four to seven remote devices. For information about physically connecting an alarm relay, see the *Getting Started Guide* for your unit.

Watchdog routines for a remote shelves

For information about the watchdog routines that are available for the remote shelves of your hosted system, see the *Stinger Compact Getting Started Guide* or the *Stinger MRT Getting Started Guide* for your system.

Defining alarms

You can configure the Stinger unit to monitor itself for certain alarm conditions or events and specify an action that it takes when it detects the alarm condition. You use the `alarm` profile to perform the following tasks:

- Configure status lights to illuminate in response to alarm conditions.
- Configure alarm relays to open or close for a specified number of seconds in response to alarm conditions.
- Configure a default `alarm` profile for the entire system.
- View `alarm` profiles.
- View outstanding alarms.

For certain alarm conditions, you might also need to configure additional profiles to define the thresholds for the alarm. Additionally, for the system to send a trap when an alarm condition occurs, you will also need to configure `trap` profile for the event. For information about setting the `trap` profile, See “Configuring SNMP traps” on page 8-13.

Overview of `alarm` profile settings

You can define an alarm profile for every event that you would like to monitor. Following is a listing of the `alarm` profile contents, shown with default settings. For additional information about these parameters, see the *Stinger Reference*.

```
[in ALARM/"" (new)]
name* = ""
enabled = no
event = line-state-change
```

```
physical-address = { any-shelf any-slot 0 }
action = { off off off 0 off 0 }
[in ALARM/"":action (new)]
alarm-led-minor = off
alarm-led-major = off
alarm-relay-minor = off
alarm-relay-minor-duration = 0
alarm-relay-major = off
alarm-relay-major-duration = 0
```

Parameter	Setting
name	User-defined name of the alarm profile.
enabled	Enable/disable the alarm profile. Specify yes to enable or no (the default) to disable this profile.
event	Event that triggers an alarm, which results in action specified by the settings in the action subprofile. Specify one of the following events ■ power-failure—Redundant power supply failure. ■ fan-failure—Redundant fan failure ■ line-state-change (the default)—Change in the state of a line. ■ slot-state-change—Change in the state of a slot. ■ input-relay-closed— Input relay monitoring circuit is closed. The alarm is cleared whenever the circuit is reopened. ■ input-relay-open—Relay monitoring circuit is open. The alarm is cleared whenever the circuit is closed. ■ primary-switchover—Change in the primary control module. ■ secondary-controller-state-change—Change in the state of the secondary control module. ■ low-temperature-trigger—Low-temperature threshold is crossed. ■ high-temperature-trigger—High-temperature threshold is crossed. ■ remote-shelf-state-change—A remote shelf changes state. The new status is shown in the remote-shelf-oper-state setting of the remote-shelf-stat profile. ■ over-temperature-relay—Temperature threshold has been crossed. ■ external-fan-failure—A sensor on a remote shelf indicates fan failure. ■ door-open—A sensor on a remote shelf indicates that the door has been opened. The status is shown in the door-open setting of the remote-shelf-stat profile.

Parameter	Setting
physical-address	Physical address of the entity that is being monitored by this alarm, as defined by its shelf, slot number, or item-number. The physical-address parameter applies only to line-state-change or slot-state-change events.
action	Subprofile that specifies the actions that the Stinger unit performs when it detects the event specified by the event parameter. Set the following parameters.
action: alarm-led-major	Enable/disable the MAJOR alarm status light to illuminate when the system detects the specified event. Set to on to enable. The default setting is off.
action: alarm-led-minor	Enable/disable the MINOR alarm status light to illuminate when the system detects the specified event. The default setting is off.
action: alarm-relay-major	Enable/disable the relay for the MAJOR alarm relay circuit to close or open when the system detects the specified event. If set to on, the major alarm relay closes (if it is normally open) or opens (if it is normally closed) when the system detects the specified event. The default setting is off.
action: alarm-relay-major-duration	Number of seconds that the Stinger unit leaves alarm-relay-major in the position specified in the alarm-relay-major action. The default setting of zero (0) directs the system to leave the alarm set indefinitely.
action: alarm-relay-minor	Enable/disable the relay for the MINOR alarm relay circuit to close or open when the system detects the specified event. If set to on, the minor alarm relay closes (if it is normally open) or opens (if it is normally closed) when the system detects the specified event. The default setting is off.
alarm-relay-minor-duration	Number of seconds that the Stinger unit leaves alarm-relay-minor in the position specified in the alarm-relay-minor action. The default value 0 (zero) directs the Stinger unit to leave the alarm set indefinitely.

Sample `alarm` profile configuration

The following sample commands configure a Stinger unit to close the relay for the MAJOR alarm for 10 minutes when the redundant power supply fails:

```
admin> read alarm alarm-1
admin> set enable = yes
admin> set event = power-fail
admin> set physical-address = {0 0 0}
admin> set action alarm-led-major = on
admin> set action alarm-led-minor = off
```

```
admin> set action alarm-relay-major = on
admin> set action alarm-relay-major-duration = 600
admin> set action alarm-relay-minor = off
admin> set action alarm-relay-minor-duration = 0
admin> write -f
```

By setting the physical-address parameter in an alarm profile to 0 0 0 (any shelf, any slot, any item), you can apply an alarm profile to the entire Stinger unit.

Working with alarms

You can use the alarm command or the alarm-stat profile to list alarms and their status, or acknowledge and clear them.

Listing alarms using the alarm command

To list the alarms that are enabled for the entire Stinger unit, use the alarm -l command as in the following example:

```
admin> alarm -l
Name         Address            Event
lalit        {  0  0  0 }       Input Relay Open
satish       {  0  0  0 }       Primary Switchover
success      {  1  1  0 }       Slot State Change
test1        {  1  2  0 }       Line State Change
test2        {  0  0  0 }       Fan Failure
```

To list the alarms that are enabled for a specific physical address, use the alarm -l command as in the following example:

```
admin> alarm -l 1 0 0
Name         Address            Event
success      {  1  1  0 }       Slot State Change
test1        {  1  2  0 }       Line State Change
```

To specify all the Stinger unit's alarms, enter the alarm command with the -s option:

```
admin> alarm -s
         Type            Address   State
 Secondary CM Down      -- -- --   Active
 Line Down            {  1 17  1 } Active
 Line Down            {  1 17  2 } Active
 Line Down            {  1 18  1 } Active
 Line Down            {  1 18  2 } Active
```

To display only the alarms for a particular module, specify the shelf (always 1) and slot number, as shown in the following example:

```
admin> alarm -s 1 17
   Type                  Address   State
 Line Down            {  1 17  1 } Active
 Line Down            {  1 17  2 } Active
```

To display only the alarms for a particular line, specify the shelf, slot, and item number, as shown in the following example:

```
admin> alarm -s 1 17 1
   Type                 Address   State
 Line Down           {  1 17  1 } Active
```

Monitoring and changing the status of alarms (alarm-stat profile)

The alarm-stat profile enables you to monitor and change the status of alarms. The system creates an alarm-stat profile whenever an alarm condition exists and deletes them when the alarm condition no longer exists or is cleared by the alarm command. The alarm-stat profile listing displays the physical address of the device in an alarm state, as well as the type of alarm condition.

In the following example, the first two lines in trunk module 1 are in a line-state change alarm condition:

```
admin> dir alarm-stat
0  06/20/1999 17:23:20  { { shelf-1 trunk-module-1 1 } line-state-change }
0  06/20/1999 17:23:49  { { shelf-1 trunk-module-1 2 } line-state-change }
```

The following commands list the contents of the alarm-stat profile. The parameter descriptions follow the profile listing.

```
admin> read alarm-stat { { shelf-1 trunk-module-1 1 } line-state-change }
ALARM-STAT/{ { shelf-1 trunk-module-1 1 } line-state-change+ read

admin> list
[in ALARM-STAT/{ { shelf-1 trunk-module-1 1 } line-state-change+]
alarm-id* = { { shelf-1 trunk-module-1 1 } line-state-change }
alarm-state = alarm-active
```

Parameter	Setting
alarm-id	Physical address of the device that has the alarm condition and the alarm event.
alarm-state	State of the alarm. Following are the valid values: ■ alarm-active—The alarm is active, and appropriate action has been taken (setting status lights or closing relays). ■ alarm-acknowledged—The alarm has been acknowledged by the user.

Acknowledging alarms

To acknowledge alarms, use the alarm command with the -a option. The following example shows how to acknowledge the alarms for line 1 in slot 17:

```
admin> alarm -a 1 17 1
```

When you use the alarm -s command, the output shows that the alarm for the first line in slot 17 has been acknowledged:

```
admin> alarm -s
     Type              Address    State
 Secondary CM Down     -- -- --   Active
 Line Down           {  1 17  1 } Acknowledged
 Line Down           {  1 17  2 } Active
```

```
Line Down           {  1 18  1 } Active
Line Down           {  1 18  2 } Active
```

Clearing alarms

You can use the `alarm` command or the `alarm-state` parameter to clear an alarm.

To clear an alarm using the `alarm` command, use the `-c` option. The following example shows how to clear the alarms for line 1 slot 18:

admin> **alarm -c 1 18 1**

Using the `-s` option shows that the alarm for the first line in slot 18 has been cleared and thus no longer appears on the list of alarms:

```
admin> alarm -s
     Type              Address     State
Secondary CM Down      -- -- --   Active
Line Down           {  1 17  1 } Acknowledged
Line Down           {  1 17  2 } Active
Line Down           {  1 18  2 } Active
```

Turning off an alarm status light

The `ledoff` command turns off an alarm status light. To turn off a MAJOR alarm status light, use the `ledoff` command with the `major` option. To turn of a MINOR alarm status light, use the `ledoff` command with the `minor` option. For example:

admin> **ledoff major**

Closing a relay

The `relayoff` command closes or opens a relay circuit that has been activated by an alarm. To turn off a MAJOR relay circuit, use the `relayoff major` command. To turn of a MINOR relay, use the `relayoff` command with the `minor` option. For example:

admin> **relayoff major**

Setting alarms for events on remote shelves

If for a remote shelf you configure an alarm to be active by setting its value to `yes`, an action is triggered and volatile profiles are updated. An emergency level log message is generated whenever the alarm is raised or cleared.

The following parameter, shown with its default setting, determines the scope of an alarm event in a hosted system:

```
[in ALARM/""]
physical-address = { any-shelf any-slot 0 }
```

The default setting represents all remote shelves in the hosted system. To specify an alarm event that will be triggered only when it occurs on the host itself, specify shelf 1. For example:

HOST> **set physical-address shelf = shelf-1**

To configure an alarm for a specific remote shelf, specify the ID of that shelf. For example, to configure an alarm for shelf 2:

HOST> **set physical-address shelf = shelf-2**

An alarm profile specific to a remote shelf is deleted if the remote-shelf-config profile for that shelf is deleted, and the corresponding alarms are cleared.

Table 8-1 lists alarm events related to MRT shelves:

Table 8-1. Hosted MRT alarm events

event setting	Event on remote shelf that triggers alarm
remote-shelf-state-change	The remote shelf changes state. The new status is shown in the remote-shelf-oper-state setting of the remote-shelf-stat profile.
input-relay-closed	Contact-closure sensors on the remote shelf indicate closure. The status is shown in the contact-closure[N] setting of the remote-shelf-stat profile.
input-relay-open	Contact-closure sensors on the remote shelf indicate loss of contact closure. The status is shown in the contact-closure[N] setting of the remote-shelf-stat profile.

Table 8-2 lists alarm events related to Compact Remote shelves:

Table 8-2. Compact Remote alarm events

Alarm event definition	Event on remote shelf that triggers alarm
remote-shelf-state-change	The remote shelf changes state. The new status is shown in the remote-shelf-oper-state setting of the remote-shelf-stat profile.
fan-failure	A sensor on the remote shelf indicates failure of the internal fan unit. The failed status is shown in the internal-fan-unit-failed setting of the remote-shelf-stat profile.
external-fan-failure	A sensor on the remote shelf indicates failure of the external fan unit. The failed status is shown in the external-fan-unit-failed setting of the remote-shelf-stat profile.
input-relay-closed	Contact-closure sensors on the remote shelf indicate closure. The status is shown in the contact-closure[N] setting of the remote-shelf-stat profile.
input-relay-open	Contact-closure sensors on the remote shelf indicate loss of contact closure. The status is shown in the contact-closure[N] setting of the remote-shelf-stat profile.
over-temperature-relay	A temperature sensor on the remote shelf indicates an over-temperature condition. The status is shown in the over-temperature setting of the remote-shelf-stat profile.

Table 8-2. Compact Remote alarm events

Alarm event definition	Event on remote shelf that triggers alarm
door-open	A sensor on the remote shelf indicates that the door has been opened.The status is shown in the door-open setting of the remote-shelf-stat profile.

Sample alarm configuration for remote shelf 3 state change

The following commands set an alarm for a change in status of shelf 3:

```
HOST> new alarm shelf-3
HOST> set enabled = yes
HOST> set event = remote-shelf-state-change
HOST> set physical-address shelf = shelf-3
HOST> write -f
```

If the alarm is triggered, for example, if shelf 3 becomes unavailable, an emergency log message is displayed. For example:

```
LOG emergency, Shelf 1, Controller-1, Time: 14:26:35--
  Wed Sep 17 14:26:35 2000 - ALARM: Remote Shelf { 3 } Alarm is: Active
```

The following alarm command shows that an alarm has been set and the remote shelf is down:

```
HOST> alarm -s
        Type            Address       State
 Remote Shelf Down      {  3 }        Active
```

When the shelf changes state again, for example, when it comes up or is disabled in the remote-shelf-config profile, the alarm is cleared. for example:

```
LOG emergency, Shelf 1, Controller-1, Time: 14:28:16--
  Wed Sep 17 14:28:16 2000 - ALARM: Remote Shelf { 3 } Alarm is: Cleared
HOST> alarm -s
        Type            Address       State
```

Sample alarm for input-relay closure status on any remote shelf

The following commands configure an alarm for input-relay closure on any remote shelf in a hosted system:

```
HOST> new alarm closed
HOST> set enabled = yes
HOST> set event = input-relay-closed
HOST> write -f
HOST> new alarm open
HOST> set enabled = yes
HOST> set event = input-relay-open
HOST> write -f
```

If one of the alarms is triggered, the alarm action takes effect, and the remote-shelf-stat profile is updated. In addition, the status is accessible in the output of the `alarm -s` command. For example, the following output shows contact closure on shelf 2:

```
HOST> alarm -s
         Type            Address           State
 Input Relay Closed     {  2  0  1 }       Active
 Input Relay Closed     {  2  0  2 }       Active
 Input Relay Closed     {  2  0  3 }       Active
```

Monitoring environmental conditions

To monitor alarm conditions for temperature changes, perform the following tasks.

1 Define high and low temperature thresholds in the `thermal` profile. For example:

```
admin> read thermal
admin> set bottom-high = 30
admin> write
```

2 Create `alarm` profiles for low-temperature and high-temperature events and define the list of actions Stinger take if either temperature alarms is raised. For example:

```
admin> new alarm thermal
admin> set event = high-temp
admin> set phy = {1 8 1}
admin> set enable = yes
admin> write
```

Configuring alarm settings for the alarm MIB

Stinger units support alarm MIBs as described in `draft-ietf-disman-alarm-mib-04.txt`. The MIBs provide the following information:

- All possible alarms in the system
- Currently active alarms in the system
- Cleared alarms in the system

Setting the maximum number of alarms in `alarmClearTable`

To set the maximum number of alarms in `alarmClearTable`, set the `alarm-clear-table-limit` parameter in the `snmp` profile. Specify a value from `1` through `200`. The default value is `100`. The following sample commands specify that up to 150 alarms can be stored in `alarmClear` Table:

```
admin> read snmp
admin> set alarm-clear-table-limit = 150
admin> write
```

Clearing alarms from `alarmActiveTable` and `alarmClearedTable`

To clear the alarms in `alarmActiveTable` and `alarmClearTable` of the alarm MIB, disable the associated `trap` profile by setting the `active-enabled` parameter in the `trap` profile to `no`. If the `trap` profile is disabled, the alarm model table reports `RowStatus` as `NOT_IN_SERVICE`.

Deleting an alarm model table

To delete an alarm model table, delete the corresponding `trap` profile.

Configuring SNMP traps

Stinger units generate traps (notifications) for important system events, such as device failure, connection failure, error conditions, and alarm events. You create and enable traps and specify their destination using a `trap` profile. When you have configured a `trap` profile to generate a trap protocol data unit (PDU) on detection of a certain event, if the event occurs, the system sends a PDU to a specified SNMP station. For hosted systems, the host sends trap PDUs generated by any shelf in the system.

If you are configuring traps for line thresholds, you must also specify an *xdsl*`-threshold` profile (a `dsl-threshold` profile, for example) and set parameters in that profile to identify the conditions for which the system should generate a trap. For information about profile and parameters that support threshold traps in the ADSL MIB, see "Monitoring ADSL threshold values" on page 8-23.

You cannot configure traps by way of SNMP.

For information about configuring SNMPv3 traps, see "SNMPv3 notifications" on page 7-10.

Creating a trap profile

You create a `trap` profile and assign it a name using the `new` command. A typical name might be the name of the destination host to which you are sending the trap PDUs. You can specify a name of up to 31 characters.

```
admin> new trap remote1
TRAP/remote1 read
```

As shown in the following example, when you list the profile, the name that you specify when you create the `trap` profile becomes the value of the `host-name` parameter. The rest of the parameters are shown with their default settings.

```
[in TRAP/remote1 ]
host-name* = remote1
active-enabled = yes
community-name = ""
host-address = 0.0.0.0
host-port = 162
inform-time-out = 1500
inform-retry-count = 4
notify-tag-list = default
target-params-name = default
notification-log-enable = no
notification-log-limit = 50
alarm-enabled = yes
security-enabled = no
port-enabled = no
slot-enabled = no
...
```

"Trap classes" on page 8-14 describes the trap parameters contained in the `trap` profile. For additional information about the parameters in the `trap` profile, see the *Stinger Reference*.

Configuring the `trap` profile

You must also activate a trap and specify a destination host and host port. The following parameters in the `trap` profile configure these settings:

Parameter	Setting
`active-enabled`	Enable/disable the system to send traps to the host specified by this profile: ■ `yes`—The system sends traps defined by this profile. ■ `no`—Traps specified by this profile are not sent.
`host-address`	IP address to which traps are sent. The default setting is `0.0.0.0`. If the host address is zero and a name service such as DNS or Network Information Service (NIS) is supported, you can specify the hostname instead. The system uses the name to look up the host address.
`host-port`	Port to which traps are sent. Specify a number from `1` to `65535`. The default setting is `162`.

The following sample commands instruct the unit to send traps to an SNMP manager at the IP address 1.1.1.1:

```
admin> read trap remote1
admin> set host-address = 1.1.1.1
admin> write
```

Trap classes

Traps are grouped into classes: alarm events, security events, port or slot state change, and OSPF events. These classes allow for enabling or disabling sets of traps. When a trap class is enabled, you can enable or disable individual traps within that class. Table 8-3 through Table 8-6 list the individual traps that belong to each trap class.

The following parameters in the `trap` profile represent the trap classes, shown with their default settings:

```
[in TRAP/""]
alarm-enabled = yes
security-enabled = no
port-enabled = no
```

```
slot-enabled = no
ospf-enabled
```

Parameter	Setting
`alarm-enabled`	Enable/disable an alarm class events. For details, see "Alarm class traps" on page 8-15.
`security-enabled`	Enable/disable security class events. For details, see "Security class traps" on page 8-18.
`port-enabled`	Enable/disable port class events. For details, see "Port class trap" on page 8-19.
`slot-enabled`	Enable/disable slot class events. For details, see "Slot class trap" on page 8-19.
`ospf-enabled`	Enable/disable OSPF class events. For details, see "OSPF class traps" on page 8-20.

Note Enabling an individual trap has no effect if the trap class to which it belongs is disabled.

Alarm class traps

By default, the alarm class is enabled. Table 8-3 lists the events in the alarm class and the parameters you use to enable or disable each individual trap.

For a Stinger unit to send a trap for the events listed in Table 8-3, accept the default setting of `yes` for the `alarm-enabled` parameter and enable the parameter for that specific event.

If the `alarm-enabled` parameter is set to `no`, the unit does not send traps for any of the events listed in Table 8-3.

Table 8-3. Parameters that enable or disable traps in the alarm class

Event	Parameter	Trap
Unit reinitialized itself in such a way that the configuration of the SNMP manager or of the system itself might be altered.	`coldstart-enabled`	`ColdStart`
Unit reinitialized itself so that neither the configuration of the SNMP manager nor that of the system itself was altered.	`warmstart-enabled`	`WarmStart`
Failure in a communication link between the unit and the SNMP manager.	`linkdown-enabled`	`LinkDown`
Communication link between the unit and the SNMP manager came back up.	`linkup-enabled`	`LinkUp`
A data link connection identifier (DCLI) was reinitialized.	`fr-linkup-enabled`	`FRLinkUp`

Table 8-3. Parameters that enable or disable traps in the alarm class (Continued)

Event	Parameter	Trap
A DLCI has become inactive.	`fr-linkdown-enabled`	`FRLinkDown`
A new event has overwritten an unread event. Once the trap has been sent, additional overwrites do not cause another trap to be sent until at least one table's worth of new events have occurred.	`event-overwrite-enabled`	`EventOverwrite`
Digital modem has been moved to the suspect list.	`lan-modem-enabled`	`LanModem`
Change in the state of a power-supply module. The module might have been added or removed.	`power-supply-enabled`	`powerSupplyStateChange` `powerSupplyOperationalStateChange`
System configuration was modified or a new software version was loaded.	`config-change-enabled`	`ConfigChange`
System clock drifted but could not be corrected.	`sys-clock-drift-enabled`	`SysClockDrifted`
T1000 module has received four or more calls for which it cannot establish a connection. The module is not assigned to terminate calls until all available resources are exhausted.	`suspect-access-resource-enabled`	`SuspectAccessResrc`
Watchdog warning has occurred.	`watchdog-warning-enabled`	`WatchdogWarning`
Change in primary control module in a unit with redundant control modules.	`controller-switchover-enabled`	`Controllerswitchover`
Change in the state of an E1 or T1 line.	`wan-line-state-change-enabled`	`WanLineStateChange`
The value of the `callLoggingDroppedPacketCount` variable changed from 0 to 1 (which indicates that packets are being dropped) or from 1 to 0 (which indicates that packets are no longer being dropped) in the call-logging MIB.	`call-log-dropped-pkt-enabled`	`CallLogDroppedPkt`
LIM redundancy has taken effect.	`lim-sparing-enabled`	`sparingSlotStatusChange`
LIM port redundancy has taken effect.	`interface-sparing-enabled`	`interfaceSparing`

Table 8-3. Parameters that enable or disable traps in the alarm class (Continued)

Event	Parameter	Trap
Change in state of the secondary control module.	`secondary-controller-state-change-enabled`	`CntrReduAvail`
No resources are available to answer a call.	`no-resource-available-enabled`	`NoResourceAvailable`
Digital subscriber line (DSL) threshold has been reached. See "Monitoring ADSL threshold values" on page 8-23.	`dsl-thresh-trap-enabled`	`dslThreshTrap`
Failure occurred on a PVC or soft PVC.	`atm-pvc-failure-trap-enabled`	`atmPvcFailureEnabled`
Failure occurred on with an IMA logical port.	`atm-ima-alarm-trap-enabled`	`atmimaalarmtrapenabled`
A module has been reset.	N/A. The system always sends traps when the corresponding event occurs and the alarm class is enabled. You cannot disable these traps individually.	`slotCardReset`
Reason for the last system reset.		`sysLastRestartReason`
ADSL link failed to initialize.		`AdslInitFailureTrap`
Failure in the a communication link between the Stinger SNMP agent and SNMP manager.	`ascend-link-down-trap-enabled`	`ascendLinkDown`
Reestablishment of a failed communication link between the Stinger SNMP agent and SNMP manager.	`ascend-link-up-trap-enabled`	`ascendLinkUp`
A multicast group join activity has occurred.	`ascend-multicast-link-trap-enabled`	`multicastLinkUpTrap`
A multicast group leave activity has occurred.	`ascend-multicast-link-trap-enabled`	`multicastLinkDownTrap`
Connection admission control (CAC) failure for an ATM connection has occurred.	`ascend-cac-fail-trap-enabled`	`cacfail`
Soft permanent virtual circuit (SPVC) target call failure has occurred.	`spvc-target-cac-fail-trap-enabled`	

Table 8-3. Parameters that enable or disable traps in the alarm class (Continued)

Event	Parameter	Trap
Operations, administration, and maintenance (OAM) loopback and continuity test has timed out.	`oam-timeout-trap-enabled`	`oamtimeoutTrap`
OAM segment reports an AIS, LOC, or RDI defect.	`oam-timeout-trap-enabled`	`atmOamDefectSegTrap`
OAM end-to-end flow reports an AIS, LOC, or RDI defect.	`oam-timeout-trap-enabled`	`atmOamDefectE2eTrap`
The primary and secondary control modules have different TAOS versions.	`ascend-sw-mismatch-trap-enabled`	`slotSWMatchingTrap`
The primary and secondary control modules have different software licenses enabled.	`ascend-hashcode-mismatch-trap-enabled`	`cntrHashcodeMatchingTrap`
A change in the state of a remote shelf.	`remote-shelf-enabled`	

Security class traps

By default, the security class is disabled. To enable the Stinger unit to send one or more of the traps listed in Table 8-4, set the `security-enabled` parameter to `yes`:

```
[in TRAP/""]
admin> security-enabled = yes
admin> write -f
```

Table 8-4. Parameters that enable or disable traps in the security class

Event	Parameter	Trap
Authentication failure occurred.	`authentication-enabled`	`authentication`
Console has changed state. The console entry can be read to determine its current state.	`console-enabled`	`console`
Specific port has exceeded the number of DS0 minutes allocated to it.	`use-exceeded-enabled`	`useexceeded`
Maximum number of login attempts for a Telnet session has been exceeded.	`password-enabled`	`password`
New RADIUS server has been accessed. This trap returns the objectID and IP address of the new server.	`radius-change-enabled`	`radiuschange`

Table 8-4. Parameters that enable or disable traps in the security class (Continued)

Event	Parameter	Trap
Call-logging server change has occurred.	`call-log-serv-change-enabled`	`calllogservchange`
SNMP access is disabled for the entire system, or the host in question was not authorized to access and/or to perform a `set` operation to the system. Only up to 10 Illegal Access traps and 10 Authentication Failure traps are generated over a 10-minute period. If the number of these traps exceeds this limit, the remaining traps are dropped.	`snmp-illegal-access-attempt`	`snmpIllegalAccessAttempt`

Port class trap

By default, the port class is disabled. For the Stinger unit to send the trap listed in Table 8-5, you must set the `port-enabled` parameter to `yes`.

```
[in TRAP/""]
port-enabled = yes
```

If the `port-enabled` parameter is set to `no`, the unit does not send the trap listed in Table 8-5.

Table 8-5. Parameter that enables or disables traps in the port-state class

Event	Parameter	Traps in port class
Change in the state of a host interface. All port connections are monitored in a state machine and reported by means of this trap.	`ascend-enabled`	`Ascend`

Slot class trap

By default, the slot class is disabled. For the Stinger unit to send the trap listed in Table 8-6, the following parameter must be set to `yes`:

```
[in TRAP/""]
slot-enabled = yes
```

If the `slot-enabled` parameter is set to `no`, the unit does not send the trap listed in Table 8-6.

Table 8-6. Parameter that enables or disables traps in the slot class

Event	Parameter	Trap
Change of state in a host interface. All port connections are monitored in a state machine and reported by means of this trap.	`slot-profile-change-enabled`	`SlotProfileChange`
Change in clock source.	`clock-change-trap-enabled`	`Clockchange`

OSPF class traps

Stinger units support OSPF class traps as defined in RFC 1850, *OSPF Version 2 Management Information Base*. By default, OSPF traps are disabled. To generate an OSPF trap when an event shown in Table 8-7 occurs, enable OSPF traps either in the `trap` profile or by setting the corresponding bit in the MIB object, `ospfSetTrap`, defined in RFC 1850. You must also enable the individual trap that represents the trap condition.

To enable OSPF traps in the `trap` profile, set `ospf-enabled` to `yes`. If `ospf-enabled` is set to `no` (the default), the unit does not send traps for any of the events listed in Table 8-7.

Table 8-7. Parameters that enable or disable traps in the OSPF class

Event	Parameter	Trap
Configuration error types 1 through 9, as defined in RFC 1850. Possible failure to form an adjacency. Traps for error type 10 (`optionMismatch`) are not currently supported.	`ospf-if-config-error-enabled`	`OSPF Trap 4`
Packet received on a nonvirtual interface from a router whose authentication key or type conflicts with the Stinger unit's authentication key or type.	`ospf-if-auth-failure-enabled`	`OSPF Trap 6`
Change in the state of a nonvirtual OSPF interface when the interface state regresses or progresses to a terminal state. For example, the state of the OSPF interface on a Stinger unit can regress from DR (designated router) to Down (unusable), or can progress to a terminal state of point-to-point (operational for point-to-point or virtual connections), DR Other (linked to a designated router on another network), or Backup (BDR). For details about interface state changes, see RFC 2328.	`ospf-if-state-change-enabled`	`OSPF Trap 16`

Table 8-7. Parameters that enable or disable traps in the OSPF class (Continued)

Event	Parameter	Trap
OSPF packet has been received on a nonvirtual interface that cannot be parsed	`ospf-if-rx-bad-packet`	`OSPF Trap 8`
OSPF packet has been retransmitted on a nonvirtual interface. All packets that are retransmitted are associated with a link-state database (LSDB) entry. The link-state type, link-state ID, and router ID identify the link-state database entry.	`ospf-tx-retransmit-enabled`	`OSPF Trap 10`
Change in the state of a nonvirtual OSPF neighbor. This trap is generated when the neighbor state regresses. For example, a neighbor's state can regress from Attempt (this neighbor needs Hello packets) or Full (this neighbor is fully adjacent) to 1-Way (communication with this neighbor is unidirectional) or Down (no recent information was received from this neighbor). Or it can progress to a terminal state like 2-Way (communication is bidirectional) or Full. A designated router transitioning to Down also causes the system to generate this trap or when a neighbor transitions from or to Full on NBMA and broadcast networks. For details about state changes, see RFC 2328.	`ospf-nbr-state-change-enabled`	`OSPF Trap 2`
Change in the state of a virtual OSPF interface when the interface state regresses (for example, from point-to-point to down) or progresses to a terminal state, such as point-to-point.	`ospf-virt-if-state-change-enabled`	`OSPF Trap 1`
A Stinger unit virtual interface received an OSPF packet that cannot be parsed.	`ospf-virt-if-rx-bad-packet`	`OSPF Trap 9`
An OSPF packet has been retransmitted on a virtual interface. All packets that are retransmitted are associated with a link-state database entry. The link-state type, link-state ID, and router ID are used to identify the link-state database entry.	`ospf-virt-if-tx-retransmit-enabled`	`OSPF Trap 11`
Change in state of an OSPF virtual neighbor.	`ospf-virt-nbr-state-change-enabled`	`OSPF Trap 3`
A new LSA has been originated by this router due to a topology change.	`ospf-originatelsa-enabled`	`OSPF Trap 12`

Table 8-7. Parameters that enable or disable traps in the OSPF class (Continued)

Event	Parameter	Trap
An LSA in the Stinger unit's link-state database has reached its maximum age.	ospf-maxagelsa-enabled	OSPF Trap 13
The number of LSAs in the Stinger unit's link-state database has exceeded the maximum limit.	ospf-lsdb-overflow-enabled	OSPF Trap 14
The number of LSAs in the Stinger unit's link-state database has exceeded 90 percent of the OSPFExtLsdbLimit.	ospf-approaching-overflow-enabled	OSPF Trap 15

Example of configuring an OSPF trap

The following commands cause the system to generate traps when the Stinger unit receives a packet from an OSPF router in which a configuration mismatch (such as an invalid OSPF version number or an address conflict) or an authentication failure occurs:

```
admin> read trap monitor-ospf
admin> set ospf-enabled = yes
admin> set ospf-if-config-error-enabled = yes
admin> set ospf-if-auth-failure-enabled = yes
admin> write -f
```

Traps not belonging to any class

The flashCardStateTrap trap does not belong to a specific class. For the system to generate a trap whenever a flash card is removed or inserted from a control module, you need only to set the ascend-flash-card-trap-enabled parameter to yes.

Typical uses of traps and trap classes

If alarm-enabled is set to yes, the following commands cause the system to send trap PDUs when LIM redundancy takes effect, the secondary controller becomes primary, a DSL threshold is reached, and a PVC failure occurs. Note that the alarm-enabled parameter must be set to yes for the system to send these traps.

```
admin> set lim-sparing-enabled = yes
admin> set secondary-controller-state-change-enabled = yes
admin> set dsl-thresh-trap-enabled = yes
admin> set atm-pvc-failure-trap-enabled = yes
admin> write -f
```

The following commands enable security class traps:

```
admin> set security-enabled = yes
admin> lim-sparing-enabled = yes
admin> write -f
```

In the following example, the host-name value is used only as a profile index, not to locate the actual host on the network. A community name is specified, security-class traps are added to the default alarm-class traps, and this host receives a trap if the link fails.

```
admin> new trap security-traps
admin> set community-name = Ascend
admin> set host-address = 10.2.3.4
admin> set security-enabled = yes
admin> set slot-enabled = yes
admin> write -f
```

Because security traps and the password-enabled and authentication-enabled parameters are enabled, two traps are sent when either of the related conditions occur. The individual trap provides additional information about the specific event that triggered the trap.

Monitoring ADSL threshold values

Stinger units can generate traps and alarms when certain ADSL line conditions reach specified threshold values. To enable the supported threshold traps in the ADSL MIB, perform the following tasks:

- Specify the dsl-threshold profile to be used for a line by setting the thresh-profile parameter in the line's al-dmt profile.
- Configure the parameters in the dsl-threshold profile that specify threshold values for SNMP alarms on ADSL lines.
- Create a trap profile that specifies the trap destination and enables related traps.

The index of the dsl-threshold profile is the name of the profile. Each dsl-threshold profile is not tied to a particular line, but is linked instead by the thresh-profile parameter of an al-dmt profile for that line. During startup, the system creates a default dsl-threshold profile named default and also sets the thresh-profile parameter in each al-dmt profile to default, creating the link between the profiles.

Specifying the dsl-threshold profile

The thresh-profile parameter in the al-dmt profile specifies the dsl-threshold profile to use for an ADSL line. By default, this parameter is set to default, which is the name of the default dsl-threshold profile.

The thresh-profile parameter is shown below with its default setting, default:

```
[in AL-DMT/{ shelf-1 slot-1 22 }]
thresh-profile = default
```

Overview of the dsl-threshold profile settings

Following are the parameters for the dsl-threshold profile:

Parameter	Setting
name	Name of the dsl-threshold profile. To set the threshold times for an ADSL line, specify the name of a dsl-threshold profile in the thresh-profile parameter of the al-dmt profile. Enter a text string of up to 23 characters.
enabled	Enable/disable this profile. Specify yes to enable the profile. This parameter must be set to yes if any of the following settings are to apply.
atuc-15min-lofs	Number of loss-of-frame seconds encountered by a DSL interface within any given 15-minute performance data collection period, which causes the SNMP agent to send a trap. One trap is sent per interval, per interface. A value of 0 disables the trap. Enter a value from 0 through 900.
atuc-15min-loss	Number of loss-of-signal-seconds encountered by a DSL interface within any given 15-minute performance data collection period, which causes the SNMP agent to send a trap. One trap is sent per interval, per interface. A value of 0 disables the trap. Enter a value from 0 through 900.
atuc-15min-lols	Number of loss-of-link seconds encountered by a DSL interface within any given 15-minute performance data collection period, which causes the SNMP agent to send a trap. One trap is sent per interval per interface. A value of 0 disables the trap. Enter a value from 0 through 900.
atuc-15min-lprs	Number of loss-of-power seconds encountered by a DSL interface within any given 15-minute performance data collection period, which causes the SNMP agent to send a trap. One trap is sent per interval per interface. A value of 0 disables the trap. Enter a value from 0 through 900.
atuc-15min-ess	Number of errored seconds encountered by a DSL interface within any given 15-minute performance data collection period, which causes the SNMP agent to send a trap. One trap is sent per interval per interface. A value of 0 disables the trap. Enter a value from 0 through 900.
atuc-fast-rate-up	Change in rate of a fast channel causing a trap to be sent. A trap is produced when ChanCurrTxRate is greater than or equal to the value of this parameter added to the ChanPrevTxRate. Enter a value from 0 through 2147483647. A value of 0 disables the trap.
atuc-interleave-rate-up	Change in rate of an interleaved channel causing a trap to be sent. A trap is produced when ChanCurrTxRate is greater than or equal to the value of this parameter added to the ChanPrevTxRate. Enter a value from 0 through 2147483647. A value of 0 disables the trap.

Parameter	Setting
atuc-fast-rate-down	Change in rate of a fast channel causing a trap to be sent. A trap is generated when ChanCurrTxRate is less than or equal to the value of this parameter added to the ChanPrevTxRate. Enter a value from 0 through 2147483647. A value of 0 disables the trap.
atuc-interleave-rate-down	Change in rate of an interleaved channel causing a trap to be sent. A trap is produced when ChanCurrTxRate is less than or equal to the value of this parameter added to the ChanPrevTxRate. Enter a value from 0 through 2147483647. A value of 0 disables the trap.
atuc-init-failure-trap	Enable/disable InitFailureTrap.

Lucent-specific ADSL threshold traps

Table 8-8 lists the Lucent-specific versions of the ADSL threshold traps. If enabled, the system sends these traps in addition to the generic ADSL traps defined in RFC 2662.

