Lucent Technologies
Bell Labs Innovations

Stinger®

Line Protection Module (LPM) Guide

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Notice

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About This Guide

What is in this guide

This guide describes the line protection modules (LPMs) that are available for the Stinger product line. It also contains information about LIM redundancy and a limited description of line testing from the test port of the 48-port LPM with splitters. For more complete information about line testing see the *Stinger Copper Loop Test (CLT) Module Guide*.

What you should know

Warning Before installing a Stinger LPM, be sure to read the Getting Started Guide or Installation and Configuration Guide for your unit. You should also read the safety instructions in the *Edge Access and Broadband Access Safety and Compliance Guide*.

The procedures in this guide require you to understand and follow the safety practices at your site, as well as those identified in this guide and the *Edge Access and Broadband Access Safety and Compliance Guide*. Before installing any hardware, check the installation location for adequate temperature, humidity, and electrical requirements. Work closely with the network manager and other systems integration personnel to ensure a functional installation.

Documentation conventions

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

Convention	Meaning
`Monospace text`	Represents text that appears on your computer's screen, or that could appear on your computer's screen.
`Boldface monospace text`	Represents characters that you enter exactly as shown (unless the characters are also in ***`italics`***—see *Italics*, below). If you could enter the characters but are not specifically instructed to, they do not appear in boldface.
Italics	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.

Convention	Meaning
[ ]	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.
|	Separates command choices that are mutually exclusive.
>	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.
Key1+Key2	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.)
Press Enter	Means press the Enter or Return key or its equivalent on your computer.
 **Note**	Introduces important additional information.
 **Caution**	Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment.
 **Warning**	Warns that a failure to take appropriate safety precautions could result in physical injury.
 **Warning**	Warns of danger of electric shock.

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 unit. Shows how to install your Stinger chassis and hardware. This guide shows you how to use the command-line interface

to configure and verify IP access and basic access security on the unit.

The Getting Started Guides for Stinger models with redundant control modules describe configuration of this feature.

The *Stinger MRT Getting Started Guide* describes the features and basic configuration of the trunk modules that are specific to a Stinger MRT.

- The *Stinger MRT-2 Getting Started Guide* describes the features and basic configuration of the trunk modules that are specific to a Stinger MRT-2.
- *Stinger Compact Remote Installation and Configuration* describes how to install a Stinger Compact Remote unit for operation as a remote shelf of a host Stinger unit. Configuration of the host unit for this type of operation, and configuration of lines on the remote shelf through the host unit are also described.
- Module guides for each type of module designed for the Stinger FS, Stinger FS+, Stinger LS, or Stinger RT, an individual guide describes the module's features and provides instructions for configuring the module and verifying its status.

- **Configuration:**
  - *Stinger ATM Configuration Guide*. Describes how to use the command-line interface to configure Asynchronous Transfer Mode (ATM) operations on a Stinger unit. The guide explains how to configure permanent virtual circuits (PVCs), and shows how to use standard ATM features such as quality of service (QoS), connection admission control (CAC), and subtending.
  - *Stinger IP2000 Configuration Guide*. For [Product] systems with the IP2000 control module, this guide describes how to integrate the system into the IP infrastructure. Topics include IP-routed switch-through ATM PVCs and RFC 1483 PVCs that terminate on the IP2000, IEEE 802.1Q VLAN, and forwarding multicast video transmissions on DSL interfaces.
  - *Stinger Private Network-to-Network Interface (PNNI) Supplement*. Provides quick-start instructions for configuring PNNI and soft PVCs (SPVCs), and describes the related profiles and commands in the Stinger command-line interface.
  - *Stinger SNMP Management of the ATM Stack Supplement.* Describes Simple Network Management Protocol (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.
- **RADIUS:** *TAOS RADIUS Guide and Reference*. Describes how to set up a TAOS 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*. 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.

Stinger Line Protection Modules (LPMs)

1

The Stinger line protection modules (LPMs) contain protective circuitry that isolate the electronic components of the Stinger line interface modules (LIMs) from voltage spikes and electrical transients on the copper facilities. Each LIM in a Stinger chassis depends upon an associated LPM for connection to the copper facilities that serve the individual DSL customers.

LPM models are available that support 24-port, 48-port, or 72-port LIMs. Some LPM models contain relay circuitry to support port redundancy. LPMs with ADSL2+ and VDSL2 splitters are also available.

Redundancy provides the capability to switch individual ports, or all the ports on one LIM, to a standby LIM. Complete details for implementing port redundancy are provided in Chapter 2, "Configuring LIM and LIM Port Redundancy."

LPM models

The following LPM models are available for Stinger units.