Table 8-8. Lucent-specific ADSL threshold traps

Trap	Event
ascendAdslAtucPerfLofsThreshTrap	Loss of Framing 15-minute interval threshold reached at the ADSL transceiver unit-central office(ATU-C) end.
ascendAdslAtucPerfLossThreshTrap	Loss of Signal 15-minute interval threshold reached at the ATU-C end.
ascendAdslAtucPerfLprsThreshTrap	Loss of Power 15-minute interval threshold reached at the ATU-C end.
ascendAdslAtucPerfESsThreshTrap	Errored Second 15-minute interval threshold reached at the ATU-C end.
ascendAdslAtucPerfLolsThreshTrap	Loss of Link 15-minute interval threshold reached at the ATU-C end.
ascendAdslAturPerfLofsThreshTrap	Loss of Framing 15-minute interval threshold reached at the ADSL transceiver unit-remote (ATU-R) end.
ascendAdslAturPerfLossThreshTrap	Loss of Signal 15-minute interval threshold reached at the ATU-R end.
ascendAdslAturPerfLprsThreshTrap	Loss of Power 15-minute interval threshold reached at the ATU-R end.
ascendAdslAturPerfESsThreshTrap	Errored Second 15-minute interval threshold reached at the ATU-R end.

Enabling the system to generate ADSL threshold traps

Table 8-9 summarizes the types of ADSL threshold traps sent by the Stinger system and the required settings:

Table 8-9. ADSL threshold traps and required settings in the `trap` profile

Type of ADSL trap sent by the system	Required parameter settings in the trap profile		
	`alarm-enabled`	`dsl-thresh-trap-enabled`	`ascend-adsl-threshold-traps-enabled`
No ADSL traps	N/A	`no`	no
Only standard ADSL traps	`yes`	`yes`	no
Standard and Lucent-specific ADSL traps	`yes`	`yes`	`yes`

The `ascend-adsl-threshold-traps-enabled` parameter in the `trap` profile controls the sending of Lucent-specific ADSL threshold traps. By default, the Stinger system does not generate Lucent-specific traps for the events listed Table 8-8 (the `ascend-adsl-threshold-traps-enabled` parameter is set to `no`).You cannot configure the system to send only Lucent-specific ADSL traps.

The following sample commands enable the system to generate generic ADSL threshold traps and Lucent-specific traps:

```
admin> new trap adsl
admin> set dsl-thresh-trap-enabled = yes
admin> set ascend-adsl-threshold-traps-enable = yes
admin> write -f
```

Configuring link-state traps for LIM and trunk ports

By default, the system generates `linkUP` and `linkDown` traps for all trunk ports, but not for LIM ports. The following parameters control the generation of `linkUP` and `linkDown` traps, shown here with their default settings:

```
[in SYSTEM]
link-phys-trap-state=trap-state-enabled
link-perm-trap-state = trap-state-enabled
lim-link-phys-trap-state = trap-state-disabled
lim-link-perm-trap-state = trap-state-disabled

[in ADMIN-STATE-PHYS-IF]
desired-trap-state = system-defined

[in ADMIN-STATE-PERM-IF]
desired-trap-state = system-defined
```

The system creates the following profiles for each LIM or trunk port present on the system:

- `admin-state-phys-if`—contains information about a port's physical layer.

- admin-state-perm-if—contains information about a port's ATM layer--that is, the dedicated (nailed) interfaces.

The desired-trap-state parameter in the admin-state-phys-if and admin-state -perm-if profiles specifies whether linkUp and linkDown notifications (traps) are generated for a *specific* LIM or trunk interface. However, the settings of the admin-state-phys-if and admin-state-perm-if profiles do not persist across system resets.

When you configure the relevant parameters in the system profile to specify if linkUP and linkdown traps are generated for LIM ports or trunk ports, the settings persist across system resets. The desired-trap-state parameter in the admin-state-phys-if and admin-state-perm-if profiles must be set to system-defined for the parameters in the system profile to apply.

Note that you must also configure a trap profile to enable the Linkdown and Linkup trap parameters in the trap profile, specify the trap destination and other trap settings.

Changing the setting for the desired-trap-state parameter systemwide

You can use the if-trap-admin command to change the setting of the desired-trap-state parameter for all admin-state-phys-if profiles, for all admin-state-perm-if profiles or both admin-state-phys-if and admin-state-perm-if profiles.

The syntax for the if-trap-admin command is as follows:

```
if-trap-admin [-a|s|m] [system|enabled|disabled]
```

Valid settings are system for system-defined, enabled, and disabled. If no argument is specified, the system uses the system.

To change the setting of the desired-trap-state parameter in the admin-state-phys-if and admin-state-perm-if profiles for all ports in the system, use the -a option. For example:

```
admin> if-trap-admin -a system
Massive desired-trap-state change done
```

To change the setting of the desired-trap-state parameter in the admin-state-phys-if profiles for all ports in the system, use the -s option.

To change the setting of the desired-trap-state parameter in the admin-state-perm-if profiles for all ports in the system, use the -m option.

Enabling a trap for Gigabit Ethernet link state

You can configure the system to generate a trap whenever a Gigabit Ethernet link goes up or down. The following settings configure the system to generate a trap when the Gigabit Ethernet link goes up or down:

```
[in ETHERNET]
link-state-enabled = yes

[in TRAP]
linkdown-enabled = yes
linkup-enabled = yes

[in system]
link-phys-trap-state = trap-state-enabled
```

Configuring trap sequencing and heartbeat traps

Traps, like any other SNMP protocol data unit (PDU), use User Datagram Protocol (UDP) for transport. UDP by its nature does not guarantee delivery. In certain situations of network congestion and link failures, traps sent from a Stinger unit might be lost in transit and never reach the target element management system (EMS). Given the critical administrative dependence on trap delivery, any loss might result in delay of servicing outages.

Trap sequencing and the heartbeat trap

You can configure a Stinger unit to add sequence numbers to traps. With the trap sequencing feature enabled, the Stinger unit increments the trap sequence number before sending it, which provides a means for the NavisAccess® management software to detect if any trap was lost in transit.

NavisAccess® management software implements a sliding window to receive traps from each Stinger unit. This mechanism is necessary because UDP-based transport does not guarantee delivery of datagrams in sequence. For NavisAccess® management software to detect any missing traps, you can configure the Stinger unit to send a special heartbeat trap after a specified interval of trap inactivity.

When the Stinger unit generates a heartbeat trap, it does not increment the sequence number. Instead, it numbers heartbeat traps with the same sequence number as the last nonheartbeat trap sent. The Stinger unit does not save heartbeat traps in its notification log MIB.

If the NavisAccess® management software detects a gap in trap sequence number, it can take corrective action by requesting for a replay of the range of missing traps. The traps are replayed using the notification log MIB and its extension. Therefore, for this feature to work, you must also enable the notification log on the Stinger unit (the `notify-log-enabled` parameter must be set to `yes`).

Configuring trap sequencing and the sending of heartbeat traps

To configure trap sequencing and the sending of heartbeat traps, create a new `trap` profile and name it `navisnlm`. For example:

```
admin> new trap navisnlm
TRAP/navisnlm read
```

The following parameters in the `trap` profile configure a Stinger unit to number traps sequentially and generate a heartbeat trap.

```
[in TRAP/navisnlm]
...
notification-log-enable = no
notification-log-limit = 50
...
trap-sequencing = yes
heart-beat-trap-interval = 5
...
```

```
heart-beat-trap-enabled = no
```

Parameter	Specifies
notification-log-enable	Whether SNMP traps (notifications) for this profile are logged. Specify yes to enable logging or no (the default) to disable it.
notification-log-limit	Maximum number of notification entries that can be held in the SNMP notification log. Specify a number from 1 to 500. The default is 50.
trap-sequencing	Enable/disable the Stinger unit from embedding sequence numbers in traps. NavisAccess® management software uses the trap sequence numbers to detect lost traps. By default, the Stinger unit does not embed sequence numbers in traps. Specify yes to enable this feature. For trap sequencing to work, the notification log must also be enabled—that is, the notification-log-enable parameter must be set to yes.
heart-beat-trap-enabled	Enable/disable the Stinger unit to generate heartbeat traps after a period of trap inactivity. By default, the Stinger unit does not generate a heartbeat trap during periods of trap inactivity. For the system to generate a heartbeat trap after a specified interval of trap inactivity specified by the heart-beat-trap-interval parameter, specify yes. The sequence number for a heartbeat trap is the same as the number of the last nonheartbeat trap generated by the Stinger unit.
heart-beat-trap-interval	Time elapsed, in minutes, since the Stinger unit last generated a trap before it sends a heartbeat trap. Specify a value from 1 through 60. The default value is 5.

Sample configuration

The following sample commands configure the Stinger unit to generate traps with sequence numbers and to generate a heartbeat trap 10 minutes after it last sends a trap.

```
admin> new trap navisnlm
admin> set trap-sequencing = yes
admin> set notification-log-enable = yes
admin> set heart-beat-trap-enabled = yes
admin> set heart-beat-trap-interval = 10
admin> write -f
```

Enabling traps for events on remote shelves

To enable the system to send traps related to sensors on remote shelves, the following parameters must be set to yes (their default value):

```
[in TRAP/""]
remote-shelf-enabled = yes
watchdog-warning-enabled = yes
```

Remote shelf `watchdog` profiles are created and deleted on the host depending on the operational state of the `remote-shelf-stat` profile for that shelf.

```
HOST> dir watchdog
    68  11/06/2003 11:59:46  { thermal shelf-controller 1 }
    41  11/06/2003 11:59:53  { relay cm-input-relay 1 }
    41  11/06/2003 11:59:53  { relay cm-input-relay 2 }
    41  11/06/2003 11:59:53  { relay cm-input-relay 3 }
    68  11/06/2003 11:59:46  { thermal shelf-controller 4001 }
    33  11/06/2003 00:24:08  { relay cm-input-relay 4001 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4002 }
    33  11/06/2003 00:22:27  { relay cm-input-relay 4003 }
```

The following commands configure a `trap` profile to support these watchdog warnings on a remote shelf, to be sent to an SNMP station at IP address 10.10.10.1:

```
HOST> new trap 10.10.10.1
HOST> set host-address = 10.10.10.1
HOST> set alarm-enabled = yes
HOST> set remote-shelf-enabled = yes
HOST> set watchdog-warning-enabled = yes
HOST> write -f
```

You can disable a specific remote shelf watchdog by modifying the `watchdog` profile. For example:

```
HOST> read watchdog { relay cm-input-relay 4003 }
HOST> set watchdog-trap-enable = no
HOST> write -f
```

Stinger trap optimization

You can optimize the number of traps that are generated by the Stinger system to make the traps more meaningful to an end user. A Stinger system can generate a large number of traps whenever a slot status changes. Most traps that are generated by the system are link up or link down traps. Whenever a link goes down, a link down trap is generated; when a slot goes down, in addition to the slot down trap, the system generates traps for the all the lines that go down with the slot. For example, when a 24-port slot goes down, the system generates 24 `linkDown` traps and 24 `ascendLinkDown` traps for each SDSL, ATM and PPP interface.

You to reduce the number of traps by masking certain unwanted traps sot that when a slot going down, the system generates only a single trap for the slot going down, rather than sending a trap for each link that goes down with the slot.

If this feature is enabled, whenever a link goes down, the system generates link down traps as in previous release. If a slot goes down, the system generates `slotStateChange` trap, but the traps for the corresponding lines going down are masked.

Similarly when a slot comes up or the system boots, the system generates `slotStateChange` traps, but the traps for the lines coming up with the slot are masked.

Optimizing the number of traps generated by the system

To configure a Stinger system to optimize the number of traps generated for slot status change, set the `trap-optimization-enabled` parameter in the `trap` profile to `yes`. By default, this parameter is set to no.

If the `trap-optimization-enabled` parameter is set to `yes`, the system does not generate certain link-level traps. Note that you cannot retrieve these link-level traps at a later time.

The `yes` setting for the `trap-optimization-enabled` parameter has the following effects:

- If `ascendLinkDown` and `ascendLinkUp` traps are enabled, `LinkUp` and `LinkDown` traps are not generated.
- `LinkUp` or `ascendLinkUp` traps are not generated as slots coming up. In this case, a 120 second no-trap window is defined, so `ascendLinkUp` traps are not generated for 120 secs after the slot comes up.
- `LinkDown` or `ascendLinkDown` traps are not generated as slots are going down.
- `sysSlotStateChange` traps are generated only for slot status changes to `operStateDown` and `operStateUp`. Intermediate states, such as `operStateLoading` and `operStatePost`, are not generated.
- If `slot-enabled` is set to `no`, when a slot goes down, `linkDown` or `ascendLinkDown` traps are generated for the lines going down with the slot. But the `sysSlotStateChange` trap is not generated.

The `maxTelnetAttempts` and `systemUseExceeded` traps are not affected by the setting of the `trap-optimization-enabled` parameter.

Trap optimization

To streamline the number of traps generated by remote shelves, you can enable trap optimization. Trap optimization behavior depends on the settings of the following parameters, shown with default values:

```
[in TRAP/""]
trap-optimization-enabled = no
slot-enabled = no
linkdown-enabled = yes
linkup-enabled = yes
ascend-link-down-trap-enabled = no
ascend-link-up-trap-enabled = no
```

To fully enable trap optimization, set all these fields to `yes`. For example:

```
HOST> read trap dsl-snmp
HOST> set trap-optimization-enabled = yes
HOST> set slot-enabled = yes
HOST> set ascend-link-down-trap-enabled = yes
HOST> set ascend-link-up-trap-enabled = yes
HOST> write -f
```

The following trap optimizations are made:

- LinkUp and LinkDown traps are not generated unless `ascend-link-down-trap-enabled` and `ascend-link-up-trap-enabled` are set to `no`.
- AscendLinkUp traps are not generated when slots are initializing or during a system reset. The ascendLinkUp trap is generated 120 seconds after a slot has initialized.
- AscendLinkDown traps as a slot is being disabled.
- The sysSlotStateChange trap is generated only for the slot status changes to operStateDown or operStateUp. The trap is not sent for other intermediate states such as operStateLoading and operStatePost.
- If `trap-optimization-enabled` is set to `yes` but `slot-enabled` is set to `no`, the system generates ascendLinkDown and ascendLinkUp traps for each line when a slot changes state, and does not generate the sysSlotStateChange trap.

Displaying information about notification logs

The `nlmstat` debug command shows information about notification logs for a Stinger unit. The `nlmstat` command is available only in the debug environment. Its syntax is as follows, where ***`trap`*** is the name of a `trap` profile:

`nlmstat` [***`trap`***]

Without any arguments, the output of the `nlmstat` command reports is as follows. Table 8-10 describes the fields reported by the output of the `nlmstat` command.

```
admin> nlmstat
      Log Name                 Limit Logged    Bumped    #Replays   Replay
----------------------------------------------------------------------------
navisnlm                        50   17         0         0          Idle
135.254.196.31                   50   20         0         0          Idle
```

Table 8-10. Description of fields for the output of the `nlmstat` command

Field	Specifies
`Log Name`	Name of the `trap` profile (EMS).
`Limit`	Maximum number of trap notification entries that can be held in `nlm` log table for this named log. The value of `Limit` is the same as the value of `notification-log-limit` parameter in the `trap` profile.
`Logged`	Number of notifications logged by the Stinger unit for the `trap` profile.
`Bumped`	Number of log entries discarded to make room for a new entry when the total number of entries has exceeded the configured limit specified in the `trap` profile.
`#Replays`	Number of notifications that have been replayed for this log.
`Replay`	Status of the replay function. Indicates whether replay is active (`active`) or not (`idle`).

To display information about traps logged for a specific `trap` profile, enter the `nlmstat` command with the name of that `trap` profile. For example:

```
admin> nlmstat 135.254.196.31
 Notification Log Name  : 135.254.196.31
 Log Limit              : 50
 Notifications Logged   : 20
 Notifications Bumped   : 0
 Notifications Replayed : 0

 Index      Uptime     Gen-trap Spec-trap Version
 ------------------------------------------------
 1          0            0        0         V1
 2          0            6        48        V1
 3          0            6        12        V1
 4          400          3        0         V1
 5          400          3        0         V1
 6          400          3        0         V1
 7          400          3        0         V1
 8          400          3        0         V1
 9          400          3        0         V1
 10         400          3        0         V1
 11         400          3        0         V1
 12         0            3        0         V1
 13         0            6        26        V1
 14         100          6        35        V1
 15         100          6        35        V1
 16         100          6        35        V1
 17         300          6        12        V1
 18         600          6        12        V1
 19         1800         3        0         V1
 20         1800         3        0         V1
```

Table 8-11 defines the fields reported by the *`nlmstat trap`* command, in addition to the fields already defined in Table 8-10.

Table 8-11. Additional fields reported with the `Ipaddress` argument

Field	Specifies
`Index`	Index of a notification in `nlm` log table.
`Uptime`	System uptime, when the notification was generated.
`Gen-trap`	Generic trap type.
`Spec-trap`	Specific trap type.
`Version`	Trap version. Reported values can be `V1` (SNMPv1) or `V3` (SNMPv3).

Configuring traps for CDR device failure

In certain LIMs, data path failure sometimes occurs because of Clock and Data Recovery (CDR) device failure. When this situation occurs, some or all ports on the LIM become unusable for data transmissions.

You can configure the system to generate an alarm or trap whenever a port malfunctions because of a CDR device failure. The system detects CDR device failure for downstream data transfers (that is, data going to LIMs through the primary control module) or upstream data transfer (data going to the primary control module through the LIM).

When an alarm or trap is generated, to allow data transfer through the affected LIM, an administrator can then perform a manual control module switchover.

Consider the following points:

- Trap reported for CDR device failure is available only on the following LIMs:
- The system generates traps only for LIMs on the host shelf. Traps are not sent to the host Stinger unit for CDR failures on LIMs installed in remote shelves. The traps can be viewed locally.
- CDR failure is reported irrespective whether the ports are active or are carrying traffic.
- Alarms and traps are generated only for data transfer through the primary control module.
- CDR device failure is not reported for Stinger MRT or Stinger CRT units.

Configuring alarms for CDR failure

To configure the system to generate an alarm for a CDR failure, set the `event` parameter in the `alarm` profile to `cdr-failure`. For example, the following commands configure the system to generate an alarm for ports in slot 3 that fail because CDR failure:

```
admin> new alarm cdr
admin> set enabled = yes
admin> set event = cdr-failure
admin> set physical-address = { 1 3 0}
admin> write -f
```

Configuring traps for events related to CDR failure

You use the new `cdr-failure-trap-enabled` parameter in the `trap` profile to configure the system to generate a trap for CDR failure. By default, the sending of traps for CDR failure is disabled. For example:

```
admin> new trap
admin> set host-name = traptest
admin> set community-name = public
admin> set host-address = 135.254.196.75
admin> set host-port = 3579
admin> set cdr-failure-trap-enabled = yes
```

```
admin> write -f
```

Displaying alarms caused by CDR failure

You can use the `alarm -s` command to display alarms generated by the system due to CDR failure.

```
admin> alarm -s
        Type            Address       State
 CDR failure         {  1  3 }    Active
 CDR failure         {  1 16 }    Active
```

Working with IP Traffic

9

The following TCP/IP information and commands apply to any interface with an IP address. The Stinger unit maintains an internal IP routing table. You can configure the system to use RIP to propagate the information in that table to other routers, receive information from other routers, or both, on any LAN or WAN interface.

TAOS supports commands that are useful for locating the sources of problems on the network and for communicating with other hosts for management purposes.

For complete information about the commands described in this chapter, see the *Stinger Reference*.

Testing IP connectivity

The `ping` command is useful for verifying that the transmission path between the Stinger unit and another station is open. Ping sends an ICMP Echo-Request packet to the specified station. If the station receives the packet, it returns an ICMP Echo-Response packet. For example, to ping the host `techpubs`:

```
admin> ping techpubs
PING techpubs (10.65.212.19): 56 data bytes
```

```
64 bytes from 10.65.212.19: icmp_seq=0 ttl=255 time=0 ms
64 bytes from 10.65.212.19: icmp_seq=3 ttl=255 time=0 ms
^C
--- techpubs ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 0/0/0 ms
```

To terminate the ping exchange at any time, press Ctrl-C. When you press Ctrl-C, the system reports the number of packets sent and received, the percentage of packet loss, the number of duplicate or damaged Echo-Response packets (if any), and round-trip statistics. In some cases, round-trip times cannot be calculated.

During the ping exchange, the Stinger unit displays information about the packet exchange, including the time-to-live (TTL) of each ICMP Echo-Response packet.

The maximum TTL for ICMP ping is 255, but the maximum TTL for TCP is often 60 or lower, so you might be able to ping a host but not be able to run a TCP application (such as Telnet or FTP) to that station. If you ping a host running a version of Berkeley UNIX before 4.3BSD-Tahoe, the TTL report is 255 minus the number of routers in the round-trip path. If you ping a host running the current version of Berkeley UNIX, the TTL report is 255 minus the number of routers in the path from the remote system to the station performing the ping.

The `ping` command also supports the `-f` option, which sets the Don't Fragment (DF) bit in the IP header of ping packets. Setting the DF bit enables the Stinger unit to discover the datagram size, or *path maximum transmission unit (PMTU)*, of the path from the remote host. If any datagram is too large to be forwarded without fragmentation by some router along the path, the router discards it and returns an ICMP `Destination Unreachable` message with a code indicating `that fragmentation is needed and the DF bit is set`.

For example, the following command sends an ICMP packet to host 10.1.1.1, with the DF bit set:

```
admin> ping -f 10.1.1.1
```

For more information, see RFC 1191, *Path MTU Discovery*, and RFC 2401, *Security Architecture for the Internet Protocol*.

Displaying the IP interface table

At system startup, the Stinger unit creates an IP interface in the active state for each Ethernet interface that has a configured `ip-interface` profile and for built-in loopback, reject, and blackhole interfaces. It also creates IP interfaces in the inactive state for remote connections.

For each IP interface that is not configured as a private route, the system also adds a route to the routing table.

IP interfaces change between the active and inactive state as switched calls are established and ended. To display the interface table, enter the `netstat` command with the `-in` option, as in the following example:

```
admin> netstat -i
Name        MTU   Net/Dest          Address          Ipkts    Ierr Opkts    Oerr
ie0          1500 134.112.26.0/24    134.112.26.201   1050443    0    47540    0
lo0          1500 127.0.0.1/32       127.0.0.1          47504    0    47504    0
```

```
rj0          1500 127.0.0.2/32       127.0.0.2              0    0         0    0
bh0          1500 127.0.0.3/32       127.0.0.3              0    0         0    0
wanabe       1500 127.0.0.3/32       127.0.0.3              0    0         0    0
local       65535 127.0.0.1/32       127.0.0.1         295498    0    295498    0
mcast       65535 224.0.0.0/4        224.0.0.0         134037    0    134037    0
tunnel0      1500 134.112.26.0/24    134.112.26.201         0    0         0    0
vr0_main     1500 134.112.26.201/32  134.112.26.201         0    0         0    0
sip0        65535 -                  -                      0    0         0    0
ie1-2-1      1500 -                  -                      0    0         0    0
ie1-2-2      1500 -                  -                1008273    0         0    0
wan26        1560 222.222.222.2      222.222.222.1      12893    0       391    0
```

The interface table contains the following information:

Column	Indicates
`Name`	Name of the interface: ■ `ie0-`*n* —The control module Ethernet interfaces. ■ `lo0`—The loopback interface. ■ `rj0`—The reject interface, used in network summarization. ■ `bh0`—The blackhole interface, used in network summarization. ■ `wanN` —A WAN connection, entered as it becomes active. ■ `wanabe`—An inactive RADIUS dial-out profile. ■ `local`—The local machine.
`MTU`	Maximum transmission unit. The maximum packet size allowed on the interface.
`Net/Dest`	Network or the target host this interface can reach.
`Address`	Address of this interface.
`Ipkts`	Number of packets received.
`Ierr`	Number of packets that contain errors.
`Opkts`	Number of packets transmitted.
`Oerr`	Number of transmitted packets that contain errors.

Displaying and modifying IP routes

You can use the `netstat` command to display the IP routing table. To add or delete static routes, use the `iproute` command.

Using the `netstat` command to display the IP routing table

To display the routing table, enter the `netstat` command with the `-r` argument, as in the following example:

```
admin> netstat -r
Destination       Gateway         IF          Flg   Pref Met     Use       Age
0.0.0.0/0         134.112.26.1    ie0         SGP     60   1   60264    507191
```

```
127.0.0.0/8        -              bh0       CP      0   0       0     669778
127.0.0.1/32       -              local     CP      0   0       3     669778
127.0.0.2/32       -              rj0       CP      0   0       0     669778
134.112.26.0/24    -              ie0       C       0   0   52758     669778
134.112.26.201/32  -              local     CP      0   0   18312     669778
222.222.222.1/32   -              local     rT      0   0       4     507191
222.222.222.2/32   222.222.222.2   wan26     rT     60   1       4     507191
224.0.0.0/4        -              mcast     CP      0   0    2837     669778
224.0.0.1/32       -              local     CP      0   0       0     669778
224.0.0.2/32       -              local     CP      0   0       0     669778
224.0.0.9/32       -              local     CP      0   0       0     669778
255.255.255.255/32 -              ie0       CP      0   0   63605     669778
Total Routes  = 13      Hidden Routes = 0
```

The columns in the routing table contain the following information:

Column	Indicates
`Destination`	Route's target address. To send a packet to this address, the Stinger unit uses this route. If the target address appears more than once in the routing table, the Stinger unit uses the most specific route (having the largest subnet mask) that matches that address.
`Gateway`	Next-hop router that can forward packets to the given destination. Direct routes (without a gateway) show a hyphen in this column.
`IF`	Name of the interface through which to send packets over this route. For an explanation of available interface types, see the *Stinger Reference*.
`Flg`	Means by which the route was added to the table. For example, the *R* flag indicates that the route was learned from RIP, and the *S* flag indicates a statically defined route. For an explanation of available flag types see the *Stinger Reference*.
`Pref`	Preference value for the route. When choosing a route, the system first compares their preference values, preferring the lowest number. For more information about the defaults for route preferences, see the description of the `preference` parameter in the *Stinger Reference*.
`Metric`	RIP-style metric for the route, with a range of 0 through 16.
`Use`	Number of times the route was referred to since it was created. (Many of these references are internal, so this value is not a count of the number of packets sent over this route.)
`Age`	Age of the route in seconds. RIP and ICMP entries are aged once every 10 seconds.

Modifying the IP routing table

The `iproute` command enables you to manually add routes to the routing table, delete them, or change their preference or metric values. The command is useful for temporary routing changes. Changes that you make to the routing table with the `iproute` command are valid only until you reset the Stinger system or remove power to the unit. RIP updates can add back any route that you remove using the `iproute delete` command. Also, the Stinger unit restores all routes listed in the `ip-route` profile after you reset the unit.

For syntax information, see the *Stinger Reference*.

Adding a static IP route to the routing table

To add a static IP route to the Stinger unit's routing table, use the `iproute add` command.

For example, the following command adds a route to the network 10.1.2.0 and all its subnets through the IP router located at 10.0.0.3/24. The metric to the route is 1 (one hop away).

```
admin> iproute add 10.1.2.0/24 10.0.0.3/24 1
```

If you try to add a route to a destination that is already in the routing table, the Stinger unit does not replace the existing route unless it has a higher metric than the route you attempted to add. If you get the message `Warning: a better route appears to exist`, the Stinger unit has rejected your attempt to add a route.

Deleting a static IP route from the routing table

To remove a static IP route from the Stinger unit's routing table, enter the `iproute delete` command. The arguments are the same as for the `iproute add` command. For example, the following command removes the route to the 10.1.2.0 network:

```
admin> iproute delete 10.1.2.0 10.0.0.3/24
```

You can also change the metric or preference value of an existing route by using the `iproute` command. For example, suppose the routing table contains the following route:

```
Destination     Gateway     IF    Flg  Pref Met     Use       Age
10.122.99.0/24  10.122.99.1 wan4  SG   100   7       0        48630
```

You can change the preference from 100 to 50 and the metric from 7 to 3 as follows:

```
admin> iproute add 10.122.99.0/24 10.122.99.1 50 3
```

Tracing IP routes

The `traceroute` command is useful for locating slow routers or diagnosing IP routing problems. It traces the route an IP packet takes by launching UDP probe packets with a low time-to-live (TTL) value and then listening for an ICMP `time exceeded` reply from a router. For example, the following sample command traces the route to the host `techpubs`:

```
admin> traceroute techpubs
```

```
traceroute to techpubs (10.65.212.19), 30 hops max, 0 byte packets
1  techpubs.abc.com (10.65.212.19)  0 ms  0 ms  0 ms
```

Probes start with a TTL of 1 and increase by 1 until one of the following conditions occurs:

- The Stinger unit receives an ICMP `port unreachable` message. (The UDP port in the probe packets is set to an unlikely value, such as 33434, because the target host is not intended to process the packets. A `port unreachable` message indicates that the packets reached the target host and were rejected.)

- The TTL value reaches the maximum value. (By default, the maximum TTL is set to 30.) You can use the `-m` option to specify a different TTL. For example:

```
admin> traceroute -m 60 techpubs
traceroute to techpubs (10.65.212.19), 60 hops max, 0 byte packets
1  techpubs.abc.com (10.65.212.19)  0 ms  0 ms  0 ms
```

The `traceroute` command sends three probes at each TTL setting. The second line of output shows the address of the router and the round-trip time of each probe. If the probe answers come from different gateways, the address of each responding system is shown. If there is no response within a 3-second timeout interval, the second line of output is an asterisk.

For the details of the `traceroute` command, see the *Stinger Reference*.

Displaying IP protocol statistics

The `netstat` command displays the Stinger IP interface and routing tables, protocol statistics, and active sockets. By default (without an argument), the `netstat` command reports information about UDP and TCP socket information. For an explanation of the output fields, see the *Stinger Reference*.

```
admin> netstat
udp:
-Socket-  Local Port  InQLen  InQMax    InQDrops    Total Rx
1/c    0        1023       0       1           0           0
1/c    1         520       0       0           0       15510
1/c    2           7       0      32           0           0
1/c    3         123       0      32           0           0
1/c    4        5150       0     256           0           0
1/c    5        1022       0     128           0           0
1/c    6         161       0      32           0           0
1/c    7        1797       0     128           0          22
1/8    0        1018       0     128           0           0
1/8    1       20108       0      32           0           0
1/8    2        1008       0     128           0           0
1/8    3        1798       0     128           0           0
1/9    0        1021       0     128           0           0
1/9    1       20109       0      32           0           0
1/9    2        1009       0     128           0           0
1/9    3        1799       0     128           0           0
1/10   0        1020       0     128           0           0
1/10   1       20110       0      32           0           0
1/10   2        1010       0     128           0           0
1/10   3        1800       0     128           0           0
1/11   0        1017       0     128           0           0
1/11   1       20111       0      32           0           0
1/11   2        1011       0     128           0           0
1/11   3        1801       0     128           0           0
1/12   0        1019       0     128           0           0
1/12   1       20112       0      32           0           0
1/12   2        1012       0     128           0           0
1/12   3        1802       0     128           0           0
```

```
tcp:
-Socket- Local                       Remote                      State
1/c    0 192.168.7.135.79            *.*                         LISTEN
1/c    1 192.168.7.135.1723          *.*                         LISTEN
1/c    2 192.168.7.135.23            *.*                         LISTEN
1/c    4 192.168.7.135.23            172.20.32.137.42863        ESTABLISHED
1/c    9 192.168.7.135.23            206.65.212.10.1991         ESTABLISHED
```

The output shows the queue depth of various UDP ports, as well as the total packets received and total packets dropped on each port. The total-packets-received count includes the total packets dropped. For an explanation of the preceding output, see the *Stinger Reference*.

To displays the protocol statistics, use the `-s` option. If no identifiers follow the `-s` option, the system shows all protocol statistics. For example:

```
admin> netstat -s
udp:
        15636 packets received
        0 packets received with no ports
        0 packets received with errors
        0 packets dropped
        68 packets transmitted

tcp:
        0 active opens
        7 passive opens
        0 connect attempts failed
        0 connections were reset
        2 connections currently established
        1457 segments received
        0 segments received out of order
        1728 segments transmitted
        18 segments retransmitted
        5 active closes
        0 passive closes
        0 disconnects while awaiting retransmission

icmp:
        216 packets received
        0 packets received with errors
        Input histogram:
                216 echo requests
        271 packets transmitted
        0 packets not transmitted due to lack of resources
        Output histogram:
                216 echo replies
                24 destination unreachable
                31 time exceeded

ip:
        28860 packets received
        0 packets received with header errors
        0 packets received with address errors
```

```
        0 packets received forwarded
        0 packets received with unknown protocols
        0 inbound packets discarded
        17310 packets delivered to upper layers
        2084 transmit requests
        0 discarded transmit packets
        49 outbound packets with no route
        0 reassemblies timeout
        268 reassemblies required
        12 reassemblies succeeded
        244 reassemblies failed
        12 fragmentation succeeded
        0 fragmentation failed
        24 fragmented packets created
        0 route discards due to lack of memory
        64 default ttl

igmp:
        0 packets received
        0 bad checksum packets received
        0 bad version packets received
        0 query packets received
        0 leave packets received
        0 packets transmitted
        0 query packets sent
        0 response packets sent
        0 leave packets sent

mcast:
        0 packets received
        0 packets forwarded
        0 packets in error
        0 packets dropped
        0 packets transmitted
```

To filter the type of protocol statistics displayed by the `netstat -s` command, add one of the following values to the `netstat -s` command: `udp`, `tcp`, `icmp`, `ip`, `igmp`, or `mcast`.

Displaying IP route cache information

The `ipcache` command displays information about IP route caches. A route cache enables a module to route IP packets to another slot, reducing the route-processing overhead on the control module. The control module is still responsible for managing routing protocols and the route caches themselves, but each module can check a small IP cache and route packets to a destination slot. When a module receives an IP packet for which it has no cache entry, it forwards that packet to the control module. The control module routes it to the proper slot and writes a cache entry. The cache entry is downloaded to the route cache of all modules via the control bus.

The command uses the following syntax:

ipcache [**-r** ***vroutername***] **cache**|**debug**|**disable**|**enable**

The following example shows command output on the control module:

```
admin> ipcache cache
Hsh     Address        Gateway        Ifname    Sh/Sl/T   MTU
20      50.0.0.20      10.168.26.74   wan392    1/14/D    1524
40      20.0.0.40      20.0.0.40      ie1-3-1   1/3 /S    1500
Cache Limit 0 Cache Count 2 Cache over limit 0 No.packets 9

Mem Usage: Allocated 1k bytes
Free block count 22
```

The following sample commands display output on a module:

```
admin> open 1 3
ether2-1/3> ipcache cache
Hsh Address    Gateway        Sh/Sl/T Switched  MTU    MPath
0   99.1.1.1   10.168.21.30   1/14/D  0         1524   Y/0.0.0.0/0
20  50.0.0.20  10.168.28.170  1/15/D  85068     1524   Y/0.0.0.0/0
40  20.0.0.40  20.0.0.40      1/3 /S  0         1500   N
Cache Limit 0 Cache Count 2 Cache over limit 0 No.packets 9
Mem Usage: Allocated 1k bytes
Free block count 22
```

The shelf number is always `1`. The `T` (Type) column following the shelf and slot numbers can specify `D` for dynamic cache entries or `S` for static cache entries. The `MPath` column indicates whether the cache entry is derived from multipath routes. If it represents a multipath route, the column indicates `Y` and the destination address. If it is not a multipath route, the column indicates `N`.

Verifying name service settings

You can retrieve a host address by using the `nslookup` command, provided that the Stinger unit has been configured with the address of a name server. If a host has several IP interfaces, the command returns several addresses.

To retrieve the IP address of the host `techpubs`, proceed as in the following example:

```
admin> nslookup techpubs
Resolving host techpubs.
IP address for host techpubs is 10.65.212.19.
```

Displaying the ARP cache

The Address Resolution Protocol (ARP) translates between IP addresses and media access control (MAC) addresses as defined in RFC 826. Hosts broadcast an ARP request that is received by all hosts on the local network, and the one host that recognizes its own IP address sends an ARP response with its MAC address.

The Stinger unit maintains a cache of known IP addresses and host MAC addresses.

With the `arptable` command, you can display the ARP table, add or delete ARP table entries, or clear the ARP cache entirely. To display the ARP cache, enter the `arptable` command without any arguments, as in the following example:

```
admin> arptable
IP Address   MAC Address      Type IF Retries/Pkts/RefCnt TimeStamp
10.103.0.141 00:B0:24:BE:D4:84 DYN 0    0/0/1              23323
```

```
10.103.0.2   00:C0:7B:7A:AC:54 DYN 0    0/0/599            23351
10.103.0.220 00:C0:7B:71:83:02 DYN 0    0/0/2843           23301
10.103.0.1   08:00:30:7B:24:27 DYN 0    0/0/4406           23352
10.103.0.8   00:00:0C:06:B3:A2 DYN 0    0/0/6640           23599
10.103.0.7   00:00:0C:56:57:4C DYN 0    0/0/6690           23676
10.103.0.49  00:B0:80:89:19:95 DYN 0    0/0/398            23674
```

The ARP table displays the following information:

Field	Indicates
IP Address	Address contained in ARP requests.
MAC Address	MAC address of the host.
Type	How the address was learned, dynamically (DYN) or by specification of a static route (STAT).
IF	Interface on which the Stinger received the ARP request.
Retries	Number of retries needed to refresh the entry after it timed out.
Pkts	Number of packets sent out to refresh the entry after it timed out.
RfCnt	Number of times the Stinger unit consulted the entry.
TimeStamp	Number of seconds since the system was activated. The system updates this column every time an ARP table entry is refreshed.

To add an ARP table entry, use the -a option, as in the following example:

admin> **arptable -a 10.65.212.3 00:00:81:3D:F0:48**

To delete an ARP table entry, use the -d option, as in the following example:

admin> **arptable -d 10.9.8.20**

To clear the entire ARP table, use the -f option:

admin> **arptable -f**

Displaying the DNS host table

The local Domain Name System (DNS) host table supplies host IP addresses when DNS fails to successfully resolve a hostname. For information about configuring the DNS host table, see the *Stinger T1000 Module Routing and Tunneling Supplement*.