Table 1-1. 24-port LPM models

LPM Product Code	Connectors	Internal splitters	Redundancy support	Stinger chassis
STGR-LPM-24-RP	1 (50-pin RJ-21X)	No	Yes	FS, FS+
STGR-LPM-24	1 (50-pin RJ-21X)	No	No	FS, FS+
STGRLS-LPM-24-RP	1 (50-pin RJ-21X)	No	Yes	LS-1, LS-2
STGRLS-LPM-24	1 (50-pin RJ-21X)	No	No	LS-1, LS-2
STGRRT-LPM-24-RP	1 (50-pin RJ-21X)	No	Yes	RT-1, RT-2
STGRRT-LPM-24	1 (50-pin RJ-21X)	No	No	RT-1,RT-2

Table 1-2. 48-port LPM models

LPM Product Code	Connectors	Internal splitters	Redundancy support	Stinger chassis
STGR-LPM-48-RP	2 (50-pin RJ-21X)	No	Yes	FS, FS+
STGR-LPM-48	2 (50-pin RJ-21X)	No	No	FS, FS+
STGRLS-LPM-48-RP	2 (50-pin RJ-21X)	No	Yes	LS-1, LS-2
STGRLS-LPM-48	2 (50-pin RJ-21X)	No	No	LS-1, LS-2
STGRRT-LPM-48-RP	2 (50-pin RJ-21X)	No	Yes	RT-1, RT-2
STGRRT-LPM-48	2 (50-pin RJ-21X)	No	No	RT-1, RT-2
STGR-LPM2-48-S[1]	3 (64-pin Tyco)	Yes	No	FS, FS+
STGRLR-LPM2-48-S	3 (64-pin Tyco)	Yes	No	LS-1, LS-2 RT-1, RT-2
STGRCR-LPM2-48-S	3 (64-pin Tyco)	Yes	No	CR
CR-LPM2V-48-NPS-0800-1726-001		Yes	No	CR, LS, RT

1 For use with intra-building central office POTS lines only. The POTS ports from the integrated splitters do not contain protection circuitry.

Table 1-3. 72-port LPM models

LPM Product Code	Connectors	Internal splitters	Redundancy support	Stinger chassis
STGR-LPM2-72-RP	3 (50-pin RJ-21X)	No	Yes	FS[1], FS+
STGR-LPM2-72	3 (50-pin RJ-21X)	No	No	FS*, FS+
STGRLS-LPM2-72-RP	3 (50-pin RJ-21X)	No	Yes	LS-1, LS-2
STGRLS-LPM2-72	3 (50-pin RJ-21X)	No	No	LS-1, LS-2
STGRRT-LPM2-72-RP	3 (50-pin RJ-21X)	No	Yes	RT-1, RT-2
STGRRT-LPM2-72	3 (50-pin RJ-21X)	No	No	RT-1, RT-2

1 Only the first 48 ports are supported in Stinger FS chassis.

LPMs designed for use in the Stinger FS and Stinger FS+ chassis have a different card length, and cannot be interchanged with LPMs designed for other Stinger chassis.

Installing an LPM

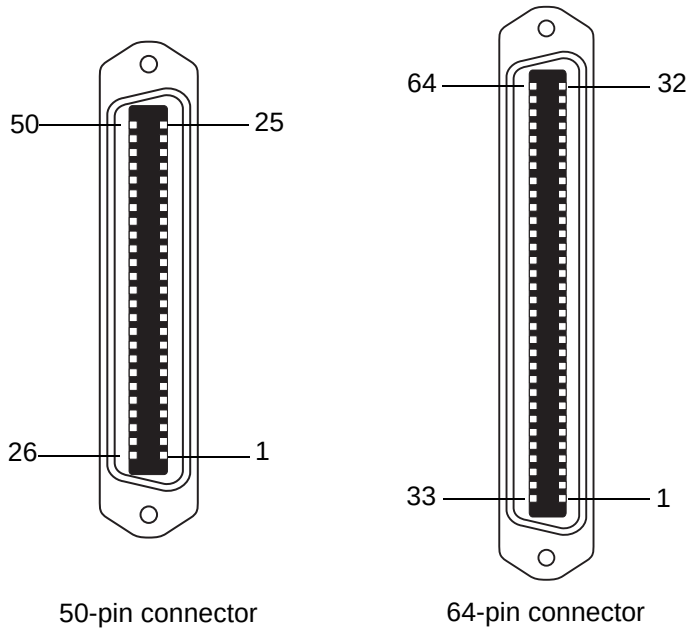
All LPMs are installed in the same manner. LPM slots in the Stinger FS and Stinger FS+ chassis are in the rear of the chassis. LPM slots on all other Stinger models are in the front of the chassis. For specific installation instructions for your chassis, see the Getting Started Guide for your unit.