The DNS host table is not a DNS cache, but a fallback option, listing up to eight host addresses for important or frequently used connections. If you use the command without any options, the system displays the usage summary. To display the DNS host table, use the -s option. For example:

```
admin> dnstab -s
Local DNS Table:enabled, AutoUpdate: enabled.
Local DNS Table
 Name                IP Address      # Reads Time of last read
 1: "barney"         200.65.212.12 *  2      Feb 10 10:40:44 01
```

```
 2: "rafael"        200.65.212.23    3      Feb 10  9:30:00 01
 3: "donatello"     200.65.212.67    1      Feb 11 11:41:33 01
 4: "wheelers"      200.65.212.9     1      Feb 12  8:35:22 01
```

The output of this commands contains the following fields:

Field	Indicates
`Local DNS Table`	Whether `enabled` is set to `yes` in the `ip-global:dns-local-table` subprofile.
`AutoUpdate`	Whether `auto-update` is set to `yes` in the `ip-global:dns-local-table` subprofile.
`Name`	Hostname.
`IP address`	IP address. An asterisk (*) indicates that the entry has been automatically updated by a DNS query.
`# Reads`	Number of accesses since the entry was created.
`Time of last read`	Time and date the entry was last accessed. If the Simple Network Time Protocol (SNTP) is not in use, the field contains hyphens.

You can also display a specific entry from the DNS table, using the syntax `dnstab` *`entry number`*, where *`entry number`* is the number of an entry in the DNS table.

Displaying the Ethernet information

The following commands provide information about Ethernet packets.

Displaying the contents of Ethernet packets

The `ether-display` command displays the hexadecimal contents of Ethernet packets being received and transmitted on an Ethernet port. You must specify how many octets of each packet you want to display.

The following example displays 12 octets of each packet on the Ethernet port (port 0):

```
admin> ether-display 0 12
Diagnostic output enabled
```

```
admin> ether-display 0 12
ETHER XMIT: 12 of 60 octets
107E1350: 00 c0 80 89 03 d7 00 c0 7b 6b 9f d6 ........
{k..
ETHER XMIT: 12 of 64 octets
107E1350: 00 c0 80 89 03 d7 00 c0 7b 6b 9f d6 ........
{k..
ETHER RECV: 12 of 60 octets
107B8FD4: 00 c0 7b 6b 9f d6 00 c0 80 89 03 d7 ........
{k..
ETHER XMIT: 12 of 407 octets
107E1350: 00 c0 80 89 03 d7 00 c0 7b 6b 9f d6 ........
```

```
{k..
ETHER XMIT: 12 of 161 octets
107E1350: 00 c0 80 89 03 d7 00 c0 7b 6b 9f d6 ........
{k..
ETHER RECV: 12 of 60 octets
..
..
..
```

To stop displaying the Ethernet statistics, specify 0 (zero) octets or use the `debug off` command, as shown in the following examples:

admin> **ether-display 0 0**

admin> **debug off**

Displaying Ethernet statistics and error counters

The `ether-stats` command displays all statistics and error counters maintained by the Ethernet driver.

This command uses the syntax

`ether-stats 0 n`

where Zero (`0`) is the first Ethernet port for which to display statistics and `n` is the last. For example:

```
admin> ether-stats 0Scb= 50
InProg= a1a00f6c
CuStatus= 1 RuStatus= 4
Handshake 0
Tx good:     84
   Maxcollisions:  0
   Latecollisions:  0
   dma under:   0
   no carrier:  0
   collisions:  0
   TxNoBuffers:  0
   Totalcollisions:  0
Rx good:     18109
   CRC:      0
   Alignment:   0
   NoResources  0
   Overrun:     0
   CDT:         0
   RxShort:     0
   RxPhyEr:     0
   RxRestarts:  0
Tcbs=160 Rfds=480 RfdLowWat=48
RfdHead=a1acee30 RfdTail=a1ace7d0 RfdCount=480
```

Displaying information about IGMP

The `igmp` command displays multicast information about Internet Group Membership Protocol (IGMP) groups and clients, if the Stinger unit is enabled for IP multicast forwarding. For syntax information, see the *Stinger Reference*.

To display information about active multicast client group addresses and interfaces, use the `-group` option. For example:

```
admin> igmp group
IGMP Group address Routing Table Up Time: 0:0:22:17
Hash      Group Address    Members     Expire time  Counts
N/A      Default route    * (Mbone)   ......       2224862
10       224.0.2.250
                              2         0:3:24       3211 :: 0 S5
                              1         0:3:21       145 :: 0 S5
                              0(Mbone)  ......       31901 :: 0 S5
```

The field descriptions are as follows:

Field	Indicates
`Hash`	Index to a hash table (displayed for debugging purposes only). N/A indicates that the Default route is not an entry in the hash table.
`Group address`	IP multicast address used for the group. An asterisk indicates the IP multicast address being monitored, meaning that members join this address by local application. The Default route is the MBONE interface (the interface on which the multicast router resides). If the Stinger unit finds can find no member in a group, it forwards multicast traffic for the group to the MBONE interface.
`Members`	ID of each member of each multicast group. The zero ID represents members on the same Ethernet interface as the Stinger unit. All other IDs go to members of each group as they inform the Stinger unit that they have joined the group. If a client is a member of more than one group to which the Stinger unit forwards multicast packets, it has more than one multicast ID. The interface labeled `Mbone` is the interface on which the multicast router resides.
`Expire time`	When this membership expires. The Stinger unit sends out IGMP queries every 60 seconds, so the expiration time is usually renewed. If the expiration time is reached, the Stinger unit removes the entry from the table. If the field contains periods, this membership never expires. A string of periods means that the default route never times out.

Field	Indicates
Counts	Number of packets forwarded to the client, the number of packets dropped due to lack of resources, and the state of the membership. The state is displayed for debugging purposes.

To list all active multicast clients, use the `client` argument. For example:

```
admin> igmp client
IGMP Clients
Client      Version  RecvCount  CLU     ALU
0(Mbone)    1        0          0       0
2           1        39         68      67
1           1        33310      65      65
```

The field descriptions are as follows:

Field	Indicates
Client	Interface ID on which the client resides. The value 0 (zero) represents the Ethernet. Other numbers are WAN interfaces, numbered according to when they became active. The interface labeled `Mbone` is the interface on which the multicast router resides.
Version	Version of IGMP being used.
RecvCount	Number of IGMP messages received on that interface.
CLU ALU	`CLU` is current line utilization, and `ALU` is average line utilization. Both indicate the percentage of bandwidth used across this interface. If bandwidth utilization is high, some IGMP packet types are not forwarded.

To display IGMP messages with IP header errors, use the `netstat -s igmp` command. The output of this command shows the number of IGMP messages received with an IP header length of 24 bytes (that is, the IP option is present, but without IP Alert option required for IGMP V2 messages).

The following sample output shows 40 packets received with IP header errors:

```
admin> netstat -s igmp
igmp:
4067 packets received
3814 query packets received
9 leave packets received
40 hdr error packets received
Alert
292 packets transmitted
89 query packets sent
175 response packets sent
28 leave packets sent
```

Displaying WAN IP interface information

The following commands provide information about WAN IP interfaces.

Displaying packets on WAN IP interfaces

The `wandisplay` command displays all packets received from, or sent to any of the IP WAN interfaces. Because `wandisplay` output shows what the Stinger unit is receiving from and sending to a remote device, the information can be very helpful in resolving PPP negotiation problems. The syntax of the command is as follows:

`wandisplay` ***`number-of-octets-to-display`***

If you enter the command while traffic through the Stinger unit is heavy, the resulting amount of output can make your search for information tedious. The screen might even display the message `----- data lost -----`, which means that not all the output can be displayed on the screen.

Depending on the types of information you need to gather, you might prefer to use the `wandisplay` command during a period of low throughput, or to use `wandsess`, `wanopen`, or `wannext` to focus the display.

The following is an example of `wandisplay` command output. Note that the bytes are displayed in hexadecimal format.

```
admin> wandisplay 24
Display the first 24 bytes of WAN messages

> RECV-272:: 1 octets @ 5E138F74
  [0000]: 0D
RECV-272:: 13 octets @ 5E13958C
  [0000]: 0A 41 63 63 65 70 74 3A 20 69 6D 61 67
XMIT-276:: 1011 octets @ 2E12D8A4
  [0000]: 7E 21 45 00 03 EE 54 2B 40 00 37 06 BA 09 CF 2B
  [0010]: 00 86 D0 93 91 90 1A 0A
```

Enter `wandisplay 0` to disable the logging of this information:

```
admin> wandisplay 0
WAN message display terminated
```

Displaying WAN data for a particular user

The `wandsess` command shows WAN data as it is received and transmitted for a particular user. The `wandsess` command is very similar to the `wandisplay` command, but when you use `wandsess`, the system displays only incoming and outgoing packets for a specific user. The system displays bytes in hexadecimal format

The `wandsess` command is particularly helpful on a Stinger unit with several simultaneous active connections. The command acts as a filter, allowing you to focus your troubleshooting.

You can use the `wandsess` command only with LIMs. For syntax information, see the *Stinger Reference*. To use the `wandsess` command, specify a session name, which is the name of a local `connection` profile or a RADIUS user profile and the maximum number of octets to display per packet. If you specify 0 (zero), the Stinger unit does not display any data.

You must first open a session with a LIM. The following sample commands open session with the module in slot 7 and activate the display of 7 octets of data per packet for the user `tim`:

```
admin> open 1 7
modem-1/7> wandsess tim
RECV-tim:300:: 1 octets @ 3E13403C
  [0000]: 7E 21 45 00 00 3E 15 00 00 00 20 7D 31 C2 D2
RECV-tim:300:: 15 octets @ 3E133A24
  [0000]: D0 7D B3 7D B1 B3 D0 7D B3 90 02 04 03 00 35
XMIT-tim:300:: 84 octets @ 3E12D28C
  [0000]: 7E 21 45 00 00 4E C4 63 00 00 1C 7D 31 17 5F D0
  [0010]: 93 90 02 D0 93 91 B3 00
```

Displaying WAN data during connection establishment for users

The `wanopening` command shows WAN data as it is received and transmitted during connection establishment for all users. The `wanopening` command is particularly helpful for troubleshooting connection problems in which users make the initial connection, but are disconnected within a few seconds. The output of `wanopening` is very similar to the output of `wandisplay`, but `wanopening` shows packets only until the connection has been completely negotiated.

To use the `wanopening` command, you must first open a session with a LIM. using the `open` command. Then, enter the `wanopening` command with the maximum number of octets to display per packet. If you specify 0 (zero), the Stinger unit does not log WAN data.

For example, the following sample commands open a session with a LIM and activate the display of WAN data received and transmitted during connection establishment:

```
admin> open 1 7

modem-1/7> wanopening
Display the first 24 bytes of WAN messages
RECV-272:: 1 octets @ 5E138F74
  [0000]: 0D
RECV-272:: 13 octets @ 5E13958C
  [0000]: 0A 41 63 63 65 70 74 3A 20 69 6D 61 67
XMIT-276:: 1011 octets @ 2E12D8A4
  [0000]: 7E 21 45 00 03 EE 54 2B 40 00 37 06 BA 09 CF 2B
  [0010]: 00 86 D0 93 91 90 1A 0A
```

Note that the bytes are displayed in hexadecimal format.

Monitoring OSPF routing

10

The `ospf` diagnostic-level commands display information related to OSPF routing, including the link state advertisements (LSAs); the routing table for border routers; and the OSPF areas, interfaces, statistics, and routing table. Use `ospf` plus its options to monitor OSPF routing.

Overview of the OSPF command

To display `ospf` command usage, enter the `ospf` command with no arguments. Following is a listing of valid options for the `ospf` command:

Option	Displays
stats	OSPF statistics. “Displaying general information about OSPF routing” on page 10-2.
size	Size of the OSPF routing table. See “Displaying the OSPF database” on page 10-4.
database	OSPF database summary. See “Displaying the OSPF database” on page 10-4.
ext	OSPF external autonomous system advertisements. See “Displaying OSPF external advertisements” on page 10-6.

Option	Displays
internal	OSPF internal routes. See “Displaying OSPF internal advertisements” on page 10-7.
lsdb [***area***]	OSPF link-state database summary for an area. If you do not specify the *area* option, the summary for the first configured area (or for the only defined area) is displayed. If you specify the an area, the unit displays a summary for the specified area. Specifying an area is meaningful if the unit is operating as an area border router (ABR). **Note** With the current release, a Stinger unit cannot operate as an ABR, so each Stinger unit’s OSPF interface belongs to the same area. See “Displaying the OSPF link-state database” on page 10-7.
lsa ***area ls-type ls-id ls-orig***	Detailed information about OSPF LSAs. ■ ***area***—Area ID. ■ ***ls-type***—LSA type. Specify one of the following options for ***ls-type***: – **rtr**—Type 1 router-LSA that describes the collected states of the router’s interfaces. – **net**—Type 2 network-LSA that describes the set of routers attached to the network. – **sum**—Types 3 and 4 routes to networks in remote areas, or autonomous system border routers (ASBRs). ■ ***ls-id***—Target address of the router. ■ ***ls-orig***—Address of the advertising router. See “Displaying OSPF LSAs” on page 10-9.
rtab	OSPF routing table. See “Displaying the OSPF routing table” on page 10-10.
routers	OSPF router information. See “Displaying information about OSPF routers” on page 10-11.
intf [***ip_addr***]	Information about one or more OSPF interfaces. See “Displaying OSPF interfaces” on page 10-12.
nbrs [***ip_addr***]	Information about one or more OSPF neighbors. See “Displaying OSPF neighbors” on page 10-14.
translators	Router IDs of not-so-stubby area (NSSA) border routers.

Displaying general information about OSPF routing

To display general information about OSPF, enter the OSPF command with the `stats` option. For example:

```
admin> ospf stats
```

```
OSPF version:   2

OSPF Router ID:          10.103.0.254
AS boundary capability:   Yes
Attached areas:           1       Estimated # ext. (5) routes: 65536
OSPF packets rcvd:        71788   OSPF packets rcvd w/errs:    19
Transit nodes allocated:  812     Transit nodes freed:         788
LS adv. allocated:        2870    LS adv. freed:               2827
Queue headers alloc:      64      Queue headers avail:         64
# Dijkstra runs:           10     Incremental summ. updates:   0
Incremental VL udates:     0      Buffer alloc failures:       0
Multicast pkts sent:       27343  Unicast pkts sent:           1154
LS adv. aged out:          0      LS adv. flushed:             507
Incremental ext.(5) updates: 1014  Incremental ext.(7) updates: 0

External (Type 5) LSA database -
Current state:                    Normal
Number of LSAs:                   43
Number of overflows:            0
```

The fields in the output contain the following information:

Field	Indicates
OSPF version	Version of the OSPF protocols running.
OSPF Router ID	IP address assigned to the Stinger unit, which is typically the address specified for the Ethernet interface.
AS boundary capability	Border router capability. This column displays yes if the Stinger unit functions as an ASBR or no if it does not function as an ASBR.
Attached areas	Number of areas to which this Stinger unit attaches.
Estimated # ext.(5) routes	Number of LSA routes external to the OSPF autonomous system that the Stinger unit can maintain before it goes into an overload state. These routes are known as AS-external (type 5) routes.
OSPF packets rcvd	Total number of OSPF packets received by the Stinger unit.
OSPF packets rcvd w/ errs	Total number of OSPF errored packets received by the Stinger unit.
Transit nodes allocated	Allocated transit nodes generated only by router LSAs (type 1) and network LSAs (type 2).
Transit nodes freed	Freed transit nodes generated only by router LSAs (type 1) and network LSAs (type 2).
LS adv. freed	Number of LSAs freed.
Queue headers alloc	Number of queue headers allocated. LSAs can reside in multiple queues. Queue headers are the elements of the queues that contain the pointer to the LSA.

Field	Indicates
`Queue headers avail`	Available memory for queue headers. To prevent memory fragmentation, the Stinger unit allocates memory in blocks. The Stinger unit allocates queue headers from the memory blocks. When the Stinger unit frees all queue headers from a specific memory block, the unit returns the block to the pool of available memory blocks.
`# Dijkstra runs`	Number of times that the Stinger unit has run the Dijkstra algorithm (short path computation).
`Incremental summ. updates`	Number of summary updates that the Stinger unit runs when small changes cause generation of summary LSAs (type 3) and summary router LSAs (type 4).
`Incremental VL updates`	Number of incremental virtual link updates that the Stinger unit performs.
`Buffer alloc failures`	Number of buffer allocation problems that the Stinger unit has detected and from which it has recovered.
`Multicast pkts sent`	Number of multicast packets sent by OSPF.
`Unicast pkts sent`	Number of unicast packets sent by OSPF.
`LS adv. aged out`	Number of LSAs that the Stinger unit has aged and removed from its tables.
`LS adv. flushed`	Number of LSAs that the Stinger unit has flushed.
`Incremental ext.(5) updates`	Number of incremental AS-external LSA (type 5) updates.
`Incremental ext.(7) updates`	Number of incremental NSSA LSA (type 7) updates.
`Current state`	State of AS-external LSA (type 5) database: Normal or Overload.
`Number of LSAs`	Number of LSAs in the AS-external LSA (type 5) LSA database.
`Number of overflows`	Number of AS-external (type 5) LSAs that exceeded the limit of the database.

Displaying the OSPF database

To display the entire OSPF database, enter the OSPF command with the `database` option. For example:

```
admin> ospf database
                        Router Link States (Area: 0.0.0.0)
Type LS ID              LS originator     Seqno     Age   Xsum
RTR  10.101.0.1         10.101.0.1      0x800002a1  746  0x8bd8
RTR  10.101.0.2         10.101.0.2      0x800002d6  539  0x0ea1
RTR  10.102.0.1         10.102.0.1      0x800002a3 2592  0x9bc1
RTR  10.103.0.204       10.103.0.204    0x800001ba 1173  0x725f
```

```
RTR  10.103.0.254       10.103.0.254    0x80000301  534  0x7066
RTR  10.104.0.1         10.104.0.1      0x800002ad  777  0xb98e
RTR  10.104.0.2         10.104.0.2      0x80000193 1258  0x265a
RTR  10.105.0.2         10.105.0.2      0x80000299  865  0x4295
RTR  10.105.0.3         10.105.0.3      0x800002e5 1057  0x4449
RTR  10.105.0.4         10.105.0.4      0x80000310 1585  0x5775
RTR  10.105.0.61        10.105.0.61     0x800002ae 1204  0xcf2e
RTR  10.105.0.200       10.105.0.200    0x80000263  213  0x4b25
RTR  10.123.0.8         10.123.0.8      0x80000401 1071  0xecf2
RTR  10.123.0.254       10.123.0.254    0x80000401 1175  0xad39
RTR  12.151.0.2         12.151.0.2      0x800006ee  825  0x0531
RTR  192.1.1.1          192.1.1.1       0x8000039b   18  0xb04b
RTR  210.210.210.1      210.210.210.1   0x800001aa  201  0x5338
                # advertisements:       17
                Checksum total:         0x7946c
                        Network Link States (Area: 0.0.0.0)
Type LS ID              LS originator     Seqno     Age   Xsum
NET  10.101.0.1         10.101.0.1      0x80000236  746  0x1d45
NET  10.102.0.1         10.102.0.1      0x80000235 2592  0x1f40
NET  10.104.0.2         10.104.0.2      0x80000179  830  0x67a8
NET  10.105.0.8         10.123.0.8      0x80000304 1071  0x0ccd
NET  10.123.0.6         12.151.0.2      0x8000023d  825  0x59ed
NET  100.103.100.204    10.103.0.204    0x80000029  252  0x8b34
                # advertisements:       6
                Checksum total:         0x1961b
                        External ASE5 Link States
Type LS ID              LS originator     Seqno     Age   Xsum
ASE5 10.103.1.0         10.103.0.204    0x8000004f 1726  0xd23f
ASE5 10.103.2.0         10.103.0.204    0x8000004f 1716  0xc749
ASE5 10.103.3.0         10.103.0.204    0x8000004f 1704  0xbc53
ASE5 10.103.4.0         10.103.0.204    0x8000004f 1692  0xb15d
ASE5 10.103.6.0         10.103.0.204    0x8000004f 1672  0x9b71
ASE5 10.103.7.0         10.103.0.204    0x8000004f 1666  0x907b
ASE5 10.103.8.0         10.103.0.204    0x8000004f 1641  0x8585
ASE5 10.107.0.0         10.103.0.254    0x80000104  250  0x1413
ASE5 10.113.0.0         10.103.0.254    0x80000121  250  0x0e76
ASE5 10.200.0.2         10.103.0.254    0x80000001  231  0xa823
ASE5 10.222.0.2         10.103.0.254    0x80000001  202  0x9f16
ASE5 11.0.0.0           10.103.0.254    0x80000027  250  0x49a6
ASE5 11.103.0.0         10.103.0.254    0x80000121  250  0xfc10
ASE5 14.240.0.0         10.103.0.204    0x800001a4  199  0x0926
ASE5 50.151.0.2         10.103.0.254    0x80000121  250  0xa90a
ASE5 101.103.0.0        10.103.0.254    0x80000121  250  0x664c
..
..
                # advertisements:       44
                Checksum total:         0x191d3a
```

The fields in the output contain the following information:

Field	Indicates
`Type`	Type of link as defined in RFC 2328, *OSPF Version 2*: ■ Type 1 (RTR) are router LSAs that describe the collected states of the router's interfaces. ■ Type 2 (NET) are network LSAs that describe the set of routers attached to the network. ■ Types 3 and 4 (SUM) describe routes to networks in remote areas or autonomous system border routers (ASBRs). ■ Type 5 (ASE5) are AS-external LSAs that describe routes to destinations external to the autonomous system. A default route for the autonomous system can also be described by an AS-external-LSA. Use `ospf ext` to display only type 5 LSAs. ■ Type 7 (ASE7) are link advertisements that are only flooded within an NSSA.
`LS ID`	Target address of the route.
`LS originator`	Address of the advertising router.
`Seqno`	Hexadecimal number that begins with 80000000 and increments by one for each LSA received.
`Age`	Age of the route in seconds.
`Xsum`	Checksum of the LSA.
`# advertisements`	Total number of entries in the database.
`Checksum total`	Checksum of the database.

Displaying OSPF external advertisements

To display only OSPF AS-external (type 5) LSAs, advertisements, include the `ext` option with the `ospf` command. For example:

```
admin> ospf ext
Type LS ID              LS originator     Seqno     Age   Xsum
ASE5 10.103.1.0         10.103.0.204    0x8000004f 1702  0xd23f
ASE5 10.103.2.0         10.103.0.204    0x8000004f 1692  0xc749
ASE5 10.103.3.0         10.103.0.204    0x8000004f 1680  0xbc53
ASE5 10.103.4.0         10.103.0.204    0x8000004f 1668  0xb15d
ASE5 10.103.6.0         10.103.0.204    0x8000004f 1648  0x9b71
ASE5 10.103.7.0         10.103.0.204    0x8000004f 1642  0x907b
ASE5 10.103.8.0         10.103.0.204    0x8000004f 1617  0x8585
..
..
ASE5 214.240.0.127      10.103.0.204    0x800001a4  175  0xdb0b
ASE5 223.57.40.0        10.103.0.254    0x80000121  226  0x7540
ASE5 223.57.40.244      10.103.0.254    0x80000121  226  0xe3dc
                # advertisements:      46
                Checksum total:         0x1a1d9e
```

The output of this command is the same as for the `ospf database` command, with the exception of the type. The `ospf ext` command shows only type 5 LSAs.

Displaying OSPF internal advertisements

To display OSPF internal LSAs, include the `internal` option with the `ospf` command. For example:

```
admin> ospf internal
                  Area: 0.0.0.1
Destination       Mask              Cost
33.240.0.0        255.255.255.224   1
103.240.0.0       255.255.255.192   1
113.240.0.0       255.255.255.128   1
183.240.0.0       255.255.255.128   1
193.240.0.0       255.255.255.128   1
203.240.0.0       255.255.255.128   1
```

The fields in the output contain the following information:

Field	Indicates
`Area`	Area in which the router resides.
`Destination`	Route's target address. To send a packet to this address, the Stinger unit uses this route. If the target address appears more than once in the routing table, the Stinger unit uses the most specific route (having the largest subnet mask) that matches that address.
`Mask`	Subnet mask of the route.
`Cost`	Cost of the router.

Displaying the OSPF link-state database

To display the link-state database for the first configured area (or for the only defined area), include the `lsdb` option with the `ospf` command. The Stinger unit does not currently operate as an ABR, so each Stinger unit's OSPF interface belongs to the same area. (That area number does not have to be the default backbone area 0.0.0.0.) For example:

```
admin> ospf lsdb
                         Area: 0.0.0.0
Type LS ID               LS originator     Seqno     Age   Xsum
RTR  10.101.0.1          10.101.0.1      0x8000029f  720  0x8fd6
RTR  10.101.0.2          10.101.0.2      0x800002d1  126  0x189c
RTR  10.102.0.1          10.102.0.1      0x800002a2  767  0x9dc0
RTR  10.102.0.2          10.102.0.2      0x800002cc  124  0x862c
RTR  10.103.0.204        10.103.0.204    0x800001b8 1147  0x765d
RTR  10.103.0.254        10.103.0.254    0x800002fb  167  0x8cc9
RTR  10.104.0.1          10.104.0.1      0x800002ab  751  0xbd8c
RTR  10.104.0.2          10.104.0.2      0x80000191 1232  0x2a58
RTR  10.105.0.2          10.105.0.2      0x80000297  843  0x4693
```

```
RTR  10.105.0.3         10.105.0.3      0x800002e3 1032  0x4847
RTR  10.105.0.4         10.105.0.4      0x8000030e 1560  0x5b73
RTR  10.105.0.61        10.105.0.61     0x800002ac 1178  0xd32c
RTR  10.105.0.200       10.105.0.200    0x80000261  194  0x4f23
RTR  10.123.0.8         10.123.0.8      0x800003ff 1045  0xf1ef
RTR  10.123.0.254       10.123.0.254    0x800003ff 1149  0xb236
RTR  12.151.0.2         12.151.0.2      0x800006ec  799  0x092f
RTR  192.1.1.1          192.1.1.1       0x80000398 1791  0xb648
RTR  210.210.210.1      210.210.210.1   0x800001a8  175  0x5736
NET  10.101.0.1         10.101.0.1      0x80000234  720  0x2143
NET  10.102.0.1         10.102.0.1      0x80000234  767  0x213f
NET  10.104.0.2         10.104.0.2      0x80000177  804  0x6ba6
NET  10.105.0.8         10.123.0.8      0x80000302 1045  0x10cb
NET  10.123.0.6         12.151.0.2      0x8000023b  799  0x5deb
NET  100.103.100.204    10.103.0.204    0x80000027  226  0x8f32
                # advertisements:      24
                Checksum total:         0xa2ae6
```

The fields in the output contain the following information:

Field	Indicates
Area	Area ID.
Type	Type of link as defined in RFC 2328: ■ RTR are Type 1 router-LSAs that describe the collected states of the router’s interfaces. ■ NET are Type 2 network-LSAs that describe the set of routers attached to the network. ■ SUM are Types 3 and 4 LSAs that describe routes to networks in remote areas or autonomous system border routers (ASBRs). ■ ASE7 are Type 7 LSAs that are only flooded within an NSSA.
LS ID	Target address of the route.
LS originator	Address of the advertising router.
Seqno	Hexadecimal number that begins with 80000000 and increments by one for each LSA received.
Age	Age of the route in seconds.
Xsum	Checksum of the LSA.
#advertisements	Total number of entries in the link-state database.
Checksum total	Checksum of the link-state database.

You can expand each entry in the link-state database to view additional information about a particular LSA, as explained in the next section.

Displaying OSPF LSAs

To view detailed information about a link state advertisement (LSA), use the following syntax for the `ospf` command:

***ospf lsa** area ls-type ls-id ls-orig*

The command requires that you include the first four fields of the LSA as listed in the database. You can select the first four fields and paste them in after typing the command.

The following sample command shows an expanded view of an LSA from a Stinger unit in area 0.0.0.0 for an external route to the target address 10.5.2.160 from a router at 10.5.2.162:

```
admin> ospf lsa 0.0.0.0 ase 10.5.2.160 10.5.2.162
LSA  type: ASE ls id: 10.5.2.160 adv rtr: 110.5.2.162 age: 568
          seq #: 80000037 cksum: 0xfffa
          Net mask: 255.255.255.255 Tos 0 metric: 10 E type: 1
          Forwarding Address: 0.0.0.0 Tag: c0000000
```

The output differs depending on the type of link. The following is an example of a router LSA:

```
admin> ospf lsa 0.0.0.0 rtr 192.1.1.1 192.1.1.1
        LS age:      66
        LS options:  (0x2) E
        LS type:     1
        LS ID (destination): 192.1.1.1
        LS originator:       192.1.1.1
        LS sequence no:      0x80000399
        LS checksum:         0xb449
        LS length:           48
        Router type:     (0x2) ASBR
        # router ifcs:   2
                Link ID:          10.105.0.8
                Link Data:        10.105.0.7
                Interface type:   (2) TrnsNetwork
                        No. of metrics: 0
                        TOS 0 metric:   10 (0)
                Link ID:          10.123.0.6
                Link Data:        10.123.0.7
                Interface type:   (2) TrnsNetwork
                        No. of metrics: 0
                        TOS 0 metric:   10 (0)
```

The next example is for a network LSA:

```
admin> ospf lsa 0.0.0.0 net 100.103.100.204 10.103.0.204
        LS age:      814
        LS options:  (0x2) E
        LS type:     2
        LS ID (destination): 100.103.100.204
        LS originator:       10.103.0.204
        LS sequence no:      0x80000027
```

```
LS checksum:        0x8f32
LS length:          36
Network mask:       255.255.0.0
        Attached Router: 10.103.0.204     (1)
        Attached Router: 10.103.0.254     (1)
        Attached Router: 10.123.0.254     (1)
```

For information about the fields in the output of these commands, see RFC 2328.

Displaying the OSPF routing table

To display the OSPF routing table, include the `rtab` option with the `ospf` command. For example:

```
admin> ospf rtab
DTyp RType Destination       Area          Cost  Flags  Next hop(s)  IfNum
RTE  FIX   50.151.0.2/32      -              1     0x81   0.0.0.6        6
RTE  FIX   130.57.40.243/32   -              10    0x1    0.0.0.6        6
RTE  FIX   130.57.0.0/16      -              10    0x2    0.0.0.6        6
RTE  FIX   140.57.40.244/32   -              10    0x1    0.0.0.6        6
RTE  FIX   140.57.0.0/16      -              10    0x2    0.0.0.6        6
RTE  FIX   150.57.40.245/32   -              10    0x1    0.0.0.6        6
RTE  FIX   150.57.0.0/16      -              10    0x2    0.0.0.6        6
RTE  FIX   160.57.40.246/32   -              10    0x1    0.0.0.6        6
RTE  FIX   160.57.0.0/16      -              10    0x2    0.0.0.6        6
..
```

The fields in the preceding output contain the following information:

Field	Indicates
`DType`	Internal route type. DType displays one of the following values: RTE (generic route), ASBR (autonomous system border route), or BR (area border route).
`RType`	Internal router type. RType displays one of the following values: FIX (static route), NONE, DEL (deleted or invalid state), OSPF (OSPF-computed), OSE1 (type 1 external), or OSE2 (type 2 external).
`Destination`	Destination address and subnet mask of the route.
`Area`	Area ID of the route.
`Cost`	Cost of the route.
`Flags`	Hexadecimal number representing an internal flag.
`Next hop(s)`	Next hop in the route to the destination.
`IfNum`	Number of the interface used to reach the destination.

Displaying information about OSPF areas

To display information about OSPF areas, include the `areas` option with the OSPF command. For example:

```
admin> ospf areas
Area ID  Authentication  Area Type #ifcs  #nets  #rtrs  #brdrs  #intnr
0.0.0.0  Simple-passwd   Normal      1      0      2       0       3
```

The fields in the output contain the following information:

Field	Indicates
Area ID	Area number in dotted-decimal format.
Authentication	Type of authentication: simple password, MD5, or null.
Area Type	Type of OSPF area: normal, stub, or NSSA.
#ifcs	Number of Stinger unit interfaces specified in the area.
#nets	Number of reachable networks in the area.
#rtrs	Number of reachable routers in the area.
#brdrs	Number of reachable area border routers (ABRs) in the area.
#intnr	Number of reachable internal routers in the area.

Displaying information about OSPF routers

To display OSPF routers, include the `routers` option with the OSPF command. For example:

```
admin> ospf routers
DType RType Destination   Area         Cost     Next hop(s)     IfNum
ASBR  OSPF  10.101.0.1    0.0.0.0        11    10.101.0.2       20
ASBR  OSPF  10.101.0.2    0.0.0.0        10    10.101.0.2       20
ASBR  OSPF  10.103.0.204  0.0.0.0        1     100.103.100.204  24
ASBR  OSPF  10.104.0.1    0.0.0.0        12    10.105.0.4       21
                                               10.105.0.61      21
ASBR  OSPF  10.104.0.2    0.0.0.0        11    10.105.0.4       21
                                               10.105.0.61      21
  BR  OSPF  10.105.0.2    0.0.0.0        1     10.105.0.2       21
ASBR  OSPF  10.105.0.2    0.0.0.0        1     10.105.0.2       21
ASBR  OSPF  10.105.0.3    0.0.0.0        1     10.105.0.3       21
ASBR  OSPF  10.105.0.4    0.0.0.0        1     10.105.0.4       21
ASBR  OSPF  10.105.0.61   0.0.0.0        1     10.105.0.61      21
ASBR  OSPF  10.105.0.200  0.0.0.0        1     10.105.0.200     21
ASBR  OSPF  10.123.0.8    0.0.0.0        1     10.105.0.8       21
ASBR  OSPF  10.123.0.254  0.0.0.0        1     100.103.100.123  24
  BR  OSPF  12.151.0.2    0.0.0.0        1     10.105.0.6       21
ASBR  OSPF  192.1.1.1     0.0.0.0        1     10.105.0.7       21
```

The fields in the output contain the following information:

Field	Specifies
DType	Internal route type. DType displays one of the following values: RTE (generic route), ASBR (AS border route), or BR (area border route).
RType	Internal router type.
Destination	Router's IP address.
Area	Area in which the router resides.
Cost	Cost of the router.
Next hop(s)	Next hop in the route to the destination.
IfNum	Number of the interface used to reach the destination.

Displaying OSPF interfaces

To display summarized information about all OSPF interfaces or specific information about a single interface, include the `intf` option with the `ospf` command.

Displaying summarized information

To display summarized information on OSPF interfaces, enter the following command:

```
admin> ospf intf
Ifc Address     Phys     Assoc. Area Type   State    #nbrs #adjs  DInt
10.103.0.254    ie0      0.0.0.0     Brdcst DR        0     0      40
10.105.0.254    ie1-7-1  0.0.0.0     Brdcst Other     9     1      40
100.103.100.254 ie1-7-4  0.0.0.0     Brdcst Other     2     2      40
50.151.0.2      apx1     0.0.0.0     P-P    P-P       0     0      120
10.103.0.254    m2       0.0.0.0     P-P    P-P       1     1      120
10.103.0.254    m1       0.0.0.0     P-P    P-P       1     1      120
```

The fields in the output contain the following information:

Field	Setting
Ifc Address	Address assigned to the Stinger unit's Ethernet interface. To identify WAN links, use the `Type` and `Cost` fields.
Phys	Name of the interface or the `connection` profile for WAN links.
Assoc. Area	Area in which the interface resides.
Type	Point-to-point (P-P) or Broadcast (Brdcst). WAN links are point-to-point links.
State	State of the link according to RFC 2328. There are many possible states, and not all states apply to all interfaces.
#nbrs	Number of neighbors of the interface.

Field	Setting
`#adjs`	Number of adjacencies on the interface.
`DInt`	Number of seconds that the Stinger unit waits for a router update before removing the router's entry from its table. The interval is called the *dead* interval.

Displaying information about a specific interface

To display detailed information for a specific interface, enter the `ospf` command with the `intf` option along with the interface IP address in dotted decimal notation. For example:

```
admin> ospf intf 194.194.194.2
              Interface address:      194.194.194.2
              Attached area:          0.0.0.0
              Physical interface:     phani (wan1)
              Interface mask:         255.255.255.255
              Interface type:         P-P

             State:                  (0x8) P-P
              Designated Router:      0.0.0.0
              Backup DR:              0.0.0.0
              Remote Address:         194.194.194.3
DR Priority:       5  Hello interval:  30   Rxmt interval:  5
Dead interval:   120  TX delay:         1   Poll interval:  0
Max pkt size:   1500  TOS 0 cost:      10
# Neighbors:       1  # Adjacencies:    1   # Full adjs.:   1
# Mcast floods: 1856  # Mcast acks:  1855
```

The fields in the output contain the following information:

Field	Setting
`Interface Address`	IP address specified for the Stinger unit's Ethernet interface.
`Attached Area`	Area in which the interface resides.
`Physical interface`	Name of the interface or the Connection profile for WAN links.
`Interface mask`	Subnet mask for the interface.
`Interface type`	Point-to-point (P-P) or broadcast (Bcast). WAN links are point-to-point links.
`State`	State of the link according to RFC 2328. There are many possible states, and not all states apply to all interfaces.
`Designated Router`	IP address of the designated router for the interface.
`Backup DR`	IP address of the backup designated router (BDR) for the interface.

Field	Setting
Remote Address	IP address of the remote end of a point-to-point (WAN) link.
DR Priority	Priority of the designated router.
Hello interval	Interval in seconds that the Stinger unit sends Hello packets (as defined in RFC 2328).
Rxmt interval	Retransmission interval (as described in RFC 2328).
Dead interval	Number of seconds that the Stinger unit waits for a router update before removing the router's entry from its table.
TX delay	Interface transmission delay.
Poll interval	Poll interval of nonbroadcast multiaccess (NBMA) networks.
Max pkt size	Maximum size of a packet that the Stinger unit can send to the interface.
TOS 0 cost	Type of service normal (*0*) cost.
# Neighbors	Number of neighbors.
# Adjacencies	Number of adjacencies.
# Full adjs.	Number of fully formed adjacencies.
# Mcast floods	Number of multicast floods on the interface.
# Mcast acks	Number of multicast acknowledgments on the interface.

Displaying OSPF neighbors

To display information about OSPF neighbors to the Stinger unit, include the `nbrs` option with the OSPF command. For example:

```
admin> ospf nbrs
```

```
Neighbor ID    Neighbor addr    State       LSrx  DBsu  LSreq If  Prio
                                            l     m           c
10.105.0.4     10.105.0.4       2Way/-      0     0     0     5   ie1-7-1
10.105.0.2     10.105.0.2       2Way/-      0     0     0     5   ie1-7-1
12.151.0.2     10.105.0.6       2Way/-      0     0     0     1   ie1-7-1
10.105.0.3     10.105.0.3       2Way/-      0     0     0     5   ie1-7-1
10.105.0.61    10.105.0.61      2Way/-      0     0     0     5   ie1-7-1
210.210.210.1  10.105.0.49      Exstar/BDR  0     0     0     5   ie1-7-1
192.1.1.1      10.105.0.7       2Way/-      0     0     0     5   ie1-7-1
10.123.0.8     10.105.0.8       Full/DR     0     0     0     5   ie1-7-1
10.105.0.200   10.105.0.200     2Way/-      0     0     0     5   ie1-7-1
```

```
10.103.0.204   100.103.100.204   Full/DR    0    0    0    5   ie1-7-4
10.123.0.254   100.103.100.123   Full/BDR        0    0    5   ie1-7-4
10.102.0.2     10.102.0.2        Init/-     00   0    0    5   m1
10.101.0.2     10.101.0.2        Full/-     0    0    0    5   m1
```

The fields in the output contain the following information:

Field	Setting
Neighbor ID	Address assigned to the interface. In the Stinger unit, the IP address is always the address assigned to the Ethernet interface.
Neighbor addr	IP address of the router used to reach a neighbor (often the same address as the neighbor itself).
State	State of the link-state database exchange. `Full` indicates that the databases are fully aligned between the Stinger unit and its neighbor. For a description of possible states, see RFC 2328.
LSrxl	Number of LSAs in the retransmission list.
DBsum	Number of LSAs in the database summary list.
LSreq	Number of LSAs in the request list.
Ifc	Interface name for the `ethernet` or `connection` profile name for the WAN.
Prio	Designated router election priority assigned to the Stinger unit.

To display information about a particular OSPF neighbor, append the `neighbor id` value to the `nbrs` option. For example:

```
admin> ospf nbrs 10.105.0.4
OSPF Router ID:         10.105.0.4
                Neighbor IP address:    10.105.0.4
                Neighbor State:         (0x8) 2Way
                Physical interface:     ie1-7-1 (ie1-7-1)
                DR choice:              10.105.0.8
                Backup choice:          10.105.0.49
                DR Priority:            5
  DB summ qlen:      0  LS rxmt qlen:      0  LS req qlen:       0
  Last hello:        6
  # LS rxmits:       0  # Direct acks:     0  # Dup LS rcvd:     0
  # Old LS rcvd:     0  # Dup acks rcv:    0  # Nbr losses:      0
  # Adj. resets:     0
```

Monitoring ATM and PNNI

11

The Stinger unit supports network management profiles and commands that are useful for locating the sources of problems on the network and for communicating with other hosts for management purposes. The following sections describe the commands and profiles that you use to monitor Asynchronous Transfer Mode (ATM) and Private Network-to-Network Interface (PNNI) operations.

For more information about the commands described in this chapter, see the *Stinger Reference*.

Monitoring ATM networks

Table 11-1 lists the profiles and commands that you use for monitoring ATM operations. For information about configuring a Stinger unit for ATM operations, see the *Stinger ATM Configuration Guide*.

Table 11-1. Profiles and commands for monitoring ATM networks

For information about	See the profile or command
Using the ATM status window	`atmvccstat` command on page 11-2
Determining ATM line status	`atm-internal-stat:` `line-state` parameter on page 11-3
Displaying the status of ATM internal lines	`atminternallines` command on page 11-4
Displaying the status of ATM trunk modules and their connections	`atmtrunkmgr` command onpage 11-5
Checking the status of a VCC interface	`atmvcc-stat` profile on page 11-5
Checking the status of a terminating PVC	`atmvcc-stat` profile `atmpvc-stat` profile on page 11-6
Displaying ATM VCC information and packet statistics	`atmvccmgr` command on page 11-6

Table 11-1. Profiles and commands for monitoring ATM networks (Continued)

For information about	See the profile or command
Displaying ATM virtual link information	atmvcl command atmvpl command on page 11-7
Displaying ATM virtual link cross-connect information	atmvcx command atmvpx command on page 11-10
Displaying SPVC information	spvcc command on page 11-11
Displaying SPVC target ATM addresses	atm-spvc-addr-config:spvc-atm-address parameter spvcshow command on page 11-13
Monitoring failing SPVCs	spvcstat command on page 11-14
Displaying signal statistics	atmsig command on page 11-14
Displaying CAC bandwidth allocation statistics	atmcacstat command on page 11-15
Displaying QoS statistics	atmqos command on page 11-18
Displaying ATM connection failures	atmconnectionfailures command on page 11-17
Displaying ATM statistics—Fast Ethernet Trunk module	stats traffic|error|rate atm command on page 5-15 and the debug command info atm on page A-13

Using the ATM status window

The atmvccstat command displays an 80-column by 24-row VT100 status window of active virtual channel connections (VCCs). This window behaves similarly to other status windows supported in the Stinger unit, as described in “Using the status window” on page 1-34.

To open the window, enter the atmvccstat command as follows:

```
admin> atmvccstat
```

When the window opens, the system prompt moves to just below the status window as shown in Figure 11-1.

Figure 11-1. Status window for ATM VCCs

```
6 Connections                          | Status
0006 ADSL6-8 ATM 06/08 0 8000K         | Serial number: 10018000  Version 9.0-126.0
0005 15-0-18 ATM 18/01 0 45M           |   Rx Pkt:    274505
0004 12-0-5  ATM 17/02 1 155M          |   Tx Pkt:    239618
0003 11-0-5  ATM 17/01 1 155M          |      Col:        50
0002 12-0-18 ATM 17/02 0 155M          |
0001 11-0-18 ATM 17/01 0 155M          | 09/05/2000 14:29:31  Up:   3 days,
                                       |  17/ 2/ 0/    5    Rx: 817        Tx: 4978
                                       |  17/ 1/ 0/    5    Rx: 834        Tx: 4998
                                       |  17/ 2/ 0/   18    Rx: 1044563    Tx: 3329
                                       |  17/ 1/ 0/   18    Rx: 1056573    Tx: 3849

[ Next AtmVccStat: <dn arw>, NextPage: <pg dn>, Exit: <esc> ]|
```

By default, the left area of the window displays connection information. One line appears for each active connection, showing the user or station name, type of connection, physical address within the Stinger system (*shelf/line/channel*) on which the call is established, and the bandwidth of the connection. You can use the Pg Up and Pg Dn keys to display additional information if more connections are active than can be displayed in one screen.

The top right area of the window displays general status information about the Stinger unit, including its serial number, the version of system software that is running, and the number of cells transmitted and received. This area also shows the current system date and time and how long the system has been running since its most recent restart.

The bottom right area of the window displays information about active lines in the format *slot/port/virtual path identifier (VPI)/virtual channel identifier (VCI)*, and the number of cells transmitted and received.

For details about customizing the type of information that is displayed in the three areas of the window, see the “Customizing the status window display” on page 1-38.

To close the status window, enter the `status` command. (If the system prompt is not visible below the status window, press Escape to display it.)

```
admin> status
```

Determining ATM line status

To determine whether an ATM connection is active, use the `get` command to display the setting of the `line-state` parameter in the `atm-internal-stat` profile for that line. The ATM connection is active if the value for this parameter is `active`. For example:

```
admin> get atm-internal-stat {1 13 1} line-state
ATM-INTERNAL-STAT/{ shelf-1 slot-13 1 }
line-state = active
```

Displaying the status of ATM internal lines

The `atminternallines` command displays the status of ATM lines. For command options, see the *Stinger Reference*. To display statistics for all ATM lines, use the `atminternallines -a` command. For example:

```
admin> atminternallines -a
All ATM Internal lines:
                                (dvOp   dvUpSt  dvRq    sAdm    nailg)
  Line    {    1  2  1 }        (Up      Assign  UP      UP     00051)
  Line    {    1  9  1 }        (Up      Assign  UP      UP     02449)
```

The data displayed includes the physical address of each line and the following information:

Field	Indicates
`dvOp`	Current operational state of the line. `Down` indicates that the line is in a nonoperational state. `Up` indicates that the line is in normal operations mode.
`dvUpSt`	Status of the line in normal operations mode. `Idle` indicates that no call is on the line. `Active` indicates that the line is handling a call.
`dvRq`	Required state of the line. `Down` indicates that the line is required to be nonoperational.`Up` indicates that the line is required to be in normal mode.
`sAdm`	Desired administrative state of the line. `Down` specifies that the line should terminate all operations and enter the down state. `Up` specifies that the line should start up in normal operations mode. Actual state of the line can differ from the desired state, as when a device is powering up or you change the desired state on a running slot. Changing the desired state does not automatically change a line to the desired state. It indicates that an operation has been initiated to change the Stinger unit to the state desired.
`nailg`	Dedicated (nailed) group to which the line is assigned.

Changing ATM debug levels

The `atmtrunkmgr -t` command toggles the debug level from 0 through 4. Each entry of the `atmtrunkmgr -t` command adds 1 to the debug level. After level 4 is reached, the level is reset to 0. The following sample commands change the debug level from 1 to 2:

```
admin> atmtrunkmgr -t
current atmtrunkmgr debug level = 1

admin> atmtrunkmgr -t
current atmtrunkmgr debug level = 2
```

Displaying the status of ATM trunk modules and their connections

The `atmtrunkmgr -g` *`connection-profile-name nailed-group`* display status of dedicated (nailed) groups.

If the code is 1, there is an active nailed group to connect to. If the interface is not operational, the return code is 0 (zero).

The following example queries a connection named ckt with nailed group 801:

```
admin> atmtrunkmgr -g ckt 801
return from atmTrunkDevGetChansByNGAndProf chan= 1.
```

Checking the status of a VCC interface

The system creates an `atmvcc-stat` profile for each virtual channel connection (VCC) interface. These profiles provide status information about each side of a circuit. You can read these profiles to check VCC status. Following are the relevant parameters, shown with sample settings:

```
[in ATMVCC-STAT/{ shelf-1 slot-10 47 0 35 }]
vcc-ident* = { shelf-1 slot-10 47 0 35 }
circuit-name = kam-1
current-state = vcc-data-transfer
vcc-type = connecting
```

Parameter	Setting
`vcc-ident`	Unique VCC identifer, made up of the interface address (shelf, slot, and modem numbers), the VPI, and the VCI.
`circuit-name`	Name of the permanent virtual circuit (PVC), which is the value of the `station` parameter in a local profile or the User-Name attribute in a RADIUS profile.
`current-state`	Current state of the circuit. The value of this parameter can be `vcc-inactive`, `vcc-closed` (the VCC exists but is closed), or `vcc-data-transfer` (the VCC is operational and data can be transferred).
`vcc-type`	For an ATM circuit, the value of this parameter is always `connecting` (point-to-point connecting). The other possible value is `terminating`. (For details, see the *Stinger ATM Configuration Guide*.)

The system also creates an `atmpvc-stat` profile for each configured ATM circuit. Following are the relevant parameters, shown with sample settings:

```
[in ATMPVC-STAT/kam-1]
circuit-name* = kam-1
pvc-type = connecting
```

```
current-state = pvc-data-transfer
vcc-members = [ { shelf-1 slot-10 47 0 35 } { shelf-1 slot-2 1 0 77 } ]
```

Parameter	Setting
circuit-name	Name of the PVC, which is the value of the station parameter in a local profile or the User-Name attribute in a RADIUS profile.
pvc-type	For an ATM circuit, the value of this parameter is always connecting (point-to-point connecting). The other possible value is terminating (see "Checking the status of a terminating PVC" on page 11-6).
current-state	Current state of the circuit. The value of this parameter can be pvc-inactive, pvc-closed (the PVC exists but is closed), or pvc-data-transfer (the PVC is operational and data can be transferred).
vcc-members	Both member VCCs of the circuit (the two sides). Each side has a unique VCC identifer, made up of the interface address (shelf, slot, and modem numbers), the VPI, and the VCI.

Checking the status of a terminating PVC

For terminating PVCs, the values in the atmvcc-stat and atmpvc-stat profiles are slightly different for terminating connections. Following are the relevant parameters (shown with sample settings):

```
[in ATMVCC-STAT/{ shelf-1 slot-17 1 0 35 }]
vcc-ident* = { shelf-1 slot-17 1 0 35 }
circuit-name = dsltnt-1
current-state = vcc-data-transfer
vcc-type = terminating
[in ATMPVC-STAT/dsltnt-1]
circuit-name* = dsltnt-1
pvc-type = terminating
current-state = pvc-data-transfer
vcc-members = [ { shelf-1 slot-17 1 0 35 }]
```

For terminating connections, the value of the vcc-type and pvc-type parameters is always terminating, and vcc-members always specifies a single member. The rest of the parameters in the profiles are the same for terminating PVCs as for ATM circuits. For details, see "Checking the status of a VCC interface" on page 11-5.

Displaying ATM VCC information and packet statistics

To display overall ATM virtual channel connection (VCC) information and packet statistics for a particular slot on a Stinger unit, use the atmvccmgr debug command. For the system to respond to this command, your user profile must be enabled with debug privileges. For information on enabling debug privileges see “Enabling debug permissions” on page A-1.

Note You cannot enter the atmvccmgr command from the secondary control module.

To display status information for all ATM connections, use the -a option:

```
admin> atmvccmgr -a
```

				This	Other
Profile	Type	RouteId	ifnum	Slot/Port/VPI/VCI	Slot/Port/VPI/VCI
adtran2/09	CONN.	0	0	17/1/0/15	64/1/0/39

Trunk module statistics are reported from the control module. The following sample command displays statistics for a trunk module in slot 17, port 1, VPI 0, and VCI 33:

```
admin> atmvcc -r 17 1 0 33
```

Received	Discarded	RX	Discarded	Error	Cells in
Cells	Cells	packets	packets	packets	last Pkt
0	0	0	0	0	392

For line interface module (LIM) statistics, you must first open a session with that module. The following sample commands display statistics for slot 14:

```
admin> auth super
super> open 1 14
sdsl-atm-v2-1/14> atmvccm -r 14
               Received   *Discarded Tagged    PCR Non-conform
port/vpi/vci   Cells      Cells      Cells     Cell count
  1/  0/   35  0          0          0         0
  2/  0/   35  9184       8163       0         7144
  3/  0/   35  0          0          0         0
  5/ 10/   35  0          0          0         0
  7/  0/   50  0          0          0         0
* Note: The Discarded Cells count includes the total
        number of cells dropped due to GCRA non conformance
        plus cells discarded due to partial packet discard
        (if PPD is enabled).
```

Displaying ATM virtual link information

An ATM connection between two devices is a virtual link. A virtual link can be a virtual channel link (VCL) or virtual path link (VPL), depending on whether it is identified by a VPI-VCI pair or the VPI field alone. For more details, see the *Stinger ATM Configuration Guide*.

To display VCL information, use the atmvcl command. For information about VPLs, use the atmvpl command. To display usage information, enter the command without any arguments or see the *Stinger Reference*.

With the -a option, both commands display information about all configured ATM VCLs or VPLs and their status. The -s and -p options enable you to display the same information as the -a option, but to restrict the output to links on a specific slot or slot-port combination. For example, the following sample command displays information about the VCLs for port 1 in slot 18:

```
admin> atmvcl -p 18 1
Intf Slot  Port   Vpi    Vci    XConnID  Kind  OStatus
   15   18     1     0   1000         2   pvc       up
   15   18     1     0   1001         3   pvc       up
   15   18     1     0   1002         9   pvc       up
   15   18     1     0   1003         4   pvc       up
   15   18     1     0   1004         5   pvc     up
```

The atmvpl command produces similar output, except it does not include a VCI field. For example:

```
admin> atmvpl -p 18 1
 Intf Slot  Port  Vpi   XConnID  Kind  OStatus
   16   18     1   10         7   pvc       up
   16   18     1   20         1   pvc       up
...
```

In the preceding examples, the fields report the following information.

Field	Indicates
Intf	ATM interface index.
Slot	Slot number in the Stinger unit.
Port	Port number on the specified slot.
Vpi	VPI assigned to the link.
Vci	VCI assigned to the link (atmvcl command only).
XConnID	Cross-connect ID, which indicates whether the link is cross-connected to another link to form an ATM circuit.
Kind	Call control type.
OStatus	Current operational status of the link (up or down).

With the -d option, the command displays additional details about a specific VCL, identified by the slot, port, and VPI-VCI pair. The following sample command displays information about a VCL on slot 3, port 1, VPI 0, and VCI 41. The output indicates that this is a terminating connection using ATM adaptation layer 5 (AAL5):

```
admin> atmvcl -d 3 1 0 41
Physical Address = { 1 3 1 }
Interface = 65
VCC Endpoint = yes
Vpi = 0
Vci = 41
Oper Status = up
Rx Traffic Descr Index = 1
Tx Traffic Descr Index = 1
```

```
Conn Kind = pvc
Cast Type = p2p
AAL Type = aal5
AAL5 Rx SDU Size = 9188
AAL5 Tx SDU Size = 9188
AAL5 Encap Type  = llcEncapsulation
```

The following sample command shows information about a VPL on slot 18, port 1 that is cross-connected to another VPL in the system:

```
admin> atmvpl -d 18 1 20
Physical Address = { 1 18 2 }
Interface = 16
Vpi = 20
Oper Status = up
Rx Traffic Descr Index = 1
Tx Traffic Descr Index = 1
Conn Kind = pvc
Cast Type = p2p
Cross Connect ID = 1
```

The output of the preceding examples reports the following information:

Field	Indicates
Physical Address	Address of the physical interface in the Stinger unit.
Interface	ATM interface index.
VCC Endpoint	Whether the link terminates a virtual connection (yes or no).
Vpi	VPI assigned to the link.
Vci	VCI assigned to the link (atmvcl command only).
Oper Status	Current operational status of the link (up or down).
Rx Traffic Descr Index	Traffic descriptor index in the receive direction. A 1 (one) indicates the default traffic descriptor.
Tx Traffic Descr Index	Traffic descriptor index in the transmit direction. A 1 (one) indicates the default traffic descriptor.
Conn Kind	Call control type.
Cast Type	Connection topology type. The p2p value indicates point-to-point.
Cross Connect ID	A cross-connect ID. If present, this field indicates that the link is cross-connected to another link to form an ATM circuit. This field is not displayed for a terminating link.
AAL Type	ATM adaptation layer (AAL) type. This field is not displayed for a cross-connected link.
AAL5 Rx SDU Size	Receive source data unit (SDU) size of an AAL5 terminating link. This field is not displayed for a cross-connected link.
AAL5 Tx SDU Size	Transmit SDU size of an AAL5 terminating link. This field is not displayed for a cross-connected link.

Field	Indicates
AAL5 Encap Type	Type of encapsulation used for the AAL5 terminating link. This field is not displayed for a cross-connected link.

The following sample command shows VCL information for the Stinger unit. The output shows the number of terminating PVCs, PVC segments without cross-connections (created by SNMP), and PVC segments with cross-connections.

```
admin> atmvcl -c
Totals:              Up      Down
  PVC XConnect       1576     768
  PVC Terminate       152      48
  PVC Legs Only         0       4
  SVC In              591       0
  SVC Out             399       0
  SPVC Initiator      192       0
  SPVC Target         384       0
  Invalid               0
```

Displaying ATM virtual link cross-connect information

A cross-connect is a configuration in which the Stinger unit receives a cell stream on one interface and transmits it on another interface. Cross-connects are called ATM circuits in the Stinger command-line interface. For more details, see the *Stinger ATM Configuration Guide*.

To display information about virtual channel (VC)-switching ATM circuits, use the atmvcx command. For information about virtual path (VP)-switching ATM circuits, use the atmvpx command. For syntax information, see the *Stinger Reference*.

With no options on the command line, the commands display the usage statement. With the -a option, they display information about all configured virtual-channel-switching or virtual-path-switching circuits and their status. The -s and -p options enable you to display the same information as the -a option, but to restrict the output to links on a specific slot or slot-port combination. For example, the following command displays information about all virtual-circuit-switching cross-connects:

admin> **atmvcx -a**

			Low						High				
Profile	Kind	Intf /	Slot /	Port /	VPI /	VCI /	OStatus	Intf /	Slot /	Port /	VPI /	VCI /	Intf
lim-3-1	pvc	15	18	1	0	1000	up	65	3	1	0	41	up
lim-3-2	pvc	15	18	1	0	1001	up	66	3	2	0	41	up
lim-3-3	pvc	15	18	1	0	1002	up	67	3	3	0	41	up
lim-3-4	pvc	15	18	1	0	1003	up	68	3	4	0	41	up

Field	Indicates
Profile	Name of the profile in which the ATM circuit is configured.
Kind	Call control type.
Intf	ATM interface index.
Slot	Slot on which a VCL of the cross-connect is established. *Low* refers to the ATM interface that has a numerically lower interface index value than the other ATM interface identified in the cross-connect. *High* refers to the ATM interface with the numerically higher interface index value.
Port	Port of the specified slot on which a VCL of the cross-connect is established. *Low* refers to the ATM interface that has a numerically lower interface index value than the other ATM interface identified in the cross connect. *High* refers to the ATM interface with the numerically higher interface index value.
VPI	VPI assigned to the VCL.
VCI	VCI assigned to the VCL.
OStatus	Current operational status of the cross-connect.

Displaying SPVC information

The spvcc command displays information about soft PVC (SPVC) connections. To display information about SPVCs that use virtual-path switching (SPVPs), use the spvpc command. For syntax information, see the *Stinger Reference*.

With no options on the command line, the commands display the usage statement. With the -a option, they display information about all configured virtual-channel-switching or virtual-path-switching SPVCs and their status. The -s and -p options enable you to display the same information as the -a option, but to restrict the output to links on a specific slot or slot-port combination. For example, the following command displays information about all virtual-channel-switching SPVCs:

```
admin> spvcc -a

Profile      Intf  Slot/ Port  VPI  VCI  targVPI  targVCI  TargSel  TargSel
             /           /     /    /    /        /        /        /

spvc-init    16    18    2     5    100  7        100      req      inProg
```

The value displayed in the OStatus field indicates the current status of the SPVC connection. In the sample output, the field indicates that establishment of the connection is in progress. Once the connection is established, the status is connected.

With the -d option, each command displays additional details about a specific SPVC, identified by the slot, port, and VPI (or VPI-VCI pair). For example, the following command displays the details about an SPVC in slot 18, port 2, with VPI 5 and VCI 100:

```
admin> spvpc -d 18 2 5 100
Profile = spvc-init-1
```

```
Physical Address = { 1 18 2 }
Interface = 16
OperStatus = inProg
VCL Vpi = 5
TargetSelect = req
TargetVpi = 7
Target ATM address = 47.41.0.31.0.31.0.31.0.31.0.31.11.22.33.44.55.66.0.0.
LastReleaseCause = 3
LastReleaseDiagnostic = 81
RetryFailures = 10
RetryInterval = 10
RetryTimer = 5
RetryThreshold = 1
RetryLimit = 0
```

Field	Indicates
Profile	Name of the profile in which the SPVC or SPVPC is configured.
Physical Address	Address of the physical interface in the Stinger unit.
Interface	ATM interface index.
OperStatus	Current operational status of the SPVC.
VCL Vpi	VPI value of the initiating PVC.
TargetSelect	Method of assigning the VPI-VCI pair for the target PVC. The req value indicates that the initiating switch supplies the target VPI-VCI assignments during the signaling setup. The any value means the target switch provides the VPI-VCI pair.
TargetVpi	VPI value of the link used at the target PVC.
Target ATM address	Target ATM address of the SPVC.
LastReleaseCause	Value of the cause field of the cause information element in the last RELEASE message received for the SPVC. The value indicates the reason for the release.
LastReleaseDiagnostic	Value of the first 8 bytes of diagnostic information from the cause field of the cause information element in the last RELEASE message received for the SPVC.
RetryFailures	Number of attempts to establish the connection that have failed. This count is reset when the SPVC is established or restarted
RetryInterval	Number of seconds the system waits before attempting to establish the SPVC after the first failed call attempt.
RetryTimer	Current value of the retry timer for this connection. When the value reaches zero, the system attempts to establish the SPVC.
RetryThreshold	Number of consecutive call setup attempts that must fail before incrementing the atmSoftPvcCallFailures object, which can cause the system to generate an alarm.

Field	Indicates
RetryLimit	Maximum number of consecutive unsuccessful call setup attempts.

Displaying SPVC target ATM addresses

Each trunk port and LIM port that supports ATM has an associated ATM interface. In a Stinger unit enabled with the Lucent Technologies, Inc. Private Network-to-Network Interface (PNNI) license, the system assigns each ATM interface with a unique soft PVC (SPVC) target address. The address is used in the signaling required to establish both initiator and target SPVCs. The SPVC target address is defined in the Soft PVC MIB, and in the `atm-spvc-addr-config` profile.

You can view the ATM address assigned to an interface by displaying the value of the `spvc-atm-address` parameter. For example, the following command displays the address assigned to interface 1 of slot 3:

```
admin> get atm-spvc-addr-config { {1 3 1 } 0 } spvc-atm-address
[in ATM-SPVC-ADDR-CONFIG/{ { shelf-1 slot-3 1 } 0 }:spvc-atm-address]
spvc-atm-address = 39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:03:00:00:00:01:00
```

The `spvcshow` command displays SPVC target addresses and the status of SPVC connections (`up` or `down`). For syntax information, see the *Stinger Reference*.

With the `-a` option, the system shows all target SPVC addresses of all ATM interfaces. For example:

```
admin> spvcshow -a
Slot/Port Stat SPVC ATM address
  2 /  1  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:01:00
  2 /  2  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:02:00
  2 /  3  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:03:00
  2 /  4  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:04:00
  2 /  5  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:05:00
  2 /  6  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:06:00
  2 /  7  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:07:00
  2 /  8  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:08:00
  2 /  9  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:09:00
  2 / 10  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:0a:00
  2 / 11  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:0b:00
  2 / 12  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:7c:92:b7:3d:0c:00
 ...
 14 / 17  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:11:00
 14 / 18  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:12:00
 14 / 19  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:13:00
 14 / 20  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:14:00
 14 / 21  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:15:00
 14 / 22  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:16:00
 14 / 23  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:17:00
 14 / 24  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:0e:00:00:00:18:00
 17 /  1  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:09:7c:9e:00:01:00
 17 /  2  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:09:7c:9e:00:02:00
 18 /  1  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:09:7c:9e:00:f1:00
 18 /  2  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:09:7c:9e:00:f2:00
```

The -s and the -p options enable you to display the same information as the -a option, but to restrict the output to addressees on a specific slot or slot-port combination. For example, the following command displays the addresses of a trunk module in slot 17:

```
admin> spvcshow -s 17
Slot/Port Stat SPVC ATM address
17 /  1  up    39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:09:7c:9e:00:01:00
17 /  2  down  39:84:0f:80:01:bc:72:00:01:09:7c:9e:00:ff:09:7c:9e:00:02:00
```

Monitoring failing SPVCs

The spvcstat command displays information about call failures and failing SPVCs. An SPVC is considered failing if it is active, but its current operational status does not indicate an established connection. For example:

```
admin> spvcstat
Call Failures = 88
Currently Failing PVCCs = 1
Currently Failing PVPCs = 1
```

Displaying signal statistics

The atmsig command clears ATM signaling statistics for an interface or displays signaling by interface or by slot and interface. Without any options on the command line, this command displays usage information.

The following sample command displays ATM statistics for interface 11:

```
admin> atmsig -i 11
Physical Address = { 1 17 1 }
Interface = 11
SSCOP Connections Events = 0
SSCOP Errored PDUs = 0
Received Call Setup Attempts = 0
Transmitted Call Setup Attempts = 7
Received Unavailable Routes = 0
Transmitted Unavailable Routes = 0
Received Unavailable Resources = 0
Transmitted Unavailable Resources = 0
Received Called Party Rejects = 0
Transmitted Called Party Rejects = 0
Received Msg Errors = 0
Transmitted Msg Errors = 0
Received Calling Party Rejects = 0
Transmitted Calling Party Rejects = 0
Received Timer Expired = 0
Transmitted Timer Expired = 0
Received Restarts = 0
Transmitted Restarts = 0
Incoming SVCs established = 0
Outgoing SVCs established = 6
Configured Signalling Type = pnni1dot0
Actual Signalling Type = pnni1dot0
Configured UNI Side = other
Actual UNI Side = symmetric
```

The following sample command clears the signaling statistics displayed in the preceding example.

```
admin> atmsig -c 11
```

Displaying CAC bandwidth allocation statistics

To ensure that the guaranteed characteristics can be delivered, Stinger units use a form of connection admission control (CAC), which keeps track of how much guaranteed bandwidth has been allocated and allows you to specify an oversubscription factor for trunk ports. For more information about CAC, see the *Stinger ATM Configuration Guide*.

To display CAC bandwidth allocation statistics, use the `atmcacstat` debug command. For the system to respond to this command, your `user` profile must be enabled with debug privileges. For information on enabling debug privileges see "Enabling debug permissions" on page A-1. For syntax information, see the *Stinger Reference*.

To display bandwidth allocation by slot, use the `-b` option. For example:

```
admin> atmcacstat -b
BANDWIDTH INFORMATION FOR SLOT 1
UP STREAM
   Total B/W Kbits/sec       : 70000
   Guaranteed B/W Kbits/sec  : 44000
   Allocated Guaranteed B/W  : 40000
   Available Guaranteed B/W  : 4000
DN STREAM
   Total B/W Kbits/sec       : 155520
   Guaranteed B/W Kbits/sec  : 155520
   Allocated Guaranteed B/W  : 40000
   Available Guaranteed B/W  : 115520
BANDWIDTH INFORMATION FOR SLOT 2
UP STREAM
   Total B/W Kbits/sec       : 70000
   Guaranteed B/W Kbits/sec  : 44000
   Allocated Guaranteed B/W  : 0
   Available Guaranteed B/W  : 44000
DN STREAM
   Total B/W Kbits/sec       : 155520
   Guaranteed B/W Kbits/sec  : 155520
   Allocated Guaranteed B/W  : 0
   Available Guaranteed B/W  : 155520
```

To display the CAC bandwidth allocation for the trunk module ports, use the `-p` option. For example:

```
admin> atmcacstat -p
CONTROL MODULE TRUNK PORTS B/W CONFIG
PORT {1 17 1} (oc3-atm-trunk-daughter-card) (INACTIVE) (PRIMARY)
Stream  Total BW        Gtd BW  Gtd Allocated   Gtd Available
UP      155520          155520  0               155520
DN      155520          155520  0               155520

PORT {1 17 2} (oc3-atm-trunk-daughter-card) (ACTIVE) (PRIMARY)
Stream  Total BW        Gtd BW  Gtd Allocated   Gtd Available
```

```
UP      155520          155520  0               155520
DN      155520          155520  0               155520

PORT {1 18 1} (ds3-atm-trunk-daughter-card) (ACTIVE) (PRIMARY)
Stream  Total BW        Gtd BW  Gtd Allocated   Gtd Available
UP      44223           44223   0               44223
DN      44223           44223   0               44223

PORT {1 18 2} (ds3-atm-trunk-daughter-card) (ACTIVE) (PRIMARY)
Stream  Total BW        Gtd BW  Gtd Allocated   Gtd Available
UP      44223           44223   40000           4223
DN      44223           44223   40000           4223
```

To display real-time CAC bandwidth allocation, use the `-r` option:

```
admin> atmcacstat -r
```

Connection	Stream	QOS	Peak Rate	Sustainable Rate	Count
vc-6-2-0-70	UP	CBR	15	0	2
vc-6-2-0-70	DN	CBR	15	0	2
spvc-1-1-1-1.1	UP	CBR	10	10	2
spvc-1-1-1-1.1	DN	CBR	10	10	2
spvc-1-1-1-1.2	UP	CBR	10	10	2
spvc-1-1-1-1.2	DN	CBR	10	10	2
lim-1-1-ckt-5	UP	CBR	10	10	2
lim-1-1-ckt-5	DN	CBR	10	10	2
spvc-1-1-1-1.3	UP	CBR	10	10	2
spvc-1-1-1-1.3	DN	CBR	10	10	2
lim-1-1-ckt-6	UP	CBR	10	10	2
lim-1-1-ckt-6	DN	CBR	10	10	2
spvc-1-1-1-1.4	UP	CBR	10	10	2
spvc-1-1-1-1.4	DN	CBR	10	10	2
lim-1-1-ckt-7	UP	CBR	10	10	2
lim-1-1-ckt-7	DN	CBR	10	10	2
lim-1-1-ckt-8	UP	CBR	10	10	2
lim-1-1-ckt-8	DN	CBR	10	10	2

To display bandwidth allocation for a specific service category, use the `-c` option with one of the following values for service category: `0` for constant bit rate (CBR), 1 for real-time variable bit rate (RT-VBR), 2 for Nonreal-time variable bit rate (NRT-VBR), or 3 for unspecified bit rate (UBR).

```
admin> atmcacstat -c 0
```

Quality of Service : CBR

Connection	Stream	Peak Rate	Sustainable Rate	Count
vc-6-2-0-70	UP	15	0	2
vc-6-2-0-70	DN	15	0	2
spvc-1-1-1-1.1	UP	10	10	2

```
spvc-1-1-1-1.1    DN        10             10                    2
spvc-1-1-1-1.2    UP        10             10                    2
spvc-1-1-1-1.2    DN        10             10                    2
lim-1-1-ckt-5     UP        10             10                    2
lim-1-1-ckt-5     DN        10             10                    2
spvc-1-1-1-1.3    UP        10             10                    2
spvc-1-1-1-1.3    DN        10             10                    2
lim-1-1-ckt-6     UP        10             10                    2
lim-1-1-ckt-6     DN        10             10                    2
spvc-1-1-1-1.4    UP        10             10                    2
spvc-1-1-1-1.4    DN        10             10                    2
lim-1-1-ckt-7     UP        10             10                    2
lim-1-1-ckt-7     DN        10             10                    2
lim-1-1-ckt-8     UP        10             10                    2
lim-1-1-ckt-8     DN        10             10                    2
```

To display all bandwidth characteristics for all active connections, use the `-a` option. For example:

admin> **atmcacstat -a**

```
Connection       Stream   QOS       Peak Rate   Sustainable Rate   Count
rcc-17-1-0-18    UP       NRT-VBR   384         192                1
                 DN       NRT-VBR   384         192                1
rcc-18-2-0-18    UP       NRT-VBR   384         192                1
                 DN       NRT-VBR   384         192                1
sig-17-1-0-5     UP       NRT-VBR   16          16                 1
                 DN       NRT-VBR   16          16                 1
sig-17-2-0-5     UP       NRT-VBR   16          16                 1
                 DN       NRT-VBR   16          16                 1
sig-18-1-0-5     UP       NRT-VBR   16          16                 1
                 DN       NRT-VBR   16          16                 1
sig-18-2-0-5     UP       NRT-VBR   16          16                 1
                 DN       NRT-VBR   16          16                 1
rcc-17-2-0-18    UP       NRT-VBR   384         192                1
                 DN       NRT-VBR   384         192                1
rcc-18-1-0-18    UP       NRT-VBR   384         192                1
                 DN       NRT-VBR   384         192                1
```

Displaying ATM connection failures

To display information about ATM connection failures, use the `atmconnectionfailures` command. For example:

admin> **atmConnectionFailures**

```
Profile Reason
4-2-17-1 NG/VPI/VCI 152/0/35 or 801/202/36 is not valid for VCC
4-3-17-1 NG/VPI 153/0 or 801/203 is not valid for VCC
```

Displaying QoS statistics

To display the quality of service (QoS) statistics on ATM connections, use the `atmqos` command. For syntax information, see the *Stinger Reference*.

To display all ATM connections in a Stinger unit with QoS settings, use the `-a` option. For example:

```
admin> atmqos -a

Td Index    QoS Name        Category     PCR (Cells       SCR (Cells
                                         Per Second)      Per Second)

1           default         UBR          0                -

2           default-ctl     NRT_VBR      37                37

3           default-rcc     NRT_VBR      905               452

392         ATMQOS392       UBR          96000            -

416         ATMQOS416       RT_VBR       1000             1000
```

For details about the output of this command, see the *Stinger Reference*.

To display all connections that use a specified QoS name, use the `-c` option. For example:

```
admin> atmqos -c atmqos416
vc-11-1-0-35
Total Number Of Connections : 1
```

To display QoS statistics for a specific QoS name, use the `-d` option. For example:

```
admin> atmqos -d atmqos416
Traffic Descriptor    : 416
Traffic Type          : NO_CLP_SCR
PCR(Cells Per Second) : 1000
SCR                   : 1000
MBS                   : 5
QOS Class             : 0
ATM Service Category  : RT_VBR
```

Monitoring PNNI nodes

You can use profiles and commands to monitor PNNI node configuration, operations, and statistics. For information about configuring PNNI operations on a Stinger unit, see the *Stinger Private Network-to-Network Interface (PNNI) Supplement*.

Table 11-2 lists the profiles and commands that you use to monitor PNNI operations.

Table 11-2. Commands and profiles for monitoring PNNI operations

Command or profile	Used for
`atm-if-stat` profile	"Verifying the PNNI link" on page 11-19
`pnnidisplay` command	"Displaying general PNNI information" on page 11-20
`pnniinterfacedisplay` command	"Displaying PNNI interface information" on page 11-21
`pnnilinkdisplay` command	"Displaying information about PNNI logical links" on page 11-22
`pnnimapdisplay` command	"Displaying information about the PNNI hierarchy" on page 11-24
`pnninbrdisplay` command	"Displaying details about neighbor nodes" on page 11-27
`pnninodedisplay` command	"Displaying local node information" on page 11-28
`pnninodetopology` command	"Displaying the PNNI topology database" on page 11-32
`pnniptsestatus` command	"Displaying the PNNI routing table" on page 11-33
`pnnirouteBase` command `pnnireachableaddr` command	"Displaying PNNI interface information" on page 11-21
`pnnirouteBase` command	"Displaying PNNI interface information" on page 11-21

Verifying the PNNI link

To verify that PNNI signaling and the PNNI link are active, open the `atm-if-stat` profile for the interface. For example:

```
admin> read atm-if-stat { { 1 18 1 } 0 }
ATM-IF-STAT/{ { shelf-1 trunk-module-2 1 } 0 } read
admin> list
[in ATM-IF-STAT/{ { shelf-1 trunk-module-2 1 } 0 }]
address* = { { shelf-1 trunk-module-2 1 } 0 }
if-number = 11
nailed-group = 851
port-state = up
signalling-state = up
pnni-link-state = up
```

The preceding profile indicates that the signaling and PNNI link state are established. For a port that has not been configured for PNNI, those settings indicate that signaling and PNNI links have not been configured. For example:

```
admin> read atm-if-stat { { 1 18 2 } 0 }
ATM-IF-STAT/{ { shelf-1 trunk-module-2 2 } 0 } read
admin> list
[in ATM-IF-STAT/{ { shelf-1 trunk-module-2 2 } 0 }]
address* = { { shelf-1 trunk-module-2 2 } 0 }
if-number = 12
nailed-group = 852
port-state = up
signalling-state = not-configured
pnni-link-state = not-configured
```

For details on the parameters, see the *Stinger ATM Configuration Guide*.

Displaying general PNNI information

The `pnnidisplay` command displays general information about PNNI implementation, including internal counters. The command does not have any command options. The following sample output shows that PNNI 1.0 is supported, and that the system failed to compute routes 148 times because the destination was unreachable:

```
admin> pnnidisplay
HighestVersion           = Version1point0
LowestVersion            = Version1point0
DtlCountOriginator       = 0
DtlCountBorder           = 0
CrankbackCountOriginator = 0
CrankbackCountBorder     = 0
AltRteCountOriginator    = 0
AltRteCountBorder        = 0
RteFailCountOriginator   = 148
RteFailCountBorder       = 0
RteFailUnreachOrg        = 148
RteFailUnreachBrdr       = 0
```

Field	Indicates
`HighestVersion`	Highest version of the PNNI protocols supported in the unit.
`LowestVersion`	Lowest version of the PNNI protocols supported in the unit.
`DtlCountOriginatr`	Number of destination transit list (DTL) stacks the unit has originated and placed in PNNI signaling messages.
`DtlCountBorder`	Number of partial DTL stacks the unit has added into signaling messages as an entry border node.
`CrankbackCount Originator`	Number of connection setup messages, including DTL stacks the unit has originated, that have cranked back to this node.
`CrankbackCountBorder`	Number of connection setup messages, including DTL stacks the unit has added as an entry border node, that have cranked back to this node.

Field	Indicates
AltRteCountOriginator	Number of alternate DTL stacks the unit has computed and placed into signaling messages it originated.
AltRteCountBorder	Number of alternate partial DTL stacks the unit has computed and placed into signaling messages as an entry border node.
RteFailCountOriginator	Number of times the unit failed to compute a viable DTL stack as originator for a call. This value indicates the number of times a call was cleared due to originator routing failure.
RteFailCountBorder	Number of times the unit failed to compute a viable partial DTL stack as an entry border node for a call. This value indicates the number of times a call was either cleared or cranked back from this node due to border routing failure.
RteFailUnreachOrg	Number of times the unit failed to compute a viable DTL stack as originator because the destination was unreachable. This value indicates those calls that were cleared with cause 2 (specified transit network unreachable) or cause 3 (destination unreachable) in the cause information element.
RteFailUnreachBrdr	Number of times the unit failed to compute a viable partial DTL stack as entry border node because the target of the path calculation was unreachable. This value indicates those calls that were cleared or cranked back with cause 2 (specified transit network unreachable) or cause 3 (destination unreachable) in the cause information element.

Displaying PNNI interface information

To display the configuration of PNNI physical interfaces, use the `pnniinterfacedisplay` command. The command does not have any command options. The following sample output shows that both ports of the trunk module in slot 17 are configured for PNNI:

```
admin> pnniinterfacedisplay
Port  PhyAddr       IntIndex      Node          AggrToken     VpCap
801   {1 17 1}      11            1             0             Y

    Cbr Wt        RtVbr Wt      NrtVbr Wt     Abr Wt        Ubr Wt
    5040          5040          5040          5040          5040

    Port  PhyAddr       IntIndex      Node          AggrToken     VpCap
    802   {1 17 2}      12            1             0             Y

    Cbr Wt        RtVbr Wt      NrtVbr Wt     Abr Wt        Ubr Wt
```

```
   5040          5040          5040          5040          5040
```

Field	Indicates
Port	Nailed group number associated with the physical port.
PhyAddr	Physical address of the trunk port in the following format: { *shelf-n slot-n item-n* }
IntIndex	Entry number in the interface table.
Node	PNNI node index. Only node index 1 is currently supported.
AggrToken	Configured aggregation token for this interface.
VpCap	Y if the interface is capable of having virtual path connections (VPCs) established within it, or N if it is not.
Cbr Wt	Configured administrative weight of this interface for the constant bit rate (CBR) service category.
RtVbr Wt	Configured administrative weight of this interface for the real-time variable bit rate (RT-VBR) service category.
NrtVbr Wt	Configured administrative weight of this interface for the nonreal-time variable bit rate (NRT-VBR) service category.
Abr Wt	Configured administrative weight of this interface for the available bit rate (ABR) service category.
Ubr Wt	Configured administrative weight of this interface for the unspecified bit rate (UBR) service category.

Displaying information about PNNI logical links

A PNNI *logical link* is a logical representation of the connectivity between two logical nodes, including the physical link and virtual path connection. The pnnilinkdisplay command displays information about the operation of logical links attached to the local PNNI node and the relationship to nodes on the other end of the links. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command prints a summary of all PNNI logical links. For example, the following output shows two logical links, one on each of the configured trunk ports in slot 17. The first link is attempting Hello protocol exchanges with its neighbors, and the second is established as a lowest-level horizontal link.

```
admin> pnnilinkdisplay
Node PortId     PhysicalAddr  IntfIndex    LinkType     HelloState
   1    801       {1 17 1}       11           Unknown      Attempt
   RemoteNodeId
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

Node PortId    PhysicalAddr   IntfIndex  LinkType      HelloState
1    802       {1 17 2}       12         Lowest horiz  Twoway inside
   RemoteNodeId
   60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00
```

With the -d option, the command displays additional details. For example, the following output shows that the link on the first port in slot 17 (port ID 801) has transmitted 121 Hello packets, but has received no information from the remote node.

```
admin> pnnilinkdisplay -d 1 801
Node PortId     PhysicalAddr   IntfIndex      LinkType       HelloState
1    801        {1 17 1}       11             Unknown        Attempt
   RemoteNodeId
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
   RemotePortId   DerAggrToken   SvccRccIndex   RcvHellos      XmtHellos
     0              0              0              0              121
   UpnodeId
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

   UpnodeAtmAddress
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

   CommonPeerGroupId                            LinkVersion
   00:00:00:00:00:00:00:00:00:00:00:00:00:00       1
```

Field	Indicates
`Node`	PNNI node index. Only node index 1 is currently supported.
`PortId`	Dedicated (nailed) group number associated with the physical port. The node index (1) and port ID identify the interface to which the link is attached.
`PhysicalAddr`	Physical address of the trunk port in the following format: { *shelf-n slot-n item-n* }
`IntIndex`	Entry number in the interface table for the interface to which the logical link corresponds. The value is valid only for LinkType values of Unknown, Lowest Level Horizontal Link, and Lowest Level Outside Link. All other link types display a zero value.
`LinkType`	Type of logical link. Possible types are Unknown, Lowest Level Horizontal Link, Horizontal link to/from LGN, Lowest Level Outside Link, Uplink, and Outside link and Uplink. (An *uplink* is a link to a higher-level node.)
`HelloState`	State of the Hello protocol exchange across the link or the state of the corresponding logical group node (LGN) horizontal link Hello exchange. For uplinks, the field displays NA. Other link types have the following valid values: NA, Down, Attempt, Oneway Inside, Twoway Inside, Oneway Outside, Twoway Outside, and Common Outside.
`RemoteNodeId`	Node ID of the neighboring node on the other end of the link. The value is valid only for LinkType values of Lowest Level Outside Link or Uplink. If the node at the other end of an uplink (*upnode*) has not yet been identified, or if the LinkType is Lowest Level Horizontal Link, the field displays zero.

Field	Indicates
RemotePortId	Port ID of the port at the other end of the link. If the LinkType is Outside link and Uplink, the field shows the port ID assigned by the lowest-level neighbor node to identify the outside link. If the remote port ID is unknown or if the LinkType is Uplink, the field displays zero.
DerAggrToken	Derived aggregation token value on the link. For horizontal links between lowest-level nodes, the value is always zero.
SvccRccIndex	Switched virtual channel connection (SVCC)-based routing control channel (RCC) used to exchange information with the neighboring peer logical group node. (*Not currently supported*.)
RcvHellos	Number of Hello packets received over this link. The value is valid for horizontal and outside links between lowest-level nodes and for links of unknown type. Other link types display zero.
XmtHellos	Number of Hello packets transmitted over this link. The value is valid for horizontal and outside links between lowest-level nodes and for links of unknown type. Other link types display zero.
UpnodeId	Node ID of the neighbor node. For horizontal links, or when the link type or upnode is not yet known, the field displays zero.
UpnodeAtmAddress	ATM end-system address used to establish connections to the upnode. For horizontal links, or when the link type or upnode is not yet known, the field displays zero.
CommonPeerGroupId	Peer group ID of the lowest-level common peer group in the hierarchy of the neighboring node and the local node. For horizontal links, or when the link type or common peer group is not yet known, the field displays zero.
LinkVersion	Version of PNNI routing protocol used to exchange information over this link. If communication with the neighbor node has not yet been established, or if the link type is Uplink or Link to/from LGN, the field displays Unknown.

Displaying information about the PNNI hierarchy

The `pnnimapdisplay` command displays information about the PNNI hierarchy. You can use this information to find and analyze the operation of all links and nodes within the PNNI hierarchy from the perspective of a local node. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command displays information about links between local and remote nodes. In the following sample output, the system is reporting a link on each of its active PNNI ports, with details about the originating and remote IDs:

admin> **pnnimapdisplay**

```
Nd Index
1  1

OriginatingNodeId                                                    OrigPortId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00       802

RemoteNodeId                                                          RmtPortId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00        801

Nd Index
1  1

OriginatingNodeId                                                    OrigPortId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00       801

RemoteNodeId                                                          RmtPortId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00     802
```

With the -d option, the command displays additional details about each link. In the following example, the command displays information about the link originating on its port 802, including the type of link and the routing metrics and attributes from this node to the specified remote node:

```
admin> pnnimapdisplay -d 1
Nd Index
1  1

OriginatingNodeId                                                    OrigPortId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00     802

RemoteNodeId                                                          RmtPortId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00        801

MapType         PeerGroupId
HorizontalLink  60:39:84:0f:80:01:bc:72:00:01:31:a3:99:00

AggrToken       VpCap           PtseId          MTag
0               1               4               1118482

Qos     Dir    AdmWt      MCR      ACR      CTD      CDV     CLR0   CLR0+1
Cbr     Out     5040   366792   366792     6890   Unused        8        8
Rtvbr   Out     5040   366792   366792     6890   Unused        8        8
NrtVbr  Out     5040   366792   366792     6890   Unused        8        8
Abr     Out     5040   366792   366792     6890   Unused        8        8
Ubr     Out     5040   366792   366792     6890   Unused        8        8
Cbr     Out     5040   366792   366792     1574     1554        8        8
Rtvbr   Out     5040   366792   366792     1574     1554        8        8
NrtVbr  Out     5040   366792   366792     1574     1554        8        8
Abr     Out     5040   366792   366792     1574     1554        8        8
Ubr     Out     5040   366792   366792     1574     1554        8        8
Cbr     Out     5040   366792   366792      674      654        8        8
Rtvbr   Out     5040   366792   366792      674      654        8        8
NrtVbr  Out     5040   366792   366792      674      654        8        8
```

```
Abr    Out     5040   366792   366792      674      654        8        8
Ubr    Out     5040   366792   366792      674      654        8        8
```

Field	Indicates
`Nd`	PNNI node index. Only node index 1 is currently supported.
`Index`	Map index, required because a specific node and port pair can have multiple entries for nodal connectivity, in addition to any entry for a horizontal link or uplink.
`OriginatingNodeId`	PNNI node ID of the originating node represented in this entry.
`OrigPortId`	Port ID as assigned by the originating node.
`RemoteNodeId`	PNNI node ID of the remote node at the other end of the link from the originating node. If unknown, the field displays zero.
`RmtPortId`	Port ID as assigned by the remote node at the other end of the link from the originating node. If the ID is unknown, the field displays zero.
`MapType`	Type of PNNI entity being described by this entry in the map table. Valid types are HorizontalLink, Uplink, and Node.
`PeerGroupId`	Peer group ID of the originating node.
`AggrToken`	Derived aggregation token value for this link. For nodes and for horizontal links between lowest-level nodes, the field displays zero.
`VPCap`	A value of 1 indicates that virtual path connections (VPCs) can be established across the PNNI entity. A value of zero indicates that VPCs cannot be established.
`PtseId`	PNNI state topology element (PTSE) ID for the PTSE that contains the information group(s) describing the PNNI entity. The PTSE is originated by the originating node.
`MTag`	Integer that represents a set of traffic parameters. The zero value indicates that no metrics are associated with the link or nodal connectivity.
`Qos`	Service categories to which this set of metrics applies.
`Dir`	Direction in which metrics apply (`In` or `Out`).
`AdmWt`	Administrative weight of the service category.
`MCR`	Maximum cell rate in cells per second for the service category.
`ACR`	Available cell rate in cells per second for the service category.
`CTD`	Maximum cell transfer delay in microseconds for the service category.
`CDV`	Cumulative cell delay variation in microseconds for the service category.

Field	Indicates
CLR0	Cell loss ratio for traffic with a cell loss priority (CLP) level of 0 (zero) for the service category.
CLR0+1	Cumulative cell loss ratio for traffic with CLP level of 0 + 1 for the service category.

Displaying details about neighbor nodes

A PNNI *neighbor node* is a node that is directly connected to a particular node via a logical link. The pnninbrdisplay command displays information about the relationship between the local node and a neighboring node within the same peer group. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command displays the PNNI node ID and state of its neighbor peers. In the following sample output, the system recognizes one neighbor node and identifies the link to that neighbor as fully established:

```
admin> pnninbrdisplay
Node PeerState      PeerPortCount
1    Full           1

     PeerNodeId
     60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00
```

With the -d option, the pnninbrdisplay command displays additional details about the neighbor node, including statistics about packet exchanges with the neighbor, as shown in the following sample output:

```
admin> pnninbrdisplay -d
Node PeerState      PeerPortCount
1    Full           1

PeerNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00

PeerSvcRccIdx  PeerRcvDbSums  PeerXmtDbSums  PeerRcvPtsps PeerXmtPtsps
0              2              3              64           64

PeerRcvPtseReq PeerXmtPtseReq PeerRcvPtseAck PeerXmtPtseAck
0              1              48             7
```

Field	Indicates
Node	PNNI node index. Only node index 1 is currently supported.
PeerState	State of the local node's neighboring peer state machine associated with PeerNodeId field. The field can display NP Down (neighboring peer is down), Negotiating, Exchanging, Loading, or Full.
PeerPortCount	Total number of ports to the neighboring peer. If the peer communicates only through an SVCC-based RCC, the field displays zero. (*SVCC-based RCCs are currently not supported.*)
PeerNodeId	PNNI node ID of the neighboring peer node.

Field	Indicates
PeerSvccRccIndex	Identifies the SVCC-based RCC being used to communicate with the neighboring peer. (*SVCC-based RCCs are currently not supported.*) If both the local node and the neighboring peer are lowest-level nodes, the field displays zero.
PeerRcvDbSums	Number of database summary packets received from the neighboring peer.
PeerXmtDbSums	Number of database summary packets transmitted to the neighboring peer.
PeerRcvPtsps	Number of PNNI topology state packets (PTSPs) received from the neighboring peer.
PeerXmtPtsps	Number of PTSPs retransmitted to the neighboring peer.
PeerRcvPtseReq	Number of PTSE Request packets received from the neighboring peer.
PeerXmtPtseReq	Number of PTSE Request packets transmitted to the neighboring peer.
PeerRcvPtseAck	Number of PTSE Ack (acknowledgement) packets received from the neighboring peer.
PeerXmtPtseAck	Number of PTSE Ack packets transmitted to the neighboring peer.

Displaying local node information

With the current software version, Stinger units support a single logical node, which is always a lowest-level node. The pnninodedisplay command displays information about factors that affect the operation of the PNNI logical node. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command identifies the node and displays some state information. Following is some sample output:

```
admin> pnninodedisplay
Node NodeId
1    60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

OperStat        DBOverload      Ptses
   UP              NO              21
```

With the -d option, the command displays many additional fields about the configuration and current state of the logical node. For example:

```
admin> pnninodedisplay -d
Node NodeId
1    60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

     OperStat        DBOverload      Ptses
     UP              NO              21

     NodeLevel       LowestLevel     AdminStatus     DomainName
     96              YES             UP              stinger1r
```

```
AtmAddress
39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

PeerGroupId                                   RestrictedTransit
60:39:84:0f:80:01:bc:72:00:01:31:a3:99:00      NO

PglLeaderPri    PglState        PglTimeStamp
0               Oper not PGL    01/01/1990 00:00:00

PreferredPgl
00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

PeerGroupLeader
00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
```

Field	Indicates
`Node`	PNNI node index. Only node index 1 is currently supported.
`NodeId`	PNNI node ID of the local node.
`OperStat`	Indication of the operational status of the node (Up or Down).
`DBOverload`	Whether the node is currently operating in topology database overload state (Yes or No).
`Ptses`	Total number of PNNI topology state elements (PTSEs) in the node's topology database at this time.
`NodeLevel`	Number from 0 to 104 indicating the level of PNNI hierarchy at which the node exists.
`LowestLevel`	Whether the node acts as a lowest-level node (Yes or No).
`AdminStatus`	Administrative status of the node. Up indicates that the node is allowed to become active. Down means the node is inactive and is not allowed to become active.
`DomainName`	Name of the node's PNNI routing domain. All lowest-level nodes with the same domain name are presumed to be connected.
`AtmAddress`	Node's ATM address.
`PeerGroupId`	Node's peer group ID.
`RestrictedTransit`	Whether the node is restricted to not allowing support of SVCs transiting this node (Yes or No).
`PglLeaderPri`	Number indicating the leadership priority value that the node advertises. With the current software version, zero is displayed, because the node cannot become a peer group leader.
`PglState`	State of the node regarding peer group leader election with the peer group. Following are valid values: `Starting`, `Awaiting`, `Awaiting Full`, `Initial Delay`, `Calculating`, `Await Unanimity`, `Oper PGL`, `Oper Not PGL`, `Hung Election`, `Await Reelection`.

Field	Indicates
PglTimeStamp	Time at which the current peer group leader was established.
PreferredPgl	Node that the local node prefers as leader of its peer group.
PeerGroupLeader	Current peer group leader.

Displaying information about other nodes

The pnninodetopology command displays the information about nodes that the local node has obtained from nodal information PTSEs. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command displays the node index and PNNI node ID (map node ID), as shown in the following output:

```
admin> pnninodetopology
Node MapNodeId
1    60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00
1    60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00
```

With the -d option, the command displays additional details about the nodes, as shown in the following sample output:

```
admin> pnninodetopology -d
Node MapNodeId
1    60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

     PeerGroupId
     60:39:84:0f:80:01:bc:72:00:01:31:a3:99:00

     NodeAtmAddress
     39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

     RestrictedTransit       NodeComplexRep          RestrictedBranching
     NO                      NO                      NO

     NodeDatabaseOverload    IAMLeader               LeadershipPriority
     NO                      NO                      0

     PreferredPgl
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

     ParentNodeId
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

     ParentAtmAddress
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

     NodeParentPeerGroupId
     00:00:00:00:00:00:00:00:00:00:00:00:00:00

     ParentPglNodeId
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
```

```
Node MapNodeId
1    60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00

     PeerGroupId
     60:39:84:0f:80:01:bc:72:00:01:31:a3:99:00

     NodeAtmAddress
     39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00

     RestrictedTransit       NodeComplexRep          RestrictedBranching
     NO                      NO                      NO

     NodeDatabaseOverload    IAMLeader               LeadershipPriority
     NO                      NO                      0

     PreferredPgl
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

     ParentNodeId
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

     ParentAtmAddress
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

     NodeParentPeerGroupId
     00:00:00:00:00:00:00:00:00:00:00:00:00:00

     ParentPglNodeId
     00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
```

Field	Indicates
Node	PNNI node index. Only node index 1 is currently supported.
MapNodeId	PNNI node ID of the node being represented.
PeerGroupId	PNNI peer group ID of the node being represented.
NodeAtmAddress	ATM address of the node being represented.
RestrictedTransit	Whether the node is restricted to not allowing support of SVCs transiting this node (Yes or No).
NodeComplexRep	Whether the node uses complex node representation (Yes or No).
RestrictedBranching	Whether the node is restricted from supporting additional point-to-multipoint branches (Yes or No).
NodeDatabaseOverload	Whether the node is currently operating in topology database overload state (Yes or No).
IAmLeader	Whether the originating node claims to be leader of its peer group (Yes or No).

Field	Indicates
LeadershipPriority	Number indicating the leadership priority value the node advertises.
PreferredPgl	Node that the local node prefers as leader of its peer group.
ParentNodeId	If the node is peer group leader, this field displays the node ID of the parent logical group node (LGN). If the node is not peer group leader, it displays zero.
ParentAtmAddress	If the node is peer group leader, this field displays the ATM address of the parent LGN. If the node is not peer group leader, it displays zero.
NodeParentPeerGroupId	If the node is peer group leader, this field displays the node's parent peer group ID. If the node is not peer group leader, it displays zero.
ParentPglNodeId	If the node is peer group leader, this field displays the node ID of the peer group leader of the parent peer group. If the node is not peer group leader, it displays zero.

Displaying the PNNI topology database

The pnniptsestatus command displays PNNI topology state elements (PTSEs) in the local node's topology database. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command displays the current topology database, as shown in the following sample output:

```
admin> pnniptsestatus
OrigNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

Node PtseId (hex)   SeqNum    LifeTime  CheckSum       PtseType
1    1              47        3600      11143          NodalInfo
1    2              60        3600      51918          InternalAddr
1    4              2         3600      46441          HorizontalLink
1    5              4         3600      7165           InternalAddr
1    6              3         3600      52636          InternalAddr
1    7              2         3600      15160          InternalAddr
1    8              3         3600      61997          InternalAddr
1    9              8         3600      62930          InternalAddr
1    a              5         3600      25143          InternalAddr
1    b              4         3600      12231          InternalAddr
1    c              10        3600      37892          InternalAddr
1    d              10        3600      37791          InternalAddr
1    e              9         3600      37691          InternalAddr
1    11             1         3600      6042           InternalAddr


OrigNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00
```

```
Node PtseId (hex)   SeqNum    LifeTime  CheckSum       PtseType
1    1              43        3308      56751          NodalInfo
1    2              50        1658      43086          InternalAddr
1    4              41        2678      33703          InternalAddr
1    5              43        2145      33718          InternalAddr
1    6              43        2061      33721          InternalAddr
1    7              42        1850      33667          InternalAddr
1    a              2         3301      46435          HorizontalLink
```

You can specify an originating node ID on the command line, use an option to retrieve information only about a specific PTSE type, or to retrieve specific PTSE types originated by a specific node. For example, the following sample command displays information only about horizontal link PTSEs:

```
admin> pnniptsestatus -h
OrigNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

Node PtseId (hex)   SeqNum    LifeTime  CheckSum       PtseType
1    4              2         3600      46441          HorizontalLink


OrigNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:38:ff:b6:ca:99:00:00:00

Node PtseId (hex)   SeqNum    LifeTime  CheckSum       PtseType
1    a              2         3301      46435          HorizontalLink
```

Field	Indicates
`OrigNodeId`	PNNI node ID of the node that originated the PTSE.
`Node`	Local node number.
`PtseId`	Hexadecimal value of the PTSE identifier assigned to the PTSE by the originating node.
`SeqNum`	Sequence of the entry in the local topology database.
`LifeTime`	Remaining lifetime in seconds, for the given PTSE as stated in the topology database.
`Checksum`	Entry's PTSE checksum as stated in the topology database.
`PtseType`	Type of information contained in the PTSE entry. Valid values are `Other`, `NodalState`, `NodalInfo`, `InternalAddr`, `ExteriorAddr`, `HorizontalLinks`, and `Uplinks`.

Displaying the PNNI routing table

The `pnniroutebase` command displays the number of current PNNI routes from nodes in the PNNI routing domain to valid addresses and transit networks. For example:

```
admin> pnniroutebase
pnniRouteAddrNumber     = 161
```

The `pnnireachableaddr` command displays a list of all reachable addresses from each node visible to the local node. For syntax information, see the *Stinger Reference*.

With no options on the command line, the command prints the entire list of reachable addresses. Following is an excerpt showing a few entries from sample output:

```
admin> pnnireachableaddr
AdvertisedNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

    PortId              Index               PrefixLength (bits)
    36610               2                   152

    ReachableAddr
    39:84:0f:80:01:bc:72:00:01:18:dd:98:00:ff:18:dd:98:00:02

AdvertisedNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

    PortId              Index               PrefixLength (bits)
    36610               3                   152

    ReachableAddr
    39:84:0f:80:01:bc:72:00:01:18:dd:98:00:ff:18:dd:98:00:f1

AdvertisedNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

    PortId              Index               PrefixLength (bits)
    36610               4                   152

    ReachableAddr
    39:84:0f:80:01:bc:72:00:01:18:dd:98:00:ff:18:dd:98:00:f2

AdvertisedNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:31:a3:99:30:ff:18:dd:98:00:00:00

    PortId              Index               PrefixLength (bits)
    36610               5                   152

    ReachableAddr
    39:84:0f:80:01:bc:72:00:01:18:dd:98:00:ff:f7:48:cf:3b:01
```

You can use a command option to display reachable addresses from a specified node or ATM address. For example, the following output shows addresses that are reachable from the specified ATM prefix:

```
admin> pnnireachableaddr -a 39:84:0f:80:01:bc:72:00:01:17:fd:27:09
AdvertisedNodeId
60:a0:39:84:0f:80:01:bc:72:00:01:17:fd:27:09:ff:e8:71:75:03:00:00

    PortId              Index               PrefixLength (bits)
    0                   1                   104
```

```
ReachableAddr
39:84:0f:80:01:bc:72:00:01:17:fd:27:09
```

Field	Indicates
`AdvertisingNodeId`	PNNI node ID of a node that advertises reachability to the ATM prefix displayed in the `ReachableAddr` field.
`PortId`	Port ID used from the advertising node to reach the ATM prefix displayed in the `ReachableAddr` field.
`Index`	Arbitrary index used to enumerate the addresses advertised by the advertising node.
`PrefixLength`	Number of significant bits in the prefix displayed in the `ReachableAddr` field.
`ReachableAddr`	ATM prefix of the reachable address.

Diagnostic Testing 12

OAM testing

Stinger units support operations, administration, and maintenance (OAM) F4 and F5 testing. ITU-T I.610 defines OAM functions.

OAM cells have following functions:

- Fault management using Alarm Indication signal (AIS), remote detection indication (RDI), loss of continuity, far-end receive failure, continuity check, and loopback OAM cells
- Performance management using forward monitoring and backward reporting OAM cells
- Activation/deactivation of performance monitoring and/or continuity check using activation/deactivation OAM cells
- System management OAM cells use by end-systems

Overview of F4 and F5 OAM tests

OAM F4 testing is a diagnostic tool for testing end-to-end and segment continuity in a virtual path connection (VPC). OAM F4 cells operate at the virtual path level. They use the following reserved virtual channel indentifiers (VCIs):

- VCI 3 for segment OAM F4 cells
- VCI 4 for end-to-end OAM F4 cells

To respond to F4 OAM segment loopback cells, the control module requires special cross-connect circuits so that it can extract the F4 OAM cells and then forward them back to the segmentation and reassembly (SAR) sublayer on the incoming slot. At the trunk module or LIM, the SAR sublayer examines the F4 OAM cells and replies with the appropriate message to the control module. Upon receiving the F4 response, the control module forwards the F4 response to the incoming port on the trunk module or line interface module (LIM).

Note The Stinger unit does not support F4 OAM end-point tests for virtual path connections (VPCs) because the connection does not terminate on the Stinger unit.

OAM F5 cells operate at the virtual circuit level and use the payload type indicator (PTI) field to distinguish between data and OAM cells. On Stinger units, F5 OAM test flows cover either an end-to-end virtual connection or only a segment of the virtual connection.

Using the `oam` command and `atm-oam` profile to run OAM tests

You can run an F4 or F5 OAM loopback or continuity check test using the `oam` command or the `atm-oam` profile. A network peer can also activate and deactivate a continuity check test. If the system is reset or a switchover occurs, all incomplete tests are restarted.

You can run OAM tests in the following configurations:

- An F4 *or* F5 OAM loopback *or* continuity test on a particular ATM circuit
- An F4 *or* F5 OAM loopback test on all ATM circuits on a particular port on a slot
- An F4 *or* F5 OAM loopback test on all ATM circuits on a slot
- An F5 OAM loopback test on all ATM circuits with a particular virtual path identifier (VPI) and port

You can run the following tests for a virtual path connection (VPC) or virtual channel connection (VCC):

Configuration	F4	F5	Segment	End-to-end
VPC connecting point	Yes	No	Yes	No
VCC end point	Yes	Yes	Yes	Yes
VCC connecting point	Yes	Yes	Yes	No

Any cross connection can be enabled as a segment end point. However, only Stinger terminating connections can be end points on the slot and port on which they terminate. Consider the following situations:

- A virtual switching virtual path (VC-switching VPI) on a trunk port terminates on that trunk port. It therefore terminates on that control module. This type of virtual path can have both F4 segment and F4 end-to-end OAM flows.
- A virtual channel connection that terminates on a line interface module (LIM) or on a control module (through a trunk) has F5 segment and F5 end-to-end flows on the LIM or control module, respectively.
- A VPC or VCC that is switched towards a LIM port does not terminate within the Stinger system. Therefore the LIM can only be the end point for F4 and F5 segment OAM flows. The LIM will always ignore and pass through F4 and F5 end-to-end OAM flows.

Overview of the `oam` command

You can use the `oam` command to run F4 and F5 OAM loopback and continuity check tests and to display OAM entries. You use the command as follows:

- To run loopback tests, use the following command syntax:

  oam -L *slot port vpi*|-l *slot port vpi* [*vci*] e|s *cell-count*

- To run continuity tests, use the following command syntax:

  oam -C *slot port vpi* |-c *slot port vpi* [*vci*] e|s +|-

- To display OAM entries in a Stinger system, use the `oam -e` command. Its syntax is as follows:

  oam -e [*slot*] [*port*] [*vpi*] [*vci*]|-p

- To display a subset of the entries reported by the OAM queries, use the oam -q command. Its syntax is as follows:

  oam -q fault normal | fault ais | fault rdi | fault loc | cc generating | cc monitoring | cc activating | cc deactivating

The following table explains the elements of the command:

Option		Description
-e		Lists the OAM entries.
-c		Runs an OAM F5 continuity test.
-l		Runs an OAM F5 loopback test.
-p		Toggles OAM internal debug messages.
-L		Runs an OAM F4 loopback test.
-C		Runs an OAM F4 continuity test.
slot		Slot number of the LIM.
port		Number of the DSL port from which testing cells are sent.
vpi		Virtual path identifier (VPI) on which to transmit testing cells.
vci		Virtual channel identifier (VPI) on which to transmit testing cells.
s		Runs a segment test.
e		Runs an end-to-end test.
cell-count		Number of F4 loopback cells to send.
+		Starts a continuity test.
-		Stops a continuity test.
-q	**fault normal**	Displays OAM entries with no defects.
	fault ais	Displays OAM entries with AIS defects.
	fault rdi	Displays OAM entries with RDI defects.
	fault loc	Displays OAM entries with LOC defects.

Option	Description
`cc generating`	Displays OAM entries generating CC cells.
`cc monitoring`	Displays OAM entries monitoring CC cells.
`cc activating`	Displays OAM entries in activating state.
`cc deactivating`	Displays OAM entries in deactivating state.

Overview of the `atm-oam` profile

Running an OAM test using the `atm-oam` profile has the following capabilities and limitations:

- An `atm-oam` profile can be created for testing a single ATM circuit or for testing multiple ATM circuits. When testing multiple circuits using one profile, you can run a loopback test only. One ATM circuit is tested at a time. On each ATM circuit, a specified number of loopback cells are sent, with an interval of 1 second between each transmission. After the test on one circuit is complete, the unit tests the next circuit.
- While testing one ATM circuit using one profile, you can run loopback and continuity tests concurrently.
- Any changes made in an `atm-oam` profile results in restarting the test. Only that test whose subprofile is changed is restarted.
- If the test is in a waiting stage and you change any of the test parameters, the unit restarts the test using the new parameters.

Following is a sample `atm-oam` profile and its contents:

```
[in ATM-OAM/{ { any-shelf any-slot 0 } 0 0 } (new)]
oam-address* = { { any-shelf any-slot 0 } 0 0 }
loopback-config = { no segment 1 0 no 1 30 }
continuity-config = { no segment }
```

The `oam-address` parameter is a complex field that specifies the `shelf`, `slot`, `port`, `vpi`, and `vci` values for an ATM interface on which the test is carried out.

- To perform tests on all the ports for the specified slot, specify 0 (zero) for the `port` value.
- To perform tests for all VPIs on the specified slot and port, specify 32768 for the `vpi` value.
- To perform tests for all VCIs on the specified slot and port, specify 32768 for the `vci` value.
- To run an F4 test, specify 32769 for the `vci` value. To run an F5 test, specify a `vci` value greater than 31.

Valid `oam-address` values

You can specify the `shelf`, `slot`, `port`, `vpi`, and `vci` values in the following combinations only. All other combinations are invalid.

- `shelf=`*`number`*, `slot=`*`number`*, `port=0`, `vpi=32768`, `vci=32769` or `vci=32768`

This combination causes the unit to test all the VPI-VCI pairs configured on the specified slot. If vci is set to 32769, the test is an F4 loopback. Otherwise, the test is an F5 loopback.

- shelf=*number*, slot=*number*, port=*number*, vpi=32768, vci=32769 or vci=32768

  This combination causes the unit to test all the VPI-VCI pairs configured on the specified port. If vci is set to 32769, the test is an F4 loopback. Otherwise, the test is an F5 loopback.

- shelf=*number*, slot=*number*, port=*number*, vpi=*number*, vci=32769, 32768, or *number*.

If vci is set to 32769, the unit performs an F4 test on its associated VPI. If vci is set to 32768, the unit performs an F5 loopback test on all configured VCIs associated with the specified VPI. If you set vci to any other value, the unit performs a loopback or continuity test on the specified VPI-VCI pair.

Settings in the continuity-config subprofile

The continuity-config subprofile include the following parameters:

Parameter	Setting
enabled	Enable/disable continuity checking. Specify yes to enable continuity checking or no (the default) to disable it. After the specified tests are complete, this parameter is reset by the system to its default.
continuity-level	Type of loopback test. Specify end-to-end to test at the end-to-end level or segment (the default) to test at the segment level.

Settings in the loopback-config subprofile

The loopback-config subprofile includes the following parameters:

Parameter	Setting
enabled	Enable/disable loopback testing. Specify yes to enable loopback testing or no (the default) to disable. After the specified tests are complete, the system resets this parameter to its default value.
loopback-level	Type of loopback test. Specify end-to-end to test at the end-to-end level or segment (the default) to test at the segment level.
loopback-cells	Number of loopback-per-test cells to be sent on each ATM circuit to be tested. Specify a number from 1 (the default) through 10. The time interval between transmission of each loopback cell is 1 second.

Parameter	Setting
error-threshold	Threshold for the number of loopback cells that can be lost. If the number of cells lost becomes equal to or greater than this value, a trap is generated. Specify a number from 0 through 10. The default, 0 (zero), disables this trap.
restart-after-trap	Enable/disable continuing a test after a trap is generated. Specify yes to continue testing after a trap is generated or no (the default) for testing to stop after a trap is generated. This parameter has no effect in the case of profiles created for multiple testing. In that case, the test is always restarted.
total-loopback-tests	Total number of tests to be performed on this interface. Specify a value from 0 through 10000. The default is 1. A value of 0 (zero) specifies continuous testing. If you specify 0, the statistics indicated by the testCompleted MIB variable are always 0.
test-iteration-interval	Time period in minutes between two tests. Specify a value from 0 through 10000. The default is 30.

You cannot stop a loopback test while actively transmitting cells on an ATM circuit. A loopback test can not be restarted while it is running.

F4 OAM support on a VP-switching VPI

You can enable and disable F4 OAM support on each VC-switching VPI.

The indexed parameter `vc-oamf4-support` in the *xxx*`-ATM/{ shelf-1 trunk-module-1 1 }:line-config` subprofile of trunk interfaces controls the enabling and disabling of F4 segment (VCI = 3) and end-to-end (VCI = 4) processing. The `vc-oamf4-support` parameter has a one-to-one mapping with `vc-switching-vpi` parameter.

Following is a sample listing of the relevant parameters in a `line-config` subprofile of an `oc3-atm` trunk profile:

```
[in OC3-ATM/{ shelf-1 trunk-module-1 1 }:line-config]
...
vpi-vci-range = vpi-0-255-vci-32-8191
vc-switching-vpi = [ 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 +
vc-oamf4-support = [ yes yes yes yes yes yes yes yes yes yes yes yes yes yes+
...
```

Following is the parameter description for `vc-oamf4-support`:

Parameter	Description
`vc-oamf4-support` *N*	Enables/disables specific F4 segment and end-to-end OAM processing on a Stinger VC-switching VPI. With the default `yes` setting, F4 segment and end-to-end processing for the specified VC-switching VPI is enabled.

By default, the `vc-oamf4-support` parameter is enabled for all VP-switching VPIs, including all of the default `vc-switching-vpi` = 0 elements.

To disable the F4 OAM support for the 0 VPI, you must disable all the corresponding `vc-oamf4-support` parameter entries that have a `0` entry in the `vc-switching-vpi` parameter. You must repeat the preceding process for each trunk for which you would like to disable F4 OAM processing.

Enabling F4 OAM on a LIM

You can enable or disable virtual circuit F4 OAM capabilities on a LIM by setting the `lim-vc-f4oam-support` parameter in the `slot-static-config` profile.

When you set `lim-vc-f4oam-support` to `yes`, the system creates segment (VCI = 3) and end-to-end (VCI = 4) F4 OAM entries when you create LIM-to trunk virtual circuits.

By default, the `lim-vc-f4oam-support` parameter is set to `yes`, as shown in the following sample listing of a `slot-static-config` profile for a LIM in slot 10:

```
[in SLOT-STATIC-CONFIG/{ shelf-1 slot-10 0 }]
name = 1:10
physical-address* = { shelf-1 slot-10 0 }
...
lim-vc-f4oam-support = yes
```

With this default setting, when you create a LIM-to-trunk virtual circuit, the system creates a segment and end-to-end F4 OAM entry.

Consider following commands, which create and provision a connection called `test1`.

```
admin> new connection test1
admin> set active = yes
admin> set telco-options nailed-groups = 451
admin> set mp-options enabled = no
admin> set atm-options vpi = 1
admin> set atm-options nailed-group = 451
admin> set atm-connect-options vpi = 2
admin> set atm-connect-options nailed-group = 852
admin> write -f
```

If the `lim-vc-f4oam-support` parameter is set to `yes`, F4 OAM entries are created on the LIM port for the VP-switching VPI. The `Total Active Oam Channels` field in the output of the `oam -e` shows the F4 OAM entries.

```
admin> open 1 10

dadsl-atm-72a-1/10> oam -e
OAM Entry list
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F4-SEG(7205b0:1.1.3) loop(Tx=0, Rx=0)
   7205b0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))

F4-E2E(728dc0:1.1.4) loop(Tx=0, Rx=0)
   728dc0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))

F5(72b670:1.1.35) E2E=FALSE loop(Tx=0, Rx=0)
   SEG:72b670:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY:D(P=DEF C=DEF))

Total Active Oam Channels=3
```

The following commands disable the system from creating F4 OAM entries when you create a VC-switching VPI.

```
admin> set lim-vc-oamf4-support = no

admin> write -f

admin> slot -b 10
```

Note In the current software version, when you change the setting of the `lim-vc-oamf4-support` parameter, you must manually reset the slot after writing the profile for the change to take effect.

If the `lim-vc-f4oam-support` parameter is set to `no`, the system does not create F4 OAM entries when you create VC-switching VPIs., as shown in the following sample output of the `oam -e` command.

```
admin> open 1 10

dadsl-atm-72a-1/10> oam -e
OAM Entry list
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F5(5fe4e0:1.1.35) E2E=FALSE loop(Tx=0, Rx=0)
   SEG:5fe4e0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY:D(P=DEF C=DEF))
```

```
Total Active Oam Channels=1
```

Continuity check and monitoring

F4 and F5 OAM continuity tests can be initiated as follows:

- Locally, using the command-line interface (CLI).
- Remotely, a network peer can send activation/deactivation requests to initiate a continuity test.

You can start an OAM continuity test locally using the command-line interface by using the `oam -c|C +` command or by setting the parameters in the `atm-oam` profile. Locally initiated continuity tests only configure the Stinger system to generate continuity cells. For both continuity check and OAM defects, events are reported by way of SNMP traps.

Continuity checks started by a remote peer are not associated with the command-line interface or a profile. For both continuity check and OAM defects, events are reported via SNMP traps.

Continuity check implementation

Stinger systems implement the standard OAM continuity check protocol. Note, however, that any remote deactivate request is accepted by the Stinger unit regardless of the direction indicated by remote peer. A remote activate request is accepted only if its specified directions is compatible with local settings (see "While in the default direction state, what happens when a Stinger unit receives an activation request" on page 12-9 for details).

When a connection is created, the OAM flow(s) associated with a connection have their continuity check direction set to *default*. The default direction indicates that the system generates no continuity check cells and does not monitor continuity check cells. The system also does not send any activation or deactivation requests to the remote.

Stinger systems support the generation of continuity cells towards the remote peer. When you start a test using the `oam` command or the `atm-oam` profile, from the perspective of the Stinger unit, the generation of continuity cells towards the remote peer is in the A-to-B direction. The A-to-B direction means that the Stinger unit sends an activate request to the remote peer. Stopping the test resets the direction to default.

While in the default direction state, what happens when a Stinger unit receives an activation request

When a Stinger unit is in the default direction and a remote peer sends a continuity check activate request, the Stinger unit accepts any direction that the remote peer specifies. The default direction is compatible with any direction sent by the peer. The A-to-B direction is only compatible when the B-to-A direction is specified by the remote peer.

Table 12-1 lists the possible directions that the remote peer can specify and the resulting action that the Stinger takes.

Table 12-1. Direction specified by the remote peer and the results

Remote request direction	Result
A-to-B	From the Stinger perspective, the B-to-A direction. The network peer generates the continuity check cells. The Stinger unit monitors continuity check cells.
B-to-A	From the perspective of the Stinger unit, the A-to-B direction. Stinger unit generates continuity check cells to the network peer.
2-way	Stinger unit monitors the continuity check cells generated by the network peer. Stinger unit generates continuity check cells to the network peer.

What happens when you start a continuity check locally

When you start a continuity check test using the `oam` command or the `atm-oam` profile, the continuity check direction is set to A-to-B (Stinger generates continuity check cells to the network peer). While the continuity check is set to A-to-B direction, the Stinger unit accepts activate requests from the remote peer only if the direction specified by the remote peer is B-to-A. The Stinger direction stays in the A-to-B direction until you deactivate the test locally using the `oam` command or the `atm-oam` profile, at which point the direction reverts to default.

Deactivating a continuity check test

The continuity check remains active until one of the following events occurs:

- You delete the cross connection.
- The Stinger unit receives a request to deactivate the continuity check either locally or from the remote. Consider the following situations:
  - If you start a test by setting parameters in the `atm-oam` profile, you can stop the test only by setting the appropriate parameters in that profile.
  - If you start a continuity check using the `oam -c|C +` command, you can stop the test only by using the `oam -c|C -` command.
  - If a test was started by a network peer, the network peer can send a deactivate request. You can also stop the test can by using the `oam -c|C -` command or by setting parameters in the `atm-oam` profile.

Whenever the continuity check direction is successfully reset to `Default`, (either using the `atm-oam` profile or the `oam -c|C` ... `-` command), the `R` field displays `NONE` before deactivation completes. Keep in mind that continuity check activation can proceed only after the deactivation is completed, which in certain situations can be up to 15 seconds. If you attempt to activate another continuity check using `oam -c|C ... +` or the `atm-oam` profile before deactivation is completed, the system generates the following error message:

```
OAM: CC was activated or is being stopped by another application
        use oam -e 18 2 0 4 for more information
F4-E2E(83b99ba0:3505.0.4) loop(Tx=0, Rx=0)
   83b99ba0:F=NORMAL CC(R=NONE:G=ACTIVE M=STOP A=DEACTG D=MON)
```

In the preceding example, the activation/deactivation status reported by the `A` field shows that the status is deactivating.

Running F4 and F5 continuity tests using the `oam` command

To run a continuity test from a control module, use the following syntax:

oam -C *slot port vpi* |-c *slot port vpi* [*vci*] e|s +|-

You can also run a continuity test from a LIM by first opening a session with the LIM. When you run a continuity test from a LIM, the *slot* option no longer applies.

The `oam - c | C` + command starts a continuity check and `oam -c | C` stops the continuity check on an F5 (`oam -c`) or F4 (`oam -C`) flow. When the continuity test is started, the continuity check direction is set to A-to-B (the Stinger generates continuity check cells to the remote peer). When the test is stopped, the continuity check direction is reset to default.

The following sample command entered on the control module starts a segment continuity check test on port 18, slot 2, VPI 0, VCI 100:

```
admin> oam -c 18 2 0 100 s +
Sending OAM continuity activation cell
```

Note that the continuity check direction for this continuity check is now set to A-to-B (Stinger unit to the remote peer), and remains in the A-to-B direction until you stop the test using the `oam` command, as in the example below:

```
admin> oam -c 18 2 0 100 s -
Sending OAM continuity deactivation cell
```

Note that the continuity check direction for this continuity check is now set to default.

The following sample command entered on the control module starts an end-to-end continuity check test on port 17, slot 2, VPI 0:

```
admin> oam -C 17 2 0 e +
Sending F4 OAM continuity activation cell
```

The following command stops the preceding test:

```
admin> oam -C 17 2 0 e -
Sending F4 OAM continuity deactivation cell
```

The following sample command entered on the control module starts an F5 end-to-end continuity check test on port 17, slot 2, vpi 0, vci 35:

```
admin> oam -c 17 2 0 35 e +
```

The following command stops the preceding test:

```
admin> oam -c 17 2 0 35 e -
```

The following sample command entered on the control module starts an F5 end-to-end continuity check test on port 17, slot 2, VPI 0, VCI 35:

```
admin> oam -C 17 2 0 35 e +
```

The following command stops the preceding test:

admin> **oam -C 17 2 0 35 e -**

To instruct the Stinger unit to perform an F5 segment continuity test from a T1000 module in slot 3, over VCI 36, proceed as follows:

admin> **open 1 3**

```
t1000-1/3> oam -c 3 0 36 s +
Sending OAM continuity activation cell
```

The following command stops the preceding test:

```
t1000-1-1/3> oam -c 3 0 36 s -
Sending OAM continuity deactivation cell
```

Running F5 continuity tests using the `atm-oam` profile

The following sample commands start an F5 continuity check on slot 15, port 2, VPI 3 and VCI 40:

admin> **new atm-oam {{ 1 15 2} 3 40}**

admin> **set continuity-config enabled = yes**

admin> **set continuity-config continuity-level = end-to-end**

admin> **write**

To disable the preceding continuity check, enter the following commands:

admin> **new atm-oam {{ 1 15 2} 3 40}**

admin> **set continuity-config enabled = no**

admin> **write**

OAM loopback tests

You run can use the `oam -L|l` command or set the parameters in the `atm-oam` profile and its `loopback-config` subprofile to run an F4 or F5 OAM loopback test.

Running F4 and F5 loopback tests using the `oam` command

To run a loopback test from the control module, use the following syntax:

oam -L *slot port vpi*|-l *slot port vpi* [*vci*] e|s *cell-count*

You can also run a loopback test from a LIM by first opening a session with the LIM. When you run a loopback test from a LIM, the *slot* option no longer applies.

For example, to send 64 consecutive segment OAM F4 loopback cells to VPI 15 on DSL port 2, issue the following command from a trunk module or LIM:

admin> **oam -L 2 15 s 64**

To display additional information about the outgoing and incoming segment test cells, use the following command:

admin> **oam -p**

The following sample command runs an end-to-end F4 loopback test by sending one cell over VPI 1, port 1 in slot 18 from the control module:

```
admin> oam -L 18 1 1 e 1
Received our F4 OAM end-to-end loopback cell, Id=0
```

The following sample commands run an F5 OAM segment loopback test from a Stinger MRT unit to the CPE connected to it on port 12.

```
admin> open 1 1
```

```
mrtdmt-1/1> oam -e
OAM Entry list
Entry=3f0ca0, Linear Port=12 vpi=8, vci=3 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=3f0de0, Linear Port=12 vpi=8, vci=4 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=3f0b60, Linear Port=12 vpi=8, vci=35 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=47e620, Linear Port=24 vpi=8, vci=3 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=47e760, Linear Port=24 vpi=8, vci=4 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=47e4e0, Linear Port=24 vpi=8, vci=35 state=Up loopTx=0 loopRx=0Segment
Continuity=READY  End2End Continuity=READY isVpc=No
```

```
mrtdmt-1/1> oam -l 12 8 35 s 1
mrtdmt-1/1> Sending F5 OAM segment loopback cell, Id=0
Received our F5 OAM segment loopback cell, Id=0
OAM: received our F5 OAM segment loopback #0
```

The following sample commands run an F5 OAM segment loopback test from the SHDSL/HDSL2 LIM in slot 4 of a Stinger unit to the CPE connected to port 25 of the LIM.

```
admin> open 1 4
```

```
hdsl2-1/4> oam -e
OAM Entry list
Entry=4743e0, Linear Port=25 vpi=0, vci=3 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=474520, Linear Port=25 vpi=0, vci=4 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=473f60, Linear Port=25 vpi=0, vci=35 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=475da0, Linear Port=26 vpi=0, vci=3 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=477760, Linear Port=26 vpi=0, vci=4 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=475c60, Linear Port=26 vpi=0, vci=35 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=4779e0, Linear Port=27 vpi=0, vci=3 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=477b20, Linear Port=27 vpi=0, vci=4 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=4778a0, Linear Port=27 vpi=0, vci=35 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=478ea0, Linear Port=28 vpi=0, vci=3 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
Entry=478fe0, Linear Port=28 vpi=0, vci=4 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
```

```
Entry=478d60, Linear Port=28 vpi=0, vci=35 state=Up loopTx=0 loopRx=0
Segment Continuity=READY  End2End Continuity=READY isVpc=No
```

```
hdsl2-1/4> oam -l 25 0 35 s 1
hdsl2-1/4> Sending F5 OAM segment loopback cell, Id=0
Received our F5 OAM segment loopback cell, Id=0
OAM: received our F5 OAM segment loopback #0
```

Running F4 and F5 loopback tests using the `atm-oam` profile

To run an F4 or F5 loopback test, you set the parameters in the `loopback-config` subprofile. You can test multiple ATM circuits using a single `atm-oam` profile.

Sample F4 OAM loopback test

The following sample commands configure four end-to-end, F4 loopback tests on slot 10, port 1, VPI 2, with a time interval of 30 minutes between each test and two cells per test:

```
admin> new atm-oam {{ 1 10 1} 2 32769}
admin> set loopback-config enabled = yes
admin> set loopback-config loopback-level = end-to-end
admin> set loopback-config loopback-cells-per-test = 2
admin> set loopback-config total-loopback-tests = 4
admin> write
```

Sample F5 OAM loopback test

The following sample commands configure four end-to-end, F5 loopback tests on slot 10, port 1, VPI 2, and VCI 35 with a time interval of 30 minutes between each test and two cells per test:

```
admin> new atm-oam {{ 1 10 1} 2 35}
admin> set loopback-config enabled = yes
admin> set loopback-config loopback-level = end-to-end
admin> set loopback-config loopback-cells-per-test = 2
admin> set loopback-config total-loopback-tests = 4
admin> set loopback-config test-iteration-interval = 30
admin> write
```

Testing multiple ATM circuits

The following examples illustrate how multiple ATM circuits can be tested by means of a single profile. Assume that the shelf value is 1 and the slot value is 15.

- To perform an F4 test on all VPIs on port 2, enter the following at the command-line interface:

  ```
  admin> new atm-oam {{ 1 15 2} 32768 32769}
  admin> write
  ```

  Then, when you configure the `loopback-config` subprofile, the test is run on all the ATM circuits configured for the port.

- To perform an F4 test on all VPIs for all ports on slot 15, enter the following at the command-line interface:

  ```
  admin> new atm-oam {{ 1 15 0} 32768 32769}
  admin> write
  ```

  Then, when you configure the `loopback-config` subprofile, the test is run on all the ATM circuits on slot 15.

- To perform an F5 test on all VCIs with VPI 3 on port 2 of slot 15, enter the following at the command-line interface:

  ```
  admin> new atm-oam {{ 1 15 2} 3 32768}
  admin> write
  ```

  Then, when you configure the `loopback-config` subprofile, the test is run on port 2 of slot 15 for all ATM circuits with VPI 3.

- To perform an F5 test on all configured VPI-VCI pairs on port 2, enter the following at the command-line interface:

  ```
  admin> new atm-oam {{ 1 15 2} 32768 32768}
  admin> write
  ```

- To perform an F5 test on all VPI-VCI pairs for all ports on slot 15, enter the following at the command-line interface:

  ```
  admin> new atm-oam {{ 1 15 0} 32768 32768}
  admin> write
  ```

  Then, when you configure the `loopback-config` subprofile, the test is run on all VPI-VCI pairs on slot 15.

Specifying that a trap is sent

The `error-threshold` parameter in the `loopback-config` subprofile enables the Stinger unit to generate a trap when the number of lost cells is greater than or equal to a specified threshold value. For example:

```
admin> set loopback-config error-threshold = 1
```

The `oam-timeout-trap-enabled` parameter in the `trap` profile enables and disables an OAM timeout trap and the `error-threshold` parameter. To enable the trap, specify `yes`. To disable the trap (the default), specify `no`.

Using the `oamloop` command

The `oamloop` command sends ATM OAM loopback cells on an ATM interface, to obtain information about the results of the looped cells.

Note Running several prolonged concurrent OAM test sessions using the `oamloop` command sometimes causes inaccurate test results. To prevent this situation, Lucent Technologies strongly recommends that you conduct only one OAM test session at a time using this software version. If you must conduct simultaneous OAM test sessions, limit them to no more than eight. Additionally, avoid running the test unnecessarily for prolonged periods.

You enter the `oamloop` command with options to specify the type of cells to transmit, the shelf number (always 1), the slot where the trunk module is located, and the virtual path identifier (VPI) and virtual channel identifier (VCI) on which to send the cells. You can optionally specify the number of cells and the transmission interval. For details about `oamloop` syntax, see the *Stinger Reference*.

For example, the following command sends 10 end-to-end loopback cells to a trunk module in slot 2 on VPI 1, VCI 32:

```
admin> oamloop -c 10 -e 1 2 1 32
Received our End2End OAM loopback cell, Id=9
Received our End2End OAM loopback cell, Id=10
Received our End2End OAM loopback cell, Id=11
Received our End2End OAM loopback cell, Id=12
Received our End2End OAM loopback cell, Id=13
Received our End2End OAM loopback cell, Id=14
Received our End2End OAM loopback cell, Id=15
Received our End2End OAM loopback cell, Id=16
Received our End2End OAM loopback cell, Id=17
Received our End2End OAM loopback cell, Id=18
--- OAM loop statistics ---
10 cells transmitted, 10 cells received, 0% cell loss
```

Configuring loopback on OC3, E3, and DS3 interfaces

To run a loopback test on the interface of an OC3-ATM, E3-ATM, or DS3-ATM trunk module, set the `loopback` parameter in the `line-config` subprofile of the `oc3-atm`, `ds3-atm`, or `e3-atm` profile. While the interface is looped back, normal data traffic is interrupted.

Specify one of the following values for the `loopback` parameter:

- `no-loopback` (the default)—The line is operating normally and is not running loopback testing.
- `facility-loopback`—This line is put in loopback mode, and the trunk module returns the signal it receives on its line.
- `local-loopback`—This line is put in loopback mode, and the trunk receive path is connected to the transmit path at the multiplexer. The transmitted signal is still sent to the network as well.

The procedure for running a loopback test on the OC3-ATM, DS3-ATM, and E3-ATM trunk modules are similar. For more information, see the module configuration guide for your device. The following sample commands activate a local loopback on an OC3-ATM trunk line:

```
admin> read oc3-atm {1 17 1}
admin> set loopback = local-loopback
admin> write
```

To stop the loopback, proceed as follows:

```
admin> set line loopback = no-loopback
admin> write
```

The `oc3-atm-stat`, `ds3-atm-stat`, and `e3-atm-stat` profiles display the status of the trunk lines. For an explanation about the parameters in these profiles, see the module configuration guide for your device or the *Stinger Reference*.

Displaying OAM entries

You can use the oam -e and oam -q commands enable you to display OAM entries in a Stinger system.

The `oam -e` command displays details about OAM entries that exist in the system. You can display OAM entries, for a specific slot, port, VPI, or VCI. The `oam -e` command reports a large number of OAM entries. The `oam -q` command enables you to display subsets of the OAM entries reported by the `oam -e` command.

The output of these commands reports the following information:

Element		Indicates
`OAM test information`		This information is reported in the following sample format: `F4-SEG (8373e890:3507.1.3)`. In this sample output, the first group of characters indicate whether the test is an F4 or F5 test and whether the test is a segment or end-to-end test. The next group of characters (preceding the colon), `8373e890`, is not for administrative use. The second group of numbers (after the colon), `3507`, is the internal trunk identification number. The last set of numbers, `1.3`, represents the VPI and VCI values.
`E2E`		Applicable only for F5 OAM entries. Whether an end point is a segment (`FALSE`) or end-to-end point (`TRUE`).
`loop`		Number of transmitted (`Tx`) and received (`Rx`) loopback cells.
`F`		Fault state. Possible fault states are: ■ `NORMAL`—No faults are detected. ■ `AIS`—an alarm indication signal cell is received. ■ `RDI`—a remote defect indication (`RDI`) cell is received. ■ `LOC`—loss of continuity. An LOC condition is detected when the system is monitoring continuity check cells and no cells are received for a specified time period.
`CC`		Continuity check information.
	`G`	Continuity check cell generation state. Possible states are stopped and activate.
	`R`	Entity that requested the continuity check activation. Possible values are: ■ `NONE`—the continuity check is stopped or is active as a result of an activation request from the network peer. ■ `CLI`—the continuity check was initiated using the `oam -c|C` command. ■ `PROF`—the continuity check was initiated by setting parameters in the `atm-oam` profile. If the continuity check direction is reset to `Default` (that is, the test is stopped), this field reports the value `NONE`.

Element	Indicates
`M`	Continuity check monitoring state. Possible states are stopped, normal, and LOC.
`A`	Continuity check activation/deactivation state. Possible states are ready, active, activating (`ACTG`), and deactivating (`DEACTG`).
`D`	Provisioned direction.

Using the `oam -e` command

The syntax of the `oam -e` command is as follows:

`oam -e` [***`slot`***] [***`port`***] [***`vpi`***] [***`vci`***]|**`-p`**

Following is an example of an F4 segment flow. The number of transmitted loopback cells is 0 and the number of received (Rx) loopback cells is 0. The fault state is normal (no fault). Continuity cell generation is stopped, monitoring for continuity cells is stopped, and the continuity check activating state is ready (not active). The provisioned direction is set to default and the current direction is also default.

```
F4-SEG(8373e890:3507.1.3) loop(Tx=0, Rx=0)
  8373e890:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))
```

Following is an example of an F4 end-to-end output:

```
F4-E2E(8373eaa0:3507.1.4) loop(Tx=0, Rx=0)
  8373eaa0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))
```

Following is an example of an F5 terminating connection output. It has both segment and end-to-end flows. The `SEG` line represents the segment flow and the `E2E` line represents the end-to-end flow.

```
F5(8373e6b0:3507.1.102) E2E=TRUE loop(Tx=0, Rx=0)
  SEG:8373e6b0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY:D(P=DEF C=DEF))
  E2E:8373e6b0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY:D(P=DEF C=DEF))
```

Using the `oam -q` command

You can use the `oam -q` command with the following arguments:

Argument	Displays
`fault normal`	OAM entries with no defects.
`fault ais`	OAM entries with AIS defects.
`fault rdi`	OAM entries with RDI defects.
`fault loc`	OAM entries with LOC defects.
`cc generating`	OAM entries generating CC cells.
`cc monitoring`	OAM entries monitoring CC cells.
`cc activating`	OAM entries in activating state.
`cc deactivating`	OAM entries in deactivating state.

Displaying entries with no defects

To display entries with no defects, use the `oam -q fault normal` command. For example:

```
admin> oam -q fault normal
OAM Entry list
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F4-SEG(836ebc10:2.0.3) loop(Tx=0, Rx=0)
   836ebc10:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))

F4-E2E(836d0ac0:2.0.4) loop(Tx=0, Rx=0)
   836d0ac0:F=NORMAL CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))

F5(82048320:3505.0.100) E2E=FALSE loop(Tx=0, Rx=0)
   SEG:82048320:F=LOC CC(R=NONE:G=ACTIVE M=LOC A=ACTIVE:D(P=DEF C=2WAY))

Total matching Oam Channels=3
```

Displaying AIS defects

To display entries with AIS defects, use the `oam -q fault AIS` command. For example:

```
admin> oam -q fault ais
OAM Entry list
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F4-SEG(836998a0:3505.0.3) loop(Tx=0, Rx=0)
   836998a0:F=AIS CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))

Total matching Oam Channels=1
```

Displaying RDI defects

To display entries with RDI defects, use the `oam -q fault RDI` command. For example:

```
admin> oam -q fault rdi
OAM Entry list
F: fault state
CC: continuity information
```

```
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F4-E2E(836999e0:3505.0.4) loop(Tx=0, Rx=0)
   836999e0:F=RDI CC(R=NONE:G=STOP M=STOP A=READY D(P=DEF C=DEF))
Total matching Oam Channels=1
```

Displaying LOC defects

To display entries with LOC defects, use the `oam -q fault loc` command. For example:

```
admin> oam -q fault loc
OAM Entry list
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F5(82048320:3505.0.100) E2E=FALSE loop(Tx=0, Rx=0)
   SEG:82048320:F=LOC CC(R=NONE:G=ACTIVE M=LOC A=ACTIVE:D(P=DEF C=2WAY))
```

Displaying continuity check cell generation

To display OAM entries generating continuity cells, use the `oam -q cc generating` command. For example:

```
admin> oam -q cc generating
Matching OAM Entry List
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F5(82048320:3505.0.100) E2E=FALSE loop(Tx=0, Rx=0)
   SEG:82048320:F=LOC CC(R=NONE:G=ACTIVE M=LOC A=ACTIVE:D(P=DEF C=2WAY))

Total matching Oam Channels=1
```

Displaying OAM entries for monitoring continuity check cells

To display OAM entries for monitoring CC cells, use the `oam -q cc monitoring` command. For example:

```
admin> oam -q cc monitoring
    Matching OAM Entry List
```

```
F: fault state
CC: continuity information
R: Continuity requester
G: CC generation state
M: CC monitoring state
A: CC Activation/Deactivation state
D: Direction. P: provisioned direction. C: current direction

F5(82048320:3505.0.100) E2E=FALSE loop(Tx=0, Rx=0)
   SEG:82048320:F=LOC CC(R=NONE:G=ACTIVE M=LOC A=ACTIVE:D(P=DEF C=2WAY))

Total matching Oam Channels=1
```

Fault reporting and alarms

Stinger systems use SNMP traps to report OAM changes for an OAM end point. Stinger systems implement the standard OAM fault protocol, with the exception that data cells and loopback cells do not clear alarms.

Fault and defect conditions and continuity check activation and deactivation events are reported through alarms.

The following conditions are detected and reported by the system:

- RDI defect raise/clear
- LOC defect raise/clear
- AIS defect raise/clear
- NONE clear any of the above defects, clear most recent raised defect. When raised, it indicates that the endpoint flow does not have any defects.

These following events related to continuity check activation and deactivation are reported through alarms:

- CC-ACTIVE indicates that continuity check has activated successfully
- CC-READY indicates that continuity check is in ready/inactive state
- CC-RX-DENIED indicates that a NAK was received from the peer
- CC-TX-DENIED indicates that we sent a NAK to the peer
- CC-ACT-TIMEOUT indicates that the activation request timed out
- CC-DEACT-TIMEOUT indicates that the deactivation request timed out

Traps for AIS/RDI and continuity check alarms

To configure the Stinger unit to send following OAM traps for defect and continuity check events, set the `oam-timeout-trap-enabled` in the `trap` profile to yes:

Trap	OAM event
`atmOamDefectSegTrap`	Segment OAM Defect—a segment flow reports an AIS, LOC, or RDI defect.
`atmOamDefectE2eTrap`	End-to-end OAM Defect—an end point flow reports an AIS, LOC, or RDI defect.

Internal and external diagnostic tests

You can use an internal diagnostic test (IDT) to identify problems that might occur during data transfer between the control module and LIMs. If you activate an IDT for a line, the control module generates a data stream internally and sends it to that line. The line loops back the data to the control module. The control module then analyzes the data and reports the statistics in the `line-diag-stat` profile. (You can also use SNMP to perform internal diagnostic testing. For additional information, see the *Stinger TAOS 9.1-142 Cumulative Release Note.)*

The external diagnostic test (EDT) feature puts the DSL modem into loopback mode. If a complete circuit is established, you can then send a data stream from an external device (such as a network traffic generator) through the trunk to the modem. The modem loops back the data stream to the external device, where it can be analyzed.

Running an internal diagnostic test (IDT)

The Stinger unit creates a `line-diag` profile for each interface or port, which you use to run internal diagnostic tests and bit-error rate tests (BERTs). You use the `idt-enable` and `idt-num-of-msg` parameters in the `line-diag` profile to run an internal diagnostic test. The system also creates a read-only `line-diag-stat` profile, which shows the status and statistics for these diagnostic tests.

The Stinger unit also supports external diagnostic testing (see “Running an external diagnostic test (EDT) feature” on page 12-23). The loopback type for running internal diagnostic tests is digital and is not affected by the loopback type configured for external diagnostic testing.

Following are the parameters in the `line-diag` and `line-diag-stat` profiles that relate to internal diagnostic testing. The parameters are shown here with default values:

```
[in LINE-DIAG/{ shelf-1 slot-12 1 }]
idt-enable = no
idt-num-of-msg = 1000
```

```
[in LINE-DIAG-STAT/{ shelf-1 slot-12 1 }]
idt-operation-state = stopped
idt-send-count = 0
idt-recv-count = 0
idt-error-counter = 0
```

Parameter	Setting
`idt-enable`	Enable/disable internal diagnostic testing on the line. Specify `yes` to enables internal diagnostic testing on the line or `no` (default) to disable it.
`idt-num-of-msg`	Number of messages that the control module sends to the line. Each message corresponds to four ATM cells. The data payload of each message consists of sequential numeric data. By default, the value of this parameter is set to `1000`. Enter a value from `0` through `10000`.

Parameter	Setting
idt-operation-state	Status of an internal diagnostic test on the line. (This parameter is read-only.) By default, this parameter shows stopped (the test is inactive). When the line is undergoing internal diagnostic testing, this parameter shows active.
idt-send-count	Number of messages sent from the LIM to the control module. (This parameter is read-only.)
idt-recv-count	Number of messages received by the control module. (This parameter is read-only.)
idt-error-counter	Number of erroneous messages received by the control module. (This parameter is read-only.)

The following sample commands instruct the Stinger unit to run an internal diagnostic test on port 1 of slot 2:

```
admin> read line-diag {1 2 1}
admin> set idt-enable = yes
admin> set idt-num-of-msg = 1000
admin> write
```

To view the results of the internal diagnostic test, display the contents of the line-diag-stat profile, as shown in the following example:

```
admin> read line-diag-stat {1 2 1}
admin> list
[in LINE-DIAG-STAT/{ shelf-1 slot-2 1 }]
physical-address* = { shelf-1 slot-2 1 }
bert-operation-state = stopped
idt-operation-state = stopped
bert-error-counter = 0
idt-send-count = 1000
idt-recv-count = 1000
idt-error-counter = 0
```

If you attempt to modify the idt-enable parameter while an internal diagnostic test is active for a line, the system generates a warning message as follows:

```
admin> set idt-enable = no
admin> write
LOG warning, Shelf 1, Controller-1, Time: 20:12:30--
IDT Test for {1 3 1} is running !
LINE-DIAG/{ shelf-1 slot-3 1 } written
```

Occasionally, when you are running an internal diagnostic test (IDT), the idt-recv-count parameter might report that the number of messages received is less than the number transmitted. Such a result is an anomaly and does not necessarily indicate faulty hardware.

Running an external diagnostic test (EDT) feature

You configure a line for external diagnostic testing by putting it loopback mode. The loop-back parameter in the line-config subprofile for a line enables external diagnostic testing.

```
[in HDSL2/{ shelf-1 slot-2 1 }:line-config]
loop-back = none
```

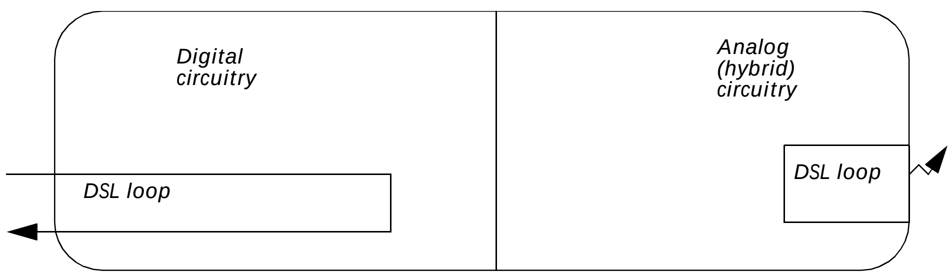
Parameter	Setting
`loop-back`	Whether the line passes normal data or is in loopback mode. Specify one of the following values: ■ `none` (default)—The line is not used for loopback testing and passes normal data. ■ `analog`—The line is enabled for analog loopback testing. (You might need to terminate the DSL line with a 150-ohm resistor.) ■ `digital`—The line is enabled for digital loopback testing.

Note External diagnostic tests in analog mode do not work for the 24-port ADSL LIM if a CPE device is connected and trained up. External diagnostic testing does work in either digital mode or analog mode if no CPE device is attached.

Digital loopback

When a line is enabled for digital loopback, data is looped only at the digital circuitry of the modem. Data does not reach the analog circuitry, as shown in Figure 12-1.

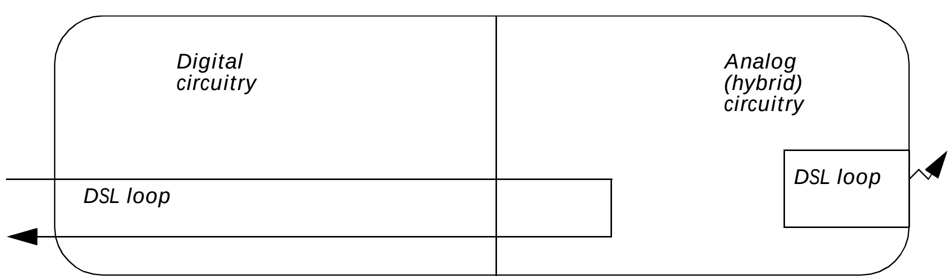
Figure 12-1. Data passing through a modem's digital circuitry



Analog loopback

When the line is enabled for analog loopback, the data passes from the digital circuitry to analog circuitry and is then looped back, as shown in Figure 12-2. Analog loopback tests more circuitry.

Figure 12-2. Data passing through a modem's digital and analog circuitry



The following sample commands put a line into analog loopback mode:

```
admin> read hdsl2 {1 1 1}
HDSL2/{ shelf-1 slot-1 1 } read
admin> set loop-back = analog
admin> write
```

Running built-in self tests (BISTs) on DSL ports

This test verifies proper operation of a specific DSL port. You can run a BIST using the command-line interface or by way of SNMP.

Supported LIMs

This capability is available on the following LIMs with ADSL2plus capability:

- 72-port ADSL2+ LIM
- 48-port ADSL2+ LIM
- 48-port low-power LIM

Enabling the built-in self test using the command-line interface

To enable the BIST test, set the `bist-enabled` parameter in `line-diag` profile to `yes`. For example:

```
[in LINE-DIAG/{ shelf-1 slot-1 1 }]
admin> set bist-enabled = yes
```

The port test runs for less than 15 seconds. You cannot run the test on a line that is enabled.

If you attempt to run the BIST test while a line is enabled, the system generates the following error message:

```
LOG error, Shelf 1, Slot 14, Time: 17:07:03--
  Line cannot be enabled during line diag
```

The `bist-operation-state` and `bist-result` parameters in the `line-diag-stat` profile report the status and result of the port test, respectively. For example:

```
admin> get line-diag-stat {1 14 1}
[in LINE-DIAG-STAT/{ shelf-1 slot-14 1 }]
...
bist-operation-state = active
bist-result = none
```

Parameter	Specifies
`bist-operation-state`	Status of the built-in self test. Possible values are: ■ `active`—BIST operation is active ■ `stopped`—BIST operation is stopped.
`bist-result`	Result of the built-in self test. Possible values are: ■ `none`—BIST is disabled. ■ `pass`—the port test was successful. ■ `fail`—the port test failed.

Relay alarm testing

You can use the debug-level `inputrelaytest` command to simulate the status of relays to generate relay alarm and trap conditions for testing.

When you use the `inputrelaytest` command, actual alarms on the system associated with relays are overwritten by this command and are not restored until you reset the system. The actual relay alarm functions revert to normal operation when you disable the test.

Overview of the `inputrelaytest` command

The command-line interface help information for the `inputrelay` command provides syntax information, as shown below:

```
admin> inputrelaytest -h
   Usage: inputrelaytest [ -p | -i |  -m | -(0-7) | -t | -s -h]
   -p : Toggle poll test/external input relay
   -i : Initialize the test
   -m : Toggle test input relay open/close mode
   -(0-7) : Set test input relay status (0=all)
   -t : Show test input relay status
   -s : Show external input relay status
   -h : help message
```

Argument	Description
`-p`	Enables/disables the input relay alarm test. When you have completed the test, you must enter the `inputrelaytest -p` command again to return to external input relay alarm mode.
`-i`	Reinitializes the test.
`-m`	Toggles the close or open setting when you set an individual relay.
`-0`	Specifies that all relays are used for testing.
`-1 through -7`	Specifies an individual for testing.
-t	Shows the simulation test input relay status.
`-s`	Shows the external input relay status.

Examples using the `inputrelaytest` command

The following sample configure an `alarm` profile, configure a `trap` profile, and runs an input relay test.

The following commands configure the unit to generate an alarm by illuminating the major LED when the input relays are closed:

```
admin> new alarm relay
admin> set enabled = yes
admin> set event = input-relay-closed
admin> set physical-address = { any-shelf any-slot 0 }
admin> set action alarm-led-major = on
```

```
admin> write
```

The following commands create the `trap` profile for the specified events:

```
admin> new trap relay
admin> community-name = public
admin> host-address = 135.17.134.31
admin> host-port = 2345
```

The following commands enable the test mode. During the test, the system generates a warning log message every minute.

```
admin> inputrelaytest -p
Test input relay alarm is enabled
Remember to run "inputrelaytest -p" again to return to external input relay
alarm mode when finish the test!

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fri May 23 10:35:05 2003 - ALARM: Input Relay No. 1 OPEN

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fri May 23 10:35:05 2003 - ALARM: Input Relay No. 2 OPEN

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fri May 23 10:35:05 2003 - ALARM: Input Relay No. 3 OPEN

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fri May 23 10:35:05 2003 - ALARM: Input Relay No. 4 OPEN

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fri May 23 10:35:05 2003 - ALARM: Input Relay No. 5 OPEN

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fri May 23 10:35:05 2003 - ALARM: Input Relay No. 6 OPEN

LOG emergency, Shelf 1, Controller-1, Time: 10:35:05--
  Fry 23 10:35:05 2003 - ALARM: Input Relay No. 7 OPEN
```

The following commands close all relays:

```
admin> inputrelaytest -m
Set relay CLOSED mode
admin> inputrelaytest -0
All test input relay closed
LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 1 CLOSED

LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 2 CLOSED

LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 3 CLOSED

LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 4 CLOSED
```

```
LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 5 CLOSED

LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 6 CLOSED

LOG emergency, Shelf 1, Controller-1, Time: 10:45:36--
  Fri May 23 10:45:36 2003 - ALARM: Input Relay No. 7 CLOSED
```

The following commands simulate an individual input relay, relay 1, as open. The system response is shown below:

```
admin> inputrelaytest -m
Set relay OPEN mode
```

```
admin> inputrelaytest -1
Test input relay 1 open
admin>
LOG emergency, Shelf 1, Controller-1, Time: 10:46:47--
  Fri May 23 10:46:47 2003 - ALARM: Input Relay No. 1 OPEN
```

Displaying the status of input relays

The following sample command shows the status of the input relays:

```
admin> inputrelaytest -t
Test Input Relay Status
Item  Status
------------------------
 1    OPEN
 2    OPEN
 3    OPEN
 4    OPEN
 5    OPEN
 6    OPEN
 7    OPEN
```

The following sample commands shows the status of the external input relays:

```
admin> inputrelaytest -s
External Input Relay Status
Item  Status
------------------------
 1    OPEN
 2    OPEN
 3    OPEN
 4    OPEN
 5    OPEN
 6    OPEN
 7    OPEN
```

Configuring a bit-error rate test (BERT)

The bit-error rate test is an end-to-end test that evaluates the quality of a line. If enabled, an internal bits generator sends all-one bits for the duration specified to either a CPE or through an internal loop terminal node.

If the CPE and Stinger unit are connected and both are enabled for bit-error rate testing, the test runs between the two systems. If the test is enabled, the Stinger unit initiates the test by sending an embedded operations channel (EOC) message to the CPE to place its port into loopback mode. The CPE responds with an acknowledgement. Once the test has completed, the CPE takes the port out of loopback mode and the port resumes normal operations.

If the Stinger unit and the CPE are not connected, the test runs within the 150-ohm DSL loop termination node on the port in the Stinger unit. If enabled, the port enters an analog loopback mode and undergoes bit-error rate testing. While undergoing the test, the port cannot pass data. Once the BERT has completed, the port is ready to train to a remote CPE.

Note Local and end-to-end BERTs work for the SHDSL/HDSL2 LIM operating in HDSL2 mode, but not for LIMs operating in SHDSL mode.

To run a BERT operation, set the `bert-enable` parameter in the `line-diag` profile for the line to `yes`. The test counts bit errors continuously for the interval specified by the `bert-timer` parameter.

The following sample commands enable a BERT on port 1 in slot 4 for 5 minutes:

```
admin> read line-diag {1 4 1}
admin> set bert-timer = 5
admin> set bert-enable = yes
admin> write
```

The `line-diag-stat` profile includes parameters that report the status of the line and the result of the test. To determine the status of the BERT, use the `get` command to display the setting for the `bert-operation-state` parameter. For a list of all the possible states of the line, see the *Stinger Reference*. The BERT operation is complete if the value for the `bert-operation-state` parameter is `stopped`. For example:

```
admin> get line-diag-stat {1 4 1} bert-operation-state
[in LINE-DIAG-STAT/{ shelf-1 slot-4 1 }:bert-operation-state]
bert-operation-state = stopped
```

To show any BERT errors detected, display the setting for the `bert-error-counter` parameter. For example:

```
admin> get line-diag-stat {1 4 1} bert-error-counter
[in LINE-DIAG-STAT/{ shelf-1 slot-4 1 }:bert-error-counter]
bert-error-counter = 0
```

Testing DSL copper loops

The following features allow for testing of DSL copper loops. You can perform more comprehensive line tests by using a Stinger Copper Loop Test (CLT) module. For more information, see the *Stinger Copper Loop Test (CLT) Module Guide*.

Stinger systems installed with ADSL2+ capable LIMs also support single-ended loop (or line) testing (SELT) and double-ended loop testing (DELT). These capabilities are described in the *Stinger ADSL Annex A Line Interface Module (LIM) Guide for LIMs with ADSL2+ Capability* or in the *Stinger TAOS 9.7.2 Release Note*.

The galvanic isolation feature disconnects up to 48 ports on a Stinger line-interface module (LIM), leaving the lines open for testing. With the multiple port tone generation feature, you can send a trace tone to up to 48 ports simultaneously. The tone is obtained from an external generator connected to the external test terminal on a path selector module (PSM) or copper loop test (CLT) module.

You can use the `line-tests` profile or the `isolate` and `gen-tone` commands to perform these tests.

Using the `line-tests` profile

Each LIM has an associated `line-tests` profile. You use the `line-tests` profile to activate both the galvanic isolation and multiport tone tests. Following are the `line-tests` parameters with their default values:

```
[in LINE-TESTS]
physical-address* = { shelf-1 slot-5 0 }
clt-slot-number = slot-13
start-port = 0
end-port = 0
port-activation-array = [ no no no no no no no no no no no no no no +
port-status = [ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0+
specific-ports = no
test-type = gal-iso
test-terminal = external-tester-terminal
activate-test = no
```

Parameter	Heading
`physical-address`	Physical address of the LIM associated with this profile.
`clt-slot-number`	Slot number of the CLT module or PSM installed in the Stinger unit.
`start-port`	First port to be isolated during test. This parameter is valid only if `specific-ports` is set to `no`.
`end-port`	Last port to be isolated during test. All ports between `start-port` and `end-port` are isolated. This parameter is valid only if `specific-ports` is set to `no`.
`port-activation-array`	Ports that are isolated. A value of `yes` isolates the port or connects it to a tone generator. A value of `no` does not isolate or connect the port. This parameter is valid only if `specific-ports` is set to `yes`.
`port-status`	Status of each port on the LIM. A value equal to the slot number of the LIM indicates that the port is isolated or connected to a tone generator. A value of 0 indicates the port is not isolated or connected to a tone generator.
`specific-ports`	Whether port activation is controlled by the `port-activation-array` (`specific-ports` is set to `yes`).
`test-type`	Type of test. Specify `gal-iso` or `tone-gen`.

Parameter	Heading
test-terminal	CLT module or PSM terminal where the test tone is applied. Specify external-tester-terminal or aux-tester-terminal.
activate-test	Enable/disable a test. A value of yes disconnects any existing calls and begins the test. A value of no reconnects any disconnected calls and stops the test.

Galvanic isolation test

You activate a galvanic isolation test by configuring the line-tests profile or by using the isolate command.

Using the line-tests profile

To isolate ports 3 through 5 of a LIM in slot 5, proceed as follows:

admin> **read line-tests {1 5}**

admin> **set start = 3**

admin> **set end = 5**

admin> **set activate = yes**

admin> **write**

As the lines are disconnected, you receive a series of error messages. For example:

```
LOG warning, Shelf 1, Slot 5, Time: 11:12:59--
[1/5/3/0] Network Problem, Cause code 001

LOG warning, Shelf 1, Slot 5, Time: 11:12:59--
[1/5/3/0] Network Problem, Cause code 002
```

If you list the line-tests profile again, the port-status parameter reports which ports are isolated. For example:

```
port-status = [ 0 0 5 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 +
```

Ports 3 through 5 remain disconnected until you set the activate-test parameter to no.

You can also select ports individually. To isolate only ports 3 and 9 on a LIM, proceed as follows:

admin> **set port-activation 3 = yes**

admin> **set port-activation 9 = yes**

admin> **set specific-ports = yes**

admin> **set activate-test = yes**

admin> **write**

To stop either test proceed as follows:

admin> **set activate-test = no**

admin> **write**

The system generates log messages as the tested lines are reconnected.

Using the `isolate` command

You use the `isolate` command to isolate either a range of ports or a list of individual ports. Its syntax is as follows:

- For a range of ports:

  `isolate` ***`shelf slot start-port - end-port`***

- For individual ports:

  `isolate` ***`shelf slot p1 p2`*** **`......`**

- To deactivate the test:

  `deisolate` ***`shelf slot`***

For example, to isolate ports 3 through 5 on a LIM in slot 5, proceed as follows:

```
admin> isolate 1 5 3 - 5
```

To isolate ports 3 and 9 only:

```
admin> isolate 1 5 3 9
```

To stop the test:

```
admin> deisolate 1 5
```

Multiport tone generation test

By connecting an external test tone generator to the external or auxiliary port on the CLT module or PSM, you can activate a multiport tone generation test by using the `line-tests` profile or `gen-tone` command.

Using the `line-tests` profile

The following sample commands apply a test tone to ports 3 through 5 of a LIM in slot 5 using a tone generator connected to the auxiliary terminals of the CLT module:

```
admin> set start = 3
admin> set end = 5
admin> set test-type = tone-gen
admim> set test-terminal = auxillary-tester-terminal
admin> set activate = yes
admin> write
```

To perform the same test on ports 3 and 9, proceed as follows:

```
admin> set specific-ports = yes
admin> set port-activation 3 = yes
admin> set port-activation 9 = yes
admin> set test-type = tone-gen
admim> set test-terminal = auxillary-tester-terminal
admin> set activate = yes
admin> write
```

To stop either test, proceed as follows:

```
admin> set activate-test = no
```

admin> **write**

Using the `gen-tone` command

You can use the `gen-tone` command to apply test tones on either a range of ports or a list of individual ports. Its syntax is as follows:

- For a range of ports:

  gen-tone *shelf slot* ext|aux *startport* - *endport*
- For individual ports:

  gen-tone *shelf slot* ext|aux *p1 p2* ......
- To deactivate the test:

  degen-tone *shelf slot*

For example, to connect test tones to ports 3 through 5 on a LIM in slot 5 using the auxiliary port:

admin> **gen-tone 1 5 aux 3 - 5**

To connect test tones to ports 3 and 9 only using the external port, enter the following command:

admin> **gen-tone 1 5 ext 3 9**

To stop the test, enter the following command:

admin> **degen-tone 1 5**

Using Debug Commands

A

Note Every attempt has been made to confirm that this chapter correctly describes the functionality and output of the Stinger debug commands. However, although debug mode can be a very valuable troubleshooting tool for anyone, its primary focus is on the requirements of Lucent Technologies development engineers. For this reason, Lucent does not guarantee the completeness of the list of debug commands published for a given release, or descriptions of their functionality.

Caution Under most circumstances, debug commands are not required for correct operation of a Stinger unit. Under some circumstances, these commands might produce undesirable results. Use the following information with caution. Contact Lucent OnLine Customer Support at `http://www.lucent.com/support` with any questions or concerns.

Enabling debug permissions

Before you can access the debug commands, you must log into the Stinger unit with a `user` profile that specifies debug privileges. The following commands enable debugging privileges:

admin> **read user admin**

admin> **set allow-debug = yes**

admin> **write**

The `allow-debug` parameter is hidden; it does not appear in the interface.

Note When you are logged into a Stinger unit with debug privileges, the interface might display normally unavailable parameters and commands, some of which are not configurable in certain situations. Therefore, Lucent Technologies recommends that you create a special profile for debugging purposes, and use that profile only when you are debugging the Stinger unit.

Enabling debug output

To enable debug output for all commands on the system or on a module, use the `debug` command as in the following examples.

To enable debug output:

```
admin> debug on
Diagnostic output enabled
```

To disable debug output:

```
admin> debug off
Diagnostic output disabled
```

When you enable debug output, the Stinger unit displays the debug messages on the terminal screen.

Setting debug levels

Debug levels vary depending on the command. But generally, the lower you set the debug level, the fewer messages the Stinger unit displays. Setting the debug level to `0` (zero) disables the debug output for the command.

Set the debug level with the `-t` toggle option, as in the following examples:

```
admin> ifmgr -t 0
ifmgr debug level is now 0 (disabled)
```

```
admin> ifmgr -t 4
ifmgr debug level is now 4 (enabled)
```

Getting online help for debug commands

To see a list of all commands, including the debug commands, enter a question mark (?) at the command prompt, as in the following example:

```
admin> ?
?                               ( user )
acct-failsafe                   ( debug )
...
```

To get basic help for a debug command, enter the `help` command, followed by the name of the debug command, as in the following example:

```
admin> help ifmgr
ifmgr usage: ifmgr [-r <vRouterName>] -option
             -d  (d)isplay interface table entries.
             -d <ifNum>  (d)etails of given i/f table entry.
             -n <conn profile name> display slot and ifNum of conn.
```

```
ifmgr [up|down] [ifNum|ifName]
```

Summary of common debug commands

Debug commands allow you to monitor and diagnose different areas of Stinger functionality. Table A-1 lists common debug commands. To use any of these commands, you must have debug permissions and the debug facility enabled. For more information on debug permissions see “Enabling debug permissions” on page A-1. For more information on enabling the debug facility see “Enabling debug output” on page A-2.

Table A-1. Commonly used debug commands

Command	Section
`portinfo`	“Displaying Stinger port information” on page A-18
`telnetdrestart`	“Resetting TCP port 23” on page A-18
`revision`	“Displaying the serial numbers” on page A-18
`update`	“Modifying Stinger unit functionality” on page A-19
`acct-failsafe`	“Using the `acct-failsafe` debug command” on page A-19
`radservdump`	“Verifying settings in the `external-auth` profile” on page A-20
`radsessdump`	“Displaying RADIUS accounting session status” on page A-21
`radstats`	“Displaying RADIUS accounting session status” on page A-21
`netif`	“Displaying network interface mappings” on page A-23
`eoc`	“Using the EOC command on ADSL interfaces” on page A-24
`controller-redundancy`	“Displaying the status of redundant control modules” on page A-25
`ifmgr`	“Displaying interface management information” on page A-26

System and devices debugging

The following sections describe the commands used for system and devices debugging.

Displaying IP control module network processor information

The syntax for the `info np` command is as follows:

`info np` *`option`*

Setting for *option*	Kind of information to display
`addr`	Payload and address information.
`arp [`*`vrtr-name`*`]`	ARP entries. If a virtual router name is specified on the command line, the command displays only the table of the virtual router. If no virtual router name is specified, the command displays the tables for all virtual routers.
`bridge` *`option group-num`* `[`*`ifnum`*`]`	Bridging information.
`conn [`*`slot`*`|`*`slot ifnum`*`]`	Connection handles. Optional arguments are: ■ *`slot`*—Display statistics only for the specified slot. ■ *`slot ifnumber`*—Display statistics only for the specified interface. You must also specify a slot number.
`did` *`id`*	Contents of Destination ID (DID) table.
`ipqos [`*`ifnum`*`]`	IP QoS information.
`lns`	LNS entries.
`mbl`	Mobile entries.
`mgrp`	Multicast groups.
`psl` *`lport`* `[`*`count`* `[`*`rspslot`*`]`	Logical port scheduler information. *`lportNum`* is the logical port number, a value from 1 through 16. *`count`* specifies the number of entries to display. Valid values are from 1 through 16. If you specify 3 for *`lport`* and 4 for *`count`*, the output shows entries for logical ports 3, 4, 5, and 6. If you specify 14 for *`lport`* and 5 for *`count`*, the output is truncated to show information for logical ports 14, 15, and 16. If no value is specified, the output displays information only for the logical port specified. *`rspslot`* is the RSP slot number—1 or 2. When you specify an RSP slot number, you must also set a nonzero value for *`count`*. If you do not specify a value for *`rspslot`*, the system uses the default RSP slot number.[1]
`qid [`*`que_id`*`] [`*`rspslot`*`]`	Service queue information.
`rsc`	Resources collection list.
`route [`*`vrouter`*`]`	Routing entries. If a virtual router name is specified on the command line, the command displays only the table of the virtual router. If no virtual router name is specified, the command displays the tables for all virtual routers.

Setting for *option*	Kind of information to display
sed *did* [*count*]	Stream editor (SED) parameters indexed by DID. *did count* specifies the number of entries to display.
sid *sid* [*rspslot*]	Scheduler information. *rspslot* is the RSP slot number—1 or 2. If you do not specify a value for *rspslot*, the system uses the default RSP slot number.[a]
spoof [*ifnum*]	Spoof details. To display information only for a specific interface, replace *ifnum* with an interface number.

1. To determine the default RSP slot, use the debug command nphw rspslot [*rspslot*].

Displaying network processor connection information

The info np conn command displays information about connection handles. For example:

```
admin> info np conn
Connection Handles
if   slot act cPort  dPort  type  uctl     udata   qos       dctl     ddata
qos19    2    Y  000001 000001 LIM   0/124    0/123  default   0/124    0/123
default
1     8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864
default
6     8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864
default
7     8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864
default
24    8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864
default
```

To display connection information only for a specific slot, append the slot number to the info np conn command. For example:

```
admin> info np conn 8
if   slot act cPort  dPort  type  uctl     udata   qos       dctl     ddata  qos
1     8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864  default
6     8    Y 000000 000000  GE   0/864    0/864  default    0/864    0/864  default
7     8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864  default
24    8    Y  000000 000000  GE   0/864    0/864  default    0/864    0/864  default
```

To display detailed information for a specific interface, append the slot number and interface number to the info np conn command. For example:

```
admin> info np conn 8 1
Connection Handles
if   slot act cPort  dPort  type  uctl     udata   qos       dctl     ddata
qos
1      8   Y  000000 000000  GE   0/866    0/866  default    0/866    0/866
default
Encaps: ETH/ATM - MTU=1500 (50)

Control & Data Service Queues:
------------------------------
ControlQID                260    Lport              0008
```

```
Scheduler                UBR   CosQueue              1

DataQID                  256    Lport             0110
Scheduler                UBR   CosQueue              3

PDU Ids:
---------
PduID      port     vpi/vci     Tree
065664    0x0208     0/866       3072
000064    0x0300     0/0         3072

VLAN Stacking: EtherType 0x9100

VLAN Configuration       : Vlan is not enabled

Packet Flow configuration: No Packet Flow is attached

Multicast Configuration  : Multicast Server

Bridge Configuration     : Bridging is not enabled

Filter Configuration     : No Filters applied

DID List:
Did            Type          QId       cosQid
500          DATA_EX          257          1
501          CNTL_EX          261          1
```

Obtaining information about routes on the network processor

The `info np route` command reports information about routes on the network processor. For example:

```
admin> info np route
Local If Routes for vrouter:main
Destination        Gateway         IF          DID   needArp
1.1.1.3/32         -               local       000000   N
9.0.0.0/8          -               ie1-1       000000   N
9.9.9.91/32        -               local       000000   N
9.9.9.92/32        -               local       000000   N
12.0.0.0/8         -               ie1         000000   N
12.12.12.12/32     -               local       000000   N
127.0.0.0/8        -               bh0         000000   N
127.0.0.1/32       -               local       000000   N
127.0.0.2/32       -               rj0         000000   N
135.254.196.0/24   210.210.210.1   ie0         000000   N
210.0.0.0/8        -               ie0         000000   N
210.210.210.75/32  -               local       000000   N
224.0.0.0/4        -               mcast       000000   N
224.0.0.1/32       -               local       000000   N
224.0.0.2/32       -               local       000000   N
224.0.0.9/32       -               local       000000   N
224.0.0.13/32      -               local       000000   N
```

```
255.255.255.255/32 -               ie0         000000   N
Route Table for vrouter:main
Destination        Gateway         IF          DID   needArp
1.1.1.0/24         1.1.1.12        wan19       000000   Y
1.1.1.12/32        1.1.1.12        wan19       000000   Y
Total 20 routes <end>
```

To display detailed information for a specific router, append the router name to the `info np route` command. For example:

```
admin> info np route main
Local If Routes for vrouter:main
Destination        Gateway         IF          DID   needArp
1.1.1.3/32         -               local       000000   N
Route Table for vrouter:main
Destination        Gateway         IF          DID   needArp
1.1.1.0/24         1.1.1.12        wan19       000000   Y
Total 2 routes <end>
```

Obtaining detailed information for a DID

The `info np did` *id* command reports information about a specific destination. For example:

```
admin> info np did 43514
Details of  DID : 43514
slot/if   type lport  qid   cos last begin end  sedScp sedlen   mgrp  state
 2/19     D_UNI 0001  8301   5    Y    2    8    0       5     00000000   -

SED Parameters:
----------------
00 00 07 B0 01

FPP Rules:
-------------
Type Learn Tree Act Value   Pattern
MTU    Y   3075  0 00000001 24  8 00054FD7 00000000
MTU    Y   3075  0 00000001 25  7 000A9FAD 00000000
MTU    Y   3075  0 00000001 26  6 00153F59 00000000
MTU    Y   3075  0 00000001 27  5 002A7EB1 00000000
MTU    Y   3075  0 00000001 30  2 0153F587 00000000
MTU    Y   3075  0 00000001 31  1 02A7EB0D 00000000
MTU    Y   3075  0 00000001 32  0 054FD619 00000000

Configuration in NP:
----------------------
RSP Slot: 1
        Transmit Queue Id  : 8301
        Last DID           : Yes
        Begin Delta        : 2
        End Delta          : 8
        SED Script Id      : 0
        SED Script Parameter:
        ----------------------
```

```
        00:00:07:b0:01:00:00:00:00:00:07:b0:01:00:00:00:
        00:00:07:b0:01:00:00:00:00:00:07:b0:01:00:00:00:
        00:00:07:b0:

RSP Slot: 2
        Did 43514 is not initialized
```

Displaying ARP entries

The `info np arp` command displays all ARP entries on the network processor. For example:

```
admin> info np arp
ARP Table for vrouter:
destIp        MAC            if    did
1.1.1.3 00:00:07:b0:01:00   wan-16 40956
```

To display ARP entries only for a specific VRouter, append the VRouter name to the `info np arp` command.

Displaying SED parameters for a DID

The `info np sed` *did* command displays SED parameters for a specified DID. For example:

```
admin> info np sed 43514

DID      SEDparamAddr len parameters(bytestream 0:len)

43514    0x711d5df0   36
00:00:07:b0:01:00:00:00:00:00:07:b0:01:00:00:00:00:00:07:b0:01:00:00:00:00:
00:07:b0:01:00:00:00:00:00:07:b0:
```

Displaying multicast group information

The `info np mgrp` command displays information about multicast groups. For example:

```
admin> info np mgrp
IP Address  MaxMtu  Member  FirstDid   LastDid   LstInList  NdDrain
224.1.1.1   1610      1      12855      12855      12855       No
```

Displaying IP QoS details

You must first enable IP QoS monitoring before using this command. See “Monitoring IP QoS” on page 5-4. for more information.

```
admin> info np ipqos 19
IP QOS monitoring information for IF 19
IP QOS profile: Pav-Pbit
Number of priority     :4          Lowest priority       :1
Default classification :provided   Total Mcast Rules     :0
Classified DIDs        :3          Classification rules  :4

Mapping priority/COS
P[0]=x P[1]=5 P[2]=x P[3]=x P[4]=4 P[5]=3 P[6]=2 P[7]=x

Main DID list
-------------
```

```
DID       Qid      COS    Type
43514     285      5      ucast

Classified DID list
-------------------
DID       Qid      COS    Type
43516     282      2      ucast
43518     283      3      ucast
43520     284      4      ucast
```

Displaying bridge group information

The `info np brige group` command displays information about a bridge group or bridge table information for a bridge group. Its syntax is as follows:

`info np brige group` *`grp`*`|table` *`grp`* `[`*`ifnum`*`]`

Replace *grp* with a bridge group number and *ifnum* with an interface number.

For example, the following command displays information about bridge group 1:

```
admin> info np bridge 1
Number of interfaces in bridge group #50 : 3
Internal bridge group number            : 1
Time left to Mac Aging Timer expiry     : 30

rif  type  bport UDID  FDID  host-name
----------------------------------------------
0020 wan   0001  43526 12600 minal-3.28
0021 wan   0002  43528 12601 minal-13.4
0022 vlan  0003  43530 12602 vlan22

Flood list pattern :
Type Learn Tree Act   Value    Pattern
BRI    Y   3120  4  00303138   16 48 00000001 00000000

Flood list Information :
list size  num   first  last   lastinlist  Not-drained
------------------------------------------------------
 0    255     3  12600  12602  12602           0

Multicast Groups :
GrpIp      Msize Maxmtu Member First  Last LstInList nDrain
225.1.1.1  255      0      1  13110  13110  13110    0
   Type Learn Tree Act Value   Pattern
   BMP    Y   3123  0 00103336 48  0 00000001 E1010101
235.1.1.1  255      0      1  12855  12855  12855    0
   Type Learn Tree Act Value   Pattern
   BMP    Y   3123  0 00103237 48  0 00000001 EB010101
```

The following sample command displays table entries for bridge group 50:

```
admin> info np bridge table 50
Group    PortBlock     if    Did      Destination
----------------------------------------------------
00050       ROUTER    0022  43530  00:00:00:00:00:09
```

```
00050       ROUTER    0022  43530  00:00:00:00:00:0a
00050       ROUTER    0022  43530  00:00:00:00:00:0b
00050       ROUTER    0022  43530  00:00:00:00:00:0c
00050       ROUTER    0022  43530  00:00:00:00:00:0d

Table has 5 entries.
```

Displaying scheduler IDs associated with a logical port

The `info np psl` *`lport`* [*`count`*] [*`rspslot`*] command displays scheduler IDs associated with a logical port. For example:

```
admin> info np psl 0 16
LPortId SchedId SchedId SchedId SchedId
    0      4       8       3       0
    1      12      16      7       0
    2      20      24      11      0
    3      28      32      15      0
    4      36      40      19      0
    5      44      48      23      0
    6      52      56      27      0
    7      60      64      31      0
    8      68      72      35      0
    9      76      80      39      0
    10     84      88      43      0
    11     92      96      47      0
    12     100     104     51      0
    13     108     112     55      0
    14     116     120     59      0
    15     124     128     63      0
```

In the following example, entry 16 shows information for the Gigabit Ethernet interface:

```
admin> info np psl 0 17 2
LPortId SchedId SchedId SchedId SchedId
    0      4       8       3       0
    1      0       0       0       0
    2      0       0       0       0
    3      0       0       0       0
    4      0       0       0       0
    5      0       0       0       0
    6      0       0       0       0
    7      0       0       0       0
    8      0       0       0       0
    9      0       0       0       0
    10     0       0       0       0
    11     0       0       0       0
    12     0       0       0       0
    13     0       0       0       0
    14     0       0       0       0
    15     0       0       0       0
    16     12      16      67      0
```

Displaying information for a specific queue

The `info np qid` *qid* [*rspslot*] provides details for a specific queue. Replace *qid* with a queue ID. For example:

```
admin> info np qid 100
Type          CosId      SchedId         PIQ         BIQ
Cos            2          --             0             0

TM parameters:
---------------
MTU                   : 0x064b
Queue Threshold       : 0x00c8
Scheduler Threshold   : 0x01f4
Bridge Port           : 0x0000

TS parameters:
---------------
PCR configured        : 0x0000
SCR configured        : 0x0000
PCR/SCR limit         : 0x00000000
Last Schedule Time    : 00:00:00:00
```

Displaying details for a specific scheduler

The `info np sid` *sid* [*rspslot*] command displays information about a specific scheduler. For example:

```
admin> info np sid 4 1
SchedId  StartOff   EndOff     DestPort  Threshold  TmScript  TsScript
4         0x00041  0x00081       0         690        1         0
admin> info np sid 4 2
SchedId  StartOff   EndOff     DestPort  Threshold  TmScript  TsScript
4         0x02638  0x04c6f       0        5500        1         0
```

Displaying Fast Ethernet trunk protocol and connection information

You can display hardware, protocol, and connection information about the Fast Ethernet trunk module using the info command. The syntax for the `info` command is as follows:

`info` *info-type* [*port/conn-id/slot*] [*ifnum*]

Syntax element	Specifies	
info-type	Type of information to display. Specify one of the following:	
	`conn`	Information about active connections.
	`aal5`	AAL5 channel information.
	`atm`	Utopia port information.
	`ether`	Ethernet port or device information.
port	Port number.	
conn-id	Connection ID	

Syntax element	Specifies
Slot	Slot number of the device.
ifnumb	Interface number.

Displaying connection information

The `info conn` command displays information about active connections.

Without any arguments, the `info conn` command reports information on all connections on the Fast Ethernet trunk module. For example:

```
fet-1/18> info conn
slot if    type vpi/vci IW
--------------------------
6    17    ATM  0/131   VBR
17   1     CTL  0/123   VBR
17   2     CTL  0/124   VBR
17   65534 ETH  0/0     VBR
17   65535 ETH  0/0     VBR
```

To display detailed information about a specific connection, append the interface number and the slot number to the `info conn` command. For example, the following command displays information about the connection on interface 17 on slot 6:

```
fet-1/17> info conn 17 6
Interface               : 17
Slot                    : 6
Interface Dir           : TOWARDS LIMS
Connection Type         : VLAN BRIDGING
MTU                     : 1610
WINPATH ATM INFO        :
rx Utopia Port          : 0
rx Utopia Address       : 0
rx Utopia VPI           : 0
rx Utopia VCI           : 131
tx Utopia Port          : 0
tx Utopia Address       : 0
tx Utopia VPI           : 0
tx Utopia VCI           : 131
ATM Encap Type          : ATM_ENCAP_LLC
IW Mode                 : IW MODE BRIDGING
qosType                 : 3
pcr                     : 0
scr                     : 0
mbs                     : 0
cdvt                    : 0
VLAN INFO vlan id       : 66
VLAN INFO acceptTagged  : 0
VLAN INFO acceptUnTagged: 1
atmChannel              : 22
etherInfo IWMode        : IW MODE BRIDGING
VLAN INFO vlan id       : 0
```

```
VLAN INFO acceptTagged  : FALSE
VLAN INFO acceptUnTagged: FALSE
Ether-QosInfo packetrate: 0
```

Displaying ATM information

The `info atm` command displays information about ATM ports. Without any arguments, the information reported by the `info atm` command is summarized. For example:

```
fet-1/17> info atm
Port UPIMode EXT STATS RxAddr TxAddr RxPHY MD   TxPHY MD   Rx M/S    Tx M/S
0    UTOPIA  ENABLED   0      0      Multi PHY  Multi PHY  SLAVE     SLAVE
```

To display detailed information about a specific ATM port, append the port number to the `info atm` command. For example:

```
fet-1/17> info atm 0
Utopia Config for Port          0
UTOPIA Mode Config              :
Operational Mode                NORMAL
UPI Mode                        UTOPIA
Utopia Clock                    50000000
CES TDM ID                      255
ATM Extended Stats              Enabled
------------------------------------------------------------
                        Utopia Port ATM Limits  Utopia Port Packet Limits
Max Tx Channels                 2021                    0
Max Rx Channels                 2021                    0
Max Entries in Prio. Q          0                       0
Max Priority Queues             0                       0


Max AAL1 Tx Channels            0
Max AAL1 Rx Chanels             0
Max Multi Queue Blocks          0
Max MQ / PQ blocks              0
------------------------------------------------------------
                                Receiver                Transmitter
Port Address                    0                       0
Phy Mode                        Multi PHY               Multi PHY
Master/Slave Mode               Slave                   Slave
Parity                          Odd                     Odd
Polling Mode                    Round Robin             Round Robin
Atm Bus Width                   16-bit Utopia           16-bit Utopia
Atm ext header size             0                       0
ATM Idle Cell Discard           Discard Idle Cells
ATM Lookup Mode                 Use VPI/VCI values
L2 Backgrnd Processing          Disabled
L2 Background FIFO Size         0
Interworking                    ForeGrnd
Queue Mode                      Fast Mode
```

Displaying AAL5 channel information

The `info aal5` command displays information about AAL5 connections on the Fast Ethernet Trunk module. Without any arguments, the information reported by the `info aal5` command is summarized. For example:

```
fet-1/17> info aal5
ConnId VPI VCI IW Mode STATS   Qos       EncapMode MRU
0      0   32  DISABLE ENABLE  UBR       VC MUX    0
16     0   123 ENABLE  ENABLE  UBR       VC MUX    1550
19     0   124 ENABLE  ENABLE  UBR       VC MUX    1550
22     0   131 ENABLE  ENABLE  UBR       LLC Encaps1610
```

To display detailed information about a specific ATM port, append the port number to the `info aal5` command. For example:

```
fet-1/17> info aal5 22
ConnectionID              : 22
Magic                     : 2152507936
VPI                       : 0
VCI                       : 131
Interrupts                : Enable
Channel Mode              : Enable
Statistics                : Enable
Test Mode                 : Disable
Tx Priority Queue Level   : 0
Tx Primary Class          : Real Time
Tx Priority               : 0
Tx Shaping Type           : Unshaped
Tx Shaping Group          : 0
Tx user to user mode      : DISABLE
Rx Time Stamp desired     : No
Rx Max SDU                : 2048
Tx MQ Level               : 0
Tx MQ Weight              : 0
Tx Calender Wheel ID      : 128
Tx Transmit Queue Priority: 3
Rx Binding: Encap Mode    : LLC Encaps
Maximum receive Unit Sizer: 1610
Tx Binding: Chan Auto Ena : Yes
max no. of packets in Iw Q: 10
SHAPING INFO              :
Unshaped weight           :1
```

Displaying Ethernet device information

The `info ether` command displays information about the Ethernet connections on the Fast Ethernet Trunk module. Without any arguments, the information reported by the `info ether` command is summarized. For example:

```
fet-1/17> info ether
P# DUPLEX SPEED     STATS MRU  MAC Address
1  FULL   100       ENA   1500 00:d0:52:07:08:09
2  FULL   100       ENA   1500 00:d0:52:10:11:12
```

To display detailed information about a specific ATM port, append the port number to the `info ether` command. For example:

```
fet-1/17> info ether 1
Ether Config for Port    : 0
Max Tx Channels          : 2
Max Rx Channels          : 2
Priority Q  Block Size   : 2
No  of Prio Q Blocks     : 2
LOOP-BACK MODE           : DISABLED
DUPLEX MODE              : FULL DUPLEX
STATISTICS               : ENABLED
MII MODE                 : MII
Rx Flow Control          : Enabled
Tx Flow Control          : Enabled
Tx Queue Mode            : FAST
Iw Back ground           : UNUSED
Tx Statistics            : ENABLED
Tx Max SDU               : 1500
Rx Statistics            : ENABLED
Rx Addr Mode             : PROMISCUOS
MAC Look up mode         : Hash Table
Rx Broadcast Filters     : Process
Rx Multicast Filters     : Process
MAC Address              : 00:d0:52:07:08:09
Flow Mode                : Single Flow Mode
Interrupt Mode           : Enabled
Interworking Mode        : Interworking
Test Mode                : Disabled
Tx Priority Queue Level  : 0
Tx Primary Class         : Real Time
Tx Priority              : 0
Tx Shaping Policy        : Weighted Fair Queueing
Rx Max SDU               : 1500
Tx Calender Wheel ID     : 0
Tx Queue Priority        : 0
Rx Binding: Encap Mode   : VC Multiplexing
Maximum receive Unit Size: 1500
Tx Binding: Channel Auto :Disable
max packets in Iw Queue  :255
VLAN Priority for prio   : 0: 0
VLAN Priority Mode prio  : 0: ENTRY PASS
VLAN Priority for prio   : 1: 0
VLAN Priority Mode prio  : 1: ENTRY PASS
VLAN Priority for prio   : 2: 0
VLAN Priority Mode prio  : 2: ENTRY PASS
VLAN Priority for prio   : 3: 0
VLAN Priority Mode prio  : 3: ENTRY PASS
VLAN Priority for prio   : 4: 0
VLAN Priority Mode prio  : 4: ENTRY PASS
VLAN Priority for prio   : 5: 0
VLAN Priority Mode prio  : 5: ENTRY PASS
VLAN Priority for prio   : 6: 0
```

```
VLAN Priority Mode prio  : 6: ENTRY PASS
VLAN Priority for prio   : 7: 0
VLAN Priority Mode prio  : 7: ENTRY PASS
Mac Address              : 00:d0:52:07:08:09
Tx Sent                  : 0
Rx Avail                 : 0
Rx Restart Required      : No
Tx Restart Required      : No
Tx Frames                : 5
```

NEBs testing and loopback (sar command)

You can use the `sar` command to verify the data path between the control module and Ripper-based LIMs when connections are established on the LIM. In this software version, this capability is not supported on IP2100 control modules.

To run a NEBs test on a LIM, enable loopback on the LIM and then run the NEBs test.

To enable loopback from a LIM, use the following syntax. (You must first open a session with the LIM.)

`sar [n|c|d|e]`

Argument	Specifies
n *port*	Setup NEBs testing on the specified port.
c *port*	Clear NEBs testing.
e	Enable loopback on LIM ports.
d	Disable loopback on LIM ports.

To enable loopback systemwide, use the following syntax:

`sar -t d [`*`slot last_port first_port count pktsize`*`]`

Argument	Specifies
slot	Slot number.
	LIMs—Specify 1 through 7 or 10 through 16.
	Trunk module—Specify 17 or 18.
	Control module—Specify 8 or 9
port	Legacy trunk port—Specify 1 or 2
	Trunk aggregation module (TRAM) port—Specify1 through 6.
	This setting is ignored for LIM and control module slots.
last_port	Last port to test.
first_port	First port to test.
count	Number of packets to send each round. Specify a value from 0 through 1000.

Argument	Specifies
pktsize	Size of packet to send. Specify a value from 0 through 2000.

For example, the following command enables loopback on a 48-port ADSL LIM.

```
admin> open 1 1
```

```
dadsl-atm-48a-1/1> sar -e
1: Loopback entered.
2: Loopback entered.
3: Loopback entered.
4: Loopback entered.
5: Loopback entered.
6: Loopback entered.
7: Loopback entered.
8: Loopback entered.
```

The following command executes NEBs testing:

```
admin> sar -t d 2
NEBS-1/1: received 10 of 10 with 0 errors @1c6ed504
NEBS-1/2: Loopback test count:10 size:100
NEBS-1/2: received 10 of 10 with 0 errors @1c6ed505
NEBS-1/3: Loopback test count:10 size:100
NEBS-1/3: received 10 of 10 with 0 errors @1c6ed505
NEBS-1/4: Loopback test count:10 size:100
NEBS-1/4: received 10 of 10 with 0 errors @1c6ed506
NEBS-1/5: Loopback test count:10 size:100
NEBS-1/5: received 10 of 10 with 0 errors @1c6ed506
NEBS-1/6: Loopback test count:10 size:100
NEBS-1/6: received 10 of 10 with 0 errors @1c6ed507
NEBS-1/7: Loopback test count:10 size:100
NEBS-1/7: received 10 of 10 with 0 errors @1c6ed507
NEBS-1/8: Loopback test count:10 size:100
NEBS-1/8: received 10 of 10 with 0 errors @1c6ed508
NEBS-1/9: Loopback test count:10 size:100
NEBS-1/9: received 10 of 10 with 0 errors @1c6ed508
NEBS-1/10: Loopback test count:10 size:100
NEBS-1/10: received 10 of 10 with 0 errors @1c6ed509
NEBS-1/11: Loopback test count:10 size:100
NEBS-1/11: received 10 of 10 with 0 errors @1c6ed50a
NEBS-1/12: Loopback test count:10 size:100
NEBS-1/12: received 10 of 10 with 0 errors @1c6ed50a
.
.
.
.
NEBS-1/47: Loopback test count:10 size:100
NEBS-1/47: received 10 of 10 with 0 errors @1c6eed58
NEBS-1/48: Loopback test count:10 size:100
NEBS-1/48: received 10 of 10 with 0 errors @1c6eed59
```

Displaying Stinger port information

The `portinfo` debug command displays information about the Stinger ports.

The `portinfo` debug command uses the following syntax:

`portinfo` *`port-number`*

For example, the following command displays port statistics for slot 1:

```
admin> show
Controller { second-control-module } ( PRIMARY ):
                                 Reqd  Oper   Slot Type
    { shelf-1 slot-2 0 }         UP    UP     terminator-card
    { shelf-1 slot-3 0 }         UP    UP     glite-atm-48-card
    { shelf-1 slot-4 0 }         UP    UP     ima-24t1-card
    { shelf-1 slot-5 0 }         UP    UP     dadsl-atm-24-card
    { shelf-1 slot-6 0 }         UP    UP     ima-8-t1-card
    { shelf-1 slot-11 0 }        UP    UP     stngr-48a-adsl-card
    { shelf-1 slot-12 0 }        UP    UP     shdsl-card
    { shelf-1 trunk-module-1 0 } UP    UP     oc3-atm-trunk-daughter-card
    { shelf-1 trunk-module-2 0 } UP    UP     2oc3-4ds3-atm-trunk-daughter-card
```

```
admin> portinfo 5
Printing fixed/allocated ports for slot 5
Linear Port:   7010
- fixed:       FALSE
- relative s#: 5
- relative p#: 2
- paired port: 65535
- slave:       FALSE
- physical:    FALSE
```

Resetting TCP port 23

The `telnetdrestart` command restarts the TCP daemon service and reopens listening port 23 when the port is closed. The syntax of the `telnetdrestart` command is as follows:

`telnetdrestart -[r]`

The `-r` option restarts TCP port 23. To display command usage, enter `telnetdrestart` without any options.

The following sample command restarts disabled port 23:

```
admin> telnetdrestart -r
The server has been restarted.
```

If you enter the command when the port is already open, the system generates the following message:

```
The telnet server port is already up
```

Displaying the serial numbers

The `revision` debug command displays the serial number of the Stinger unit. To use the command, proceed as in the following example.

In the output, `10539207` is the serial number of the Stinger unit.

```
admin> revision
first-control-module : revision =  C 1 10 10539207
```

Modifying Stinger unit functionality

The update debug command modifies optional functionality of the Stinger unit. To enable some options, you must obtain one or more software licenses (supplied by a Lucent representative) that enable the functionality in your Stinger. After each string is entered, the word *complete* appears, indicating that the Stinger accepted the license.

If you enter update without a text string modifier, the Stinger unit displays a list of current configuration information, as shown in the following example:

```
admin> update
Host interfaces: 4
Net interfaces: 0
Field features 1: 0
Field features 2: 32
Field features 3: 0
Field features 4: 28
Protocols: 2048
New Options 1: 6
New Options 2: 0
New Options 3: 0
New Options 4: 0
New Options 5: 0
New Options 6: 9729
New Options 7: 40
```

Suppose you enter update with a text string modifier as shown:

```
admin> update 5 1023 12321312312312321
```

The following two messages indicate that the text strings were entered incorrectly:

```
update command: invalid arg 3!
update command: disallowed
```

RADIUS debugging

The following sections describe the commands that you use for RADIUS debugging. For information about RADIUS, see the *TAOS RADIUS Guide and Reference*.

Using the acct-failsafe debug command

The acct-failsafe debug command is available on the primary control module and LIMs for verifying correct accounting proxying. (LIMs do not include the -d option.)

This command has the following syntax:

```
acct-failsafe -d [shelf slot] -t -?
```

Syntax element	Description
-d	Displays account fail-safe (AFS) information for a particular slot or, with no arguments, for all slots. This option is available only on the Stinger primary control module.
-t	Toggles the module debug level.
-?	Displays the command summary.

To display information about the calls on any slot that are candidates for proxy accounting, enter the following command:

```
admin> acct-failsafe -d
Slot 1/8:
HashTable @ 10542160, bucketCount: 192, callCount: 23, hashName <afs-1:8>
Slot 2/5:
HashTable @ 10585730, bucketCount: 48, callCount: 7, hashName <afs-2:5>
```

The following sample command displays the same information for a single module in shelf 1, slot 8:

```
admin> acct-failsafe -d 1 8
Slot 1/8:
HashTable @ 10542160, bucketCount: 192, callCount: 23, hashName <afs-1:8>
```

To specify which level of debug to use for the command, use the -t option. A debug level of zero indicates none (no messages). A level of 7 is fairly verbose.

Verifying settings in the external-auth profile

Use the radservdump command to verify the configuration you have set in the external-auth profile.

To enable radservdump debugging, enter radservdump at the command prompt as follows:

```
admin> radservdump
RADSERVDUMP debug display is ON
```

This command does not display any information related to the configuration of either your RADIUS authentication server or your RADIUS accounting server.

As shown in the following example, a Stinger unit has been configured with two RADIUS servers, 1.1.1.1 and 2.2.2.2. The port has not been changed from its default of 1700.

```
admin> radservdump
Rad serv vars: port=1700,sockId=8
 0) clients=1010101
 1) clients=2020202
 2) clients=0
 3) clients=0
 4) clients=0
 5) clients=0
 6) clients=0
```

```
7) clients=0
8) clients=0
```

Displaying RADIUS accounting session status

The radsessdump debug command displays the state of all RADIUS accounting sessions.

To enable radsessdump debugging, enter radsessdump at the command prompt as shown in the following example:

```
admin> radsessdump
RadActSess:  state route sessID   nasPort authM  evTime
             loadd 00289 252365175 012032 local  523932
             loadd 00288 252365174 012032 local  523946
             loadd 00287 252365173 012032 local  523945
             loadd 00286 252365172 012032 local  523946
             loadd 00227 252355493 012032 local  370610
             loadd 00226 252355492 012032 local  370611
             loadd 00225 252355491 012032 local  370608
             loadd 00224 252355490 012032 local  370609
             loadd 00004 252332182 012032 none   29
             loadd 00003 252332181 012032 none   28
             loadd 00002 252332180 012032 none   27
             loadd 00001 252332179 012032 none   26
```

The radsessdump command displays the following information:

Field	Indicates
state	State of the RADIUS accounting parameters and any accounting requests that have been sent. This field reports one of the following values: ■ init—Initializing. No RADIUS accounting parameters have been loaded. ■ loadd—RADIUS accounting parameters have been loaded, but an accounting request either has not been issued or has failed. ■ start—All RADIUS accounting parameters are loaded. An accounting request has been issued. ■ done—Session is over. No accounting request was issued, or the request failed. ■ stop—Session is over. An accounting stop request has been issued.
route	Internal route ID.
sessid	Session ID. This setting depends on the route ID.
nasPort	Statistics about the call. The first two digits indicate the type of call: 1 indicates a digital call, 2 indicates an analog call. The next two digits indicate the line on which the call was received. The last two digits indicate the channel on which the call was received.

Field	Indicates
authM	Method of authentication.
evTime	Event time. This is a timestamp.

Displaying RADIUS authentication and accounting statistics

The radstats debug command displays a compilation of RADIUS authentication and accounting statistics.

To enable radstats debugging, enter radstats at the command prompt as shown:

```
admin> radstats
RADIUS authen stats:
```

In the following sample message, A denotes *Authentication*, and O denotes *Other*. There were 612 authentication requests sent and 612 authentication responses received:

```
0  sent[A,O]=[612,15], rcv[A,O]=[612,8]
```

Of connections attempts, 602 were authenticated successfully, and 18 were not:

```
timout[A,O]=[0,6], unexp=0, bad=18, authOK=602
```

In the next sample message, the IP address of the RADIUS server is 1.1.1.1, and the curServerFlag indicates whether or not this RADIUS server is the current authentication server. (You can have several configured RADIUS servers, but only one is current at any one time.) 0 indicates *no*. 1 indicates *yes*.

```
IpAddress 1.1.1.1, curServerFlag 1
RADIUS accounting stats:
```

The next message indicates that the Stinger unit sent 1557 accounting packets and received 1555 responses (ACKs from the accounting server). Therefore, the unexp value is 2. This value does not necessarily indicate a problem, but might be the result of the Stinger unit timing out a particular session before receiving an ACK from the RADIUS server. A momentarily heavy traffic load might cause this condition. The value of bad is the number of packets that were formatted incorrectly by either the Stinger unit or the RADIUS server.

```
0  sent=1557, rcv=1555, timout=0, unexp=2, bad=0
```

In the next message, note that the accounting server is different from the authentication server. The accounting and authentication servers do not need to be running on the same host, although they can be.

```
IpAddress 2.2.2.2, curServerFlag 1
Local Rad Acct Stats:
```

You can use the next two messages to look for traffic congestion problems or badly formatted accounting packets. Under typical conditions, you might see a few packets whose acknowledgments fail.

- The following message indicates whether any RADIUS requests have been dropped by the Stinger unit. With this particular message, no requests were dropped and 1557 were sent successfully.

  ```
  nSent[OK,fail]=[1557,0], nRcv=1557, nDrop[QFull,Other]=[0,0]
  ```

- The following message indicates whether any session timeouts resulted from a failure to receive RADIUS responses. The message also indicates responses that are received by the Stinger unit but do not match any expected responses. The Stinger unit keeps a list of sent requests, and expects a response for each request. In the following message, one response was received from the RADIUS server that did not match any of the requests that the Stinger had sent out. This situation might be caused by a corrupted response packet, or by the Stinger unit timing out the session before the response was received.

```
nRsp[TimOut,NoMatch]=[0,1], nBackoff[new,norsp]=[0,0]
```

The following messages display a summarized list of RADIUS server statistics.

```
Local Rad Serv Stats:
unkClient=0
index 0 #Sent = 0, #SendFail=0 badAuthRcv = 0, badPktRcv = 0
```

Interface debugging

The following sections describe the commands that you can use to debug Stinger interfaces.

Displaying network interface mappings

The `netif` debug command displays the Stinger network interface mappings. This command has the following syntax:

```
netif -m | -q | -v |?
```

Syntax element	Description
-m	Displays mappings for the specified map type.
-q	Displays the queue for a map.
-v	Displays valid mapping tables.
?	Displays the command summary.

The following example displays valid interface mappings:

```
admin> netif -v
map 0x1042C0E0: type 0 (call-id), id 0x1042B5A0
```

This example displays interface mappings that contain `type 0`:

```
admin> netif -m 0
SHELF       SLOT  SysID  SlotID
   1         1      52      2
   1         6      90     58
   1         6      89     57
   1         6      86     56
   1         6      78     51
   1         6      72     50
   1         6      71     49
   1         6      70     48
   1         6      69     47
   1         6      68     46
   1         6      62     45
   1         6      61     44
```

.
.
.

Using the EOC command on ADSL interfaces

The `eoc` command allows you to send read and write requests to the standard register set, as defined in ANSI T1.413 Issue 2, ITU 992.1 and ITU 992.2, on the customer premises equipment (CPE) by way of the embedded operations channel (EOC). The ADSL interfaces on the following hardware support this command:

- 24-port ADSL LIM
- 48-port ADSL G.lite LIM
- 40-port ADSL Annex C LIM
- 48-port ADSL Annex A LIM
- 48-port ADSL Annex B LIM
- Stinger MRT unit with 36 ADSL ports
- 72-port ADSL Annex A LIM

You must first open a session with the LIM, or with logical slot 1 on a Stinger MRT to use this command. The `eoc` command has the following syntax:

`eoc -p [-r|-w` *`reg slot port`* `[`*`data`*`]]`

Syntax Element	Description
`-p`	Enable/disable module debug.
`-r`	Read from the specified register.
`-w`	Write to the specified register.
`reg`	Register number to read from or write to. With the read option, specify a value from `0` through `8` or `10`. With the write option, specify 4 or 5.
`slot`	Slot number.
`port`	Port number.
`data`	Data to save to the register using the `-w` option. Enter up to 32 bytes of data.

The following sample commands display the output of the `eoc` command from a 48-port G.lite ADSL LIM:

```
admin> open 1 4
```

```
glite-atm-48-1/4> eoc -r 1 4 5
Eoc status: OK
Eoc Read Rev number of ATU-R -
0x0f 0x00 0x42 0x43 0x4c 0x41 0x00 0x00
0x01 0x00 0x22 0x01 0x01 0x00 0x00 0x00
0x03
```

The following example shows the output of the `eoc` command from a 48-port Annex A ADSL LIM:

```
admin> open 1 4
```

```
dadsl-atm-48a-1/6> eoc -r 1 6 1
Cmd Seq No - 00002
dadsl-atm-48a-1/6>
EOC READ, Port - 1, Reg - 1, Cmd Seq No. - 00002, Status - OK
0x21 0x03 0x00 0x00
```

Note Because different CPE devices respond at different rates, the system runs the command in the background and displays the results as they become available. As a result, the command prompt might sometimes appear in the middle of the output.

Control module debugging

The following sections describe the commands that you use for control module debugging. The *Stinger IP Control Modules Configuration Guide.* also describes debug commands that are used specifically for IP control modules.

Displaying the status of redundant control modules

The `controller-redundancy` debug command displays the status of the primary and secondary control modules in a Stinger unit with redundant control modules.

To enable `controller-redundancy` debugging, proceed as shown in the following example:

```
admin> controller-redundancy
My id                 = Slot 8  Controller-1
My state              = MONITORING
My function           = PRIMARY
Remote's state        = MONITORING
Remote's function     = SECONDARY
HW state              = I_AM_PRIMARY
Remote detected by HW = PRESENT_ACTIVE
Msgs sent             = 5279
Send errors           = 1
Msgs received         = 5279
State machine events = 6143
State transitions   = 2
Profile Xfer Cycles  = 11
Profile sends        = 161
Profile Rx Cycles    = 0
Profile Rx           = 0
_needProfileTransfer = 0
_remoteCntrlActive   = 1
_debug level         = 17
read slot serial #   = 9235004
```

Following are descriptions of some of the more important fields in this display:

Field	Indicates
My id	Location of the primary control module.

Field	**Indicates**

My state	State of the primary control module. Following are valid states:
	`Initial`
	`Load_context`
	`Start_POST`
	`Local_POST`
	`Remote_POST`
	`Selecting`
	`Selection_Complete`
	`Inauguration`
	`Primary_to_Operational`
	`Loading`
	`Secondary_to_Operational`
	`Monitoring`
	`Dead`

My function	Function of the primary control module. Following are valid functions:
	`No_Function`
	`Primary`
	`Secondary`

Remote's state	State of the secondary control module. See `My state` for valid values.
Remotes's function	Function of the secondary control module. See `My function` for valid values.

HW state	Hardware state of the primary control module. Following are valid hardware states:
	`No_Primary_Controller`
	`I_Am_Primary`
	`Other_Controller_Primary`
	`HW_Status_Not_Available`

Remote detected by HW	Condition of secondary control module hardware: `Present_Active.` Hardware is present and software is running. `Present_Inactive.` Hardware is present, but software is not running (for example, is being reset). `Not_Present`. Hardware is not present. `Unknown.` Cannot be determined.

Displaying interface management information

The `ifmgr` debug command displays interface-table entries, toggles the debug display, and marks an interface as enabled or disabled. You can enter this command only from the control module.

The `ifmgr` debug command uses the following syntax:

```
ifmgr [-d [ifnam|ifnum]|-t] [up|down ifnum|ifname]
```

Syntax element	Description
-d	Displays interface table entries.
-d *ifname*|*ifnum*	Displays details of the specified interface name or number.
-t	Toggles the debug display.
up|down *ifnum*|*ifname*	Enables or disables the specified interface. These options have the same effect as setting the enabled parameter in the ethernet profile, and are subject to the same limitations.

To display the interface table entries, use the -d option. (The netstat command also displays a hyphen to indicate a disabled Ethernet interface.) For example:

```
admin> ifmgr -d
bif slot sif u m p ifname      host-name  remote-addr       local-addr
-----------------------------------------------------------------------------
-
000 1:17 000 *     ie0        -          0.0.0.0/32        192.168.7.133/32
001 1:17 001 *     lo0        -          0.0.0.0/32        127.0.0.1/32
002 0:00 000 *     rj0        -          0.0.0.0/32        127.0.0.2/32
003 0:00 000 *     bh0        -          0.0.0.0/32        127.0.0.3/32
004 0:00 000 *     wanabe     -          0.0.0.0/32        127.0.0.3/32
005 0:00 000 *     local      -          0.0.0.0/32        127.0.0.1/32
006 0:00 000 *     mcast      -          0.0.0.0/32        224.0.0.0/32
007 0:00 000 -     tunnel7    -          0.0.0.0/32        192.168.7.133/32
008 1:11 001 *   p wan8       tnt-t1-t32 200.2.1.2/32      192.168.7.133/32
009 1:11 002 *   p wan9       tnt-t1-t32 200.2.2.2/32      192.168.7.133/32
010 1:11 003 *   p wan10      tnt-e1-t22 200.3.2.2/32      192.168.7.133/32
011 1:11 004 *   p wan11      tnt-e1-t32 200.5.1.2/32      192.168.7.133/32
012 1:11 005 *   p wan12      tnt-e1-t32 200.5.2.2/32      192.168.7.133/32
013 1:11 006 *   p wan13      tnt-t1-t22 200.1.1.2/32      192.168.7.133/32
014 1:15 001 *   p wan14      tnt-t1-s1- 100.1.100.2/32    100.6.100.2/32
015 1:11 007 *   p wan15      tnt-e1-t22 200.3.1.2/32      192.168.7.133/32
016 1:11 008 *   p wan16      cisco-t221 200.4.103.2/32    192.168.7.133/32
017 1:11 009 *   p wan17      m-e1-t2211 200.4.4.2/32      192.168.7.133/32
018 1:11 010 *   p wan18      m-e1-t2212 200.4.4.3/32      192.168.7.133/32
019 1:17 000 -   p wan19      m2t81      200.8.1.2/32      192.168.7.133/32
020 1:17 000 -   p wan20      m41        200.4.1.2/32      200.6.1.2/32
021 1:16 001 *   p wan21      p1321n<>p1 0.0.0.0/32        0.0.0.0/32
[More? <ret>=next entry, <sp>=next page, <^C>=abort]
```

The output of the ifmgr command includes the following fields:

Field	Indicates
bif	Bundle interface number. There is one interface number per bundle, including Multilink Protocol Plus™ (MP+) connections. This number is the global interface-table number.

Field	Indicates
slot	Shelf and slot the interface is assigned to.
sif	Slot interface.
u	Whether the interface is enabled (*) or disabled (-).
m	The interface is part of an Multilink Protocol (MP) bundle.
p	Whether the interface is permanent. A P indicates a permanent interface. A hyphen (-) or a blank indicates that the interface is not permanent. A permanent interface is an interface that is configured in the command-line interface and stored in Stinger NVRAM. All the Ethernet interfaces and the interfaces based on connection profiles are permanent. Transient interfaces are those the Stinger unit builds from RADIUS, TACACS, or an answer profile. These interfaces have no interface entry when the connection is down.
ifname	Interface name.
host-name	Hostname of remote device.
remote-addr	Remote address of device as configured in a connection profile.
local-addr	Local address of device as configured in a connection profile.

To display details about a specific interface name or number, add an interface name or number to the ifmgr -d command. The following sample command displays information about interface 7:

```
admin> ifmgr -d 007
iff             0x82000db0
inUse:          Yes
hostName:
dialoutName:
Authentication Source:  In: local       Out: local
ExternFilters:  No
ExternRoutes @  0
miscInfo @      0
DLCI routeId:   0
rtIf:   0:00:0
virtual id: 0, virtual next @ -1, virtual main @ -1
minor device:   0
device status:  0x20c4
output func:    0x8013ea98
input func:     0x804d27a4
mtu:            65535
ip_addr:        0.0.0.0
dstip_addr:     0.0.0.0
netmask:        255.255.255.255
net:            0.0.0.0
subnet:         0.0.0.0
bcast:          255.255.255.255
```

```
nbcast:         255.255.255.255
directed-bcast:         yes
management only:        no
macaddr:        000000000000
inp_qcnt:       0
out_qcnt:       0
nexthop:        0.0.0.0
proxy_arp_mode: 0
proxy_arp_head: 0
No associated connection profile
SNMP ifType:    24
```

The `icmp-reply-directed-bcast` parameter in the `ip-global` profile specifies whether the Stinger unit responds to directed-broadcast ICMP echo requests. If this parameter is set to `no`, the system does not respond to any directed-broadcast ICMP requests. The setting of this parameter is shown in the `Directed-Bcast` field in the `ifmgr` output.

Stinger Log Messages

B

The Stinger unit logs fatal and warning error messages to the fatal error log. If the system crashes before creating a log entry, it prints a stack trace to the console serial port. System-status messages, however, go to the Syslog host (if enabled) and the Status log. For information about how to enable logging and Syslog services on a Stinger system, see “Configuring system logging and Syslog services” on page 3-1.

Fatal and warning error messages

Each time the system reboots, it logs a fatal error message to the fatal error log. The fatal error log also notes warnings, which indicate situations that did not cause the system to reset.

Development engineers use warnings for troubleshooting purposes. When a warning occurs, the system has detected an error condition and has recovered from it. Available flash space limits the number of entries in the fatal error log, and entries rotate on a first-in, first-out (FIFO) basis. To clear the log, use the `clr-history` command.

Reviewing the fatal error log

The system fatal error log contains messages related to Stinger unit operations.

To view the log of fatal errors, use the `fatal-history` command. For example:

```
admin> fatal-history
SYSTEM IS UP:  Index: 100 Revision:9.3-170 first-controller (stngrcm2)
        Date: 04/30/2002.       Time: 12:09:55

PRIMARY SELECTED:Index: 98 Revision:9.3-170 first-controller (stngrcm2)

        Date: 04/30/2002.       Time: 12:10:24
```

```
OPERATOR RESET:Index:  99 Revision:9.3-170 first-controller (stngrcm2)
        Date: 04/30/2002.       Time: 14:53:02
        Reset from 135.140.144.124, user profile admin.
```

Clearing the fatal error log

Each entry shows the system software version, the slot on which the error occurred, and the date and time at which the error occurred. To clear the log, enter the `clr-history` command:

```
admin> clr-history
```

Fatal and warning messages have the format shown in the following example:

```
Warning:  Index:   171  Revision: 8.0.0  Shelf 1 (stngrcmb)
Date: 06/14/1999.       Time: 16:03:33
Location: 81026460 81069380 81024b38 81024af4 00000000 00000000
```

The first line indicates the type of error (fatal or warning), the index number of the error, the software revision number, the shelf and slot on which the error occurred, and the software load. The fatal log from older software versions display shelf 0.

The second line shows the date and time of the error.

The third line displays the top six program counter addresses from the execution stack active at the time of the crash.

Definitions of fatal errors

Following are definitions, by index number, of the fatal errors that the Stinger unit can report. If you experience a fatal error, contact Lucent OnLine Customer Support at `http://www.lucent.com/support`.

Index	Definition
1	Assert invoked during program execution An Assert has been placed in the code. This problem can be either hardware related or software related.
2	Out of memory during memory allocation This is an out-of-memory condition, sometimes termed a memory leak.
3	Bad profile (T1 DSL related)
4	Switch type bad
5	LIF error
6	LCD error
7	ISAC (BRI) timeout BRI physical layer timeout.
8	Processor exception A processor-exception error caused the reset.
9	Invalid task switch (EXEC)

Index	Definition
10	No mail descriptor (EXEC) This reset occurs if the Stinger tries to allocate a mail message when there are none left. The cause is usually a memory leak.
11	No mail buffer memory (EXEC)
12	No task to run (EXEC)
13	No timer memory (EXEC)
14	No timer pool (EXEC)
15	Wait called while in critical section (EXEC)
16	DSP not responding
17	DSP protocol error
18	DSP internal error
19	DSP loss of sync
20	DSP unused
21	DDD not responding
22	DDD protocol error
23	X25 buffer error
24	X25 init error
25	X25 stack error
27	Memory allocation of zero length
28	Memory allocation of negative length
29	Task infinite loop The reset was the result of a software loop.
30	Too large memory copy
31	Magic sequence missing (MEMCPY)
32	Wrong magic sequence (MEMCPY)
33	Bad start address (MEMCPY)
34	IDEC timeout
35	EXEC restricted
36	Stack overflow
37	DRAM card error Indicates that a DRAM card of unknown size is inserted in the DRAM slot or that the DRAM card failed POST. Applies to the Pipeline® 220 only.

Index	Definition
39	No priority 2 task This error occurs if the Stinger has not run a priority 2 task in the last minute. Tasks in the Stinger are assigned priorities. Because the main routing task runs at priority 2, this error means that Stinger operation has been suspended for 1 minute.
40	Protection fault
41	Memory shortage
60	SNMP-related error
60	SNMP-related error
60	SNMP-related error
93	Failure of LIM to respond to control module watchdog message A Stinger control module continually monitors the status of installed LIMs by sending a watchdog message to LIMs. Fatal error FE93 occurs when a LIM fails to respond to three watchdog messages from the control module.
99	Operator reset This reset is logged immediately before the Stinger goes down. Instead of a standard stack backtrace, the message includes the active security-profile index. 0 (zero) indicates an unknown security profile. On the Stinger, the Default profile is number 1, and the Full Access profile is number 9.
100	System up As a complement to entry 99, this entry is logged as the Stinger is coming up. For a normal, manual reset, you normally see a fatal error 99 followed by a fatal error 100.

Definitions of warning messages

Warnings are not the results of reset conditions. Most are detected problems from which the Stinger unit typically recovers fully. Following are the definitions, by index number, of the warnings the Stinger unit can report. Warning messages, by themselves, are not necessarily cause for concern. They are used by development engineers to determine the cause of fatal errors.

Contact Lucent OnLine Customer Support at `http://www.lucent.com/support` if warning messages are accompanied by fatal errors.

Index	Definition
101	Buffer already in use
102	Buffer belongs to wrong pool
103	Buffer belongs to wrong heap

Index	Definition
104	Buffer not previously allocated This warning can be logged under different conditions. For example, double freeing of memory and low-memory conditions can both generate a warning 104.
105	Buffer bad memory allocation
106	Buffer belongs to bogus pool
107	Buffer belongs to bogus heap Memory management code (or other modules) detected that the buffer header of what should have been a free buffer was corrupted by the previous overwrite.
108	Buffer negative length memory allocation A negative length request was made to the memory allocation code.
109	Buffer zero length memory allocation This warning is similar to Warning 108, except that a zero length request is made to the memory allocation code.
110	Error in buffer boundary
111	Error buffer too big Indicates that a software routine has tried to allocate a block of memory greater than 64Kbytes.
112	Error buffer null
113	Error buffer segment count zero
114	Error buffer trailer magic
115	Error in buffer trailer
116	Error in buffer trailer length
117	Error in buffer trailer user magic
118	Error buffer write after free
119	Error buffer not in use
120	Error buffer magic in memory copy
121	Error next buffer magic in memory copy
130	PPP async buffer in use Indicates a PPP error.
131	Error with PPP
135	Error with WAN data or WAN sessions
136	Error with WAN data or WAN sessions
140	Error no timers

Index	Definition
145	LCD memory allocation failure Indicates that a memory-copy routine was called, but the source buffer was much larger than expected.
146	Invalid state
150	Error memory copy too large
151	Error memory copy magic missing
152	Error memory copy wrong magic
153	Error memory copy bad start address
154	WAN buffer leak Indicates an error in the WAN drivers.
160	Error in terminal-server state Indicates an error in the WAN drivers.
161	Error in terminal server semaphore
165	Error in Telnet free driver
170	Stac timeout Indicates a hardware error in the Stac compression chip.
171	Stac data not owned Error in the Stac compression chip.
175	EXEC failure Indicates that there is insufficient memory to start a new task.
176	EXEC restricted
177	EXEC no mailbox
178	EXEC no resources
179	Unexpected error
181	Channel display stuck
182	New call without disconnect request Indicates that a Disconnect message to the central office (CO) was not sent. The problem can be caused by conditions on the Stinger or at the CO. When the Stinger encounters the condition, it assumes the CO is correct, and answers the call.
183	New call without disconnect response
184	Disconnect request dropped
185	Spyder buffer error
186	Spyder descriptor error
190	TCP send buffer too big
191	TCP sequence gap

Index	Definition
192	TCP too much data
193	TCP write attempt too large
194	TCP options bad
195	Modem message parsing failed
301	TACACS+ pointer inconsistency
302	TACACS+ index inconsistency
303	TACACS+ TCP inconsistency
304	TACACS+ TCP out-of-range socket
305	TACACS+ socket mismatch
306	TACACS+ unexpected authentication state
381	Error in filter list
382	Error no count in filter list
383	Error mismatch count filter list
550	No Ethernet transmit buffer
1001	Waiting for Ethernet controller
1002	Ethernet ACK command failed
1003	Ethernet reset invoked
1006	Ethernet controller unavailable (wait fail)
1010	Bad Ethernet transmit interrupt
1011	Ethernet transmit not completed
1012	No Ethernet transmit buffer

Fatal crash information on the console

If the system crashes without being able to write to the fatal error log, it prints a stack trace to the console serial port at the bit rate defined in the Serial profile. The trace reports the following information:

`FE:` *N*`, Load:` *loadname*`, Version:` *version*
`Stack trace: 0x`*addr-0* `0x`*addr-1* `0x`*addr-2* `0x`*addr-3* `0x`*addr-4* `0x`*addr-5*

The first line indicates the number of the error and the software revision number.

The second line displays the top six program counter addresses from the execution stack active at the time of the crash.

Syslog messages

Syslog offloads to a host computer known as the Syslog host. The `host` parameter in the `log` profile specifies the Syslog host, which saves the system status messages in a log file.

See the UNIX man pages about `logger(1)`, `syslog(3)`, `syslog.conf(5)`, and `syslogd(8)` for details of the `syslog` daemon. The Syslog function requires UDP port 514.

The Stinger unit can report the following session data about various errors logged via Syslog:

Data	Description
`[shelf/slot/line/channel]`	Physical channel identifier.
`[MBID xxx]`	Session identifier. For a given session identifier, multiple physical channel identifiers are possible.
`[name]`	Authenticated name.
`[ calling -> called ]`	Calling number or the called number, or both.
`Progress code`	Lucent-specific code indicating the progress of the call. (For a list of progress codes, see the *Stinger Reference*.)
`Disconnect code`	Lucent-specific code indicating the reason the call was disconnected. (For a list of disconnect codes, see the *Stinger Reference*.)

Accounting records are kept until they are acknowledged by the accounting server. Up to 100 unacknowledged records are stored in the backoff queue. If the unit never receives an acknowledgment to an accounting request, it will eventually run out of memory. In order to keep this situation from the occurring, the unit deletes the accounting records and displays this error message in the syslog file:

`Backoff Q full, discarding user` *`username`*

This error generally occurs for one of the following reasons:

- You enabled RADIUS accounting on the Stinger unit, but not on the RADIUS server.
- The Acct-Port or Acct-Key are incorrect. The Acct-Key must match the value assigned in the RADIUS clients file or the TACACS+ configuration file.
- You are using a Lucent RADIUS server instead of an Ascend RADIUS server.

PCMCIA flash card error messages

When a `load`, `format`, or `dircode` command fails, the Stinger unit logs the messages described in this section.

`load` command messages

Table B-1 lists the error messages that might appear if the system terminates while in the process of loading a tar file.

Table B-1. Load command error messages (loading a tar file)

Error message	Description
load aborted: not a tar image	The image you are trying to load is not in tar format.
load aborted: a tar image, inconsistent with the specified load-type.	The image header not does not match the load type.
load aborted: invalid/unknown image header.	The image header is missing or corrupt.
load aborted: mismatched image for the specified load-type.	The type checking process discovered inconsistencies between the load type and the image header.
load aborted: invalid image, unsupported by load tar command.	The tar image you are trying to load has been corrupted or is in an unsupported format.

The following warning message does not terminate the load operation, but indicates that you are not loading the most recent software version:

`load: warning: old image header version detected, load continued...`

Table B-2 lists the error messages that might appear when you are using the `load` command to upload an image to a PCMCIA flash card on a Stinger unit.

Table B-2. Load command error messages (uploading to PCMCIA flash cards)

Error message	Description
`load: error: flash card write failed: card full`	The flash card currently has no space available to load software.
`load: error: specified flash card not present`	No flash card is detected in the specified slot (1 or 2).
`load: error: specified flash card not formatted`	You must enter a `format` command to format the flash card before loading the software.
`load: error: specified flash card has obsolete format`	The flash card was formatted for an older version of the system. You must reformat the card to use it with the current release.

Table B-2. Load command error messages (uploading to PCMCIA flash cards) (Continued)

Error message	Description
`load: error: specified flash card is write-protected`	The flash card's write-protect switch is set.
`load: error: specified flash image is currently in use`	A control module in the LOAD state is currently accessing the flash card.

`format` command messages

Table B-3 lists the error messages might appear when you are using the `format` command.

Table B-3. Format command error messages

Error message	Description
`error: flash card` *N* `is not present`	No flash card is detected in the specified slot (1 or 2).
`error: flash card` *N* `is unavailable`	The flash card in the specified slot is already being formatted, is just coming up, or is in an error condition.
`error: flash card` *N* `is write-protected`	The write-protect switch is set on the card in the specified slot (1 or 2).
`error: flash card` *N* `is currently in use`	One or more images on the flash card are being read by a module in the LOAD state or are being written as part of a code download.

`dircode` command messages

Table B-4 lists the error messages might appear when you are using the `dircode` command.

Table B-4. Dircode command error messages

Error message	Description
`Card` *N* `is not formatted for use with this system`	The flash card is blank, corrupted, or formatted for another environment, such as DOS. To use this card, you must issue a `format` command first.

Table B-4. Dircode command error messages (Continued)

Error message	Description
`Card` *N* `is temporarily unavailable`	The flash card is currently coming up or is being formatted.
`Card` *N* `is unavailable`	The flash card experienced an error and is inaccessible. Verify that the card is inserted properly.
`Card` *N* `uses a format which is no longer supported`	The flash card was formatted for an older version of the operating system. You must reformat the card to use it with the current release.

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