LPM connectors

All LPMs, except the 48-port LPM with splitters, have one, two, or three, RJ-21X, 50-pin telephone company connectors. The 48-port LPM with splitters has three 64-pin Tyco connectors. Both types of connectors and their pin assignments are illustrated in Figure 1-1.

Note For details about pin assignments and cabling, see Appendix A, "Cabling Connections."

Figure 1-1. LPM connectors

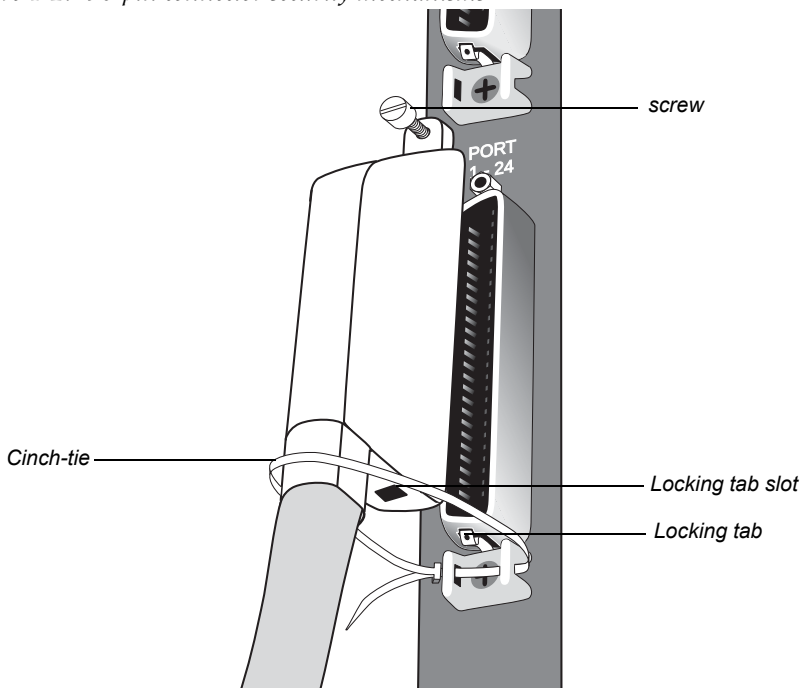


50-pin connectors details

The 50-pin connectors can be secured to the LPM by three mechanisms shown in Figure 1-2. It is recommended that you use these mechanisms to make the connectors as secure as possible.

- An anchor screw on the far end of the connector can be screwed into a fitting on the chassis.
- A locking tab under the cable side of the connector automatically secures the connector upon installation.
- A nylon cinch-tie can be used secure the cable end of the connector to a tie-down fitting on the chassis. If the connectors you are using have a slot to accept the connector locking tab, use of a nylon cinch-tie is optional.

Figure 1-2. 50-pin connector security mechanisms



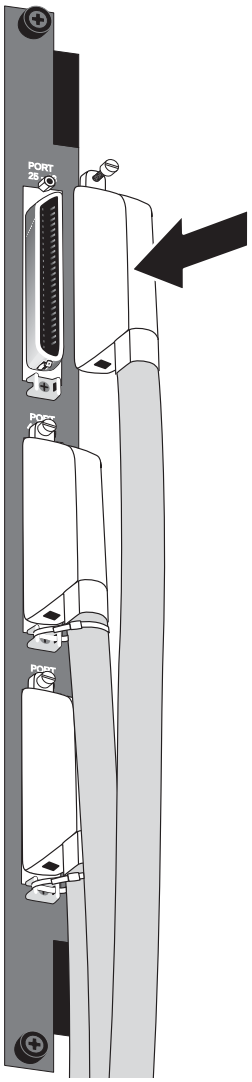
Installing the connectors

To install the 50-pin or 64-pin cable connectors on an LPM:

1. Begin with the bottom connector on the LPM and carefully insert the head of the cable into the connector on the LPM. Push until the bottom locking tab is engaged (if equipped).
2. Tighten the screw on the top end of the connector.
3. Tighten the cable tie around the connector.
4. Secure the cable to the LPM using the cable ties provided on the LPM.
5. Repeat step 1 through step 4 for the next connector above the connector that has just been connected. Install the top connector last, as shown in Figure 1-3.

Note When removing LPM connectors, remove the top connector first, the middle connector next, and the bottom connector last.

Figure 1-3. Connecting an LPM



Removing a 50-pin connector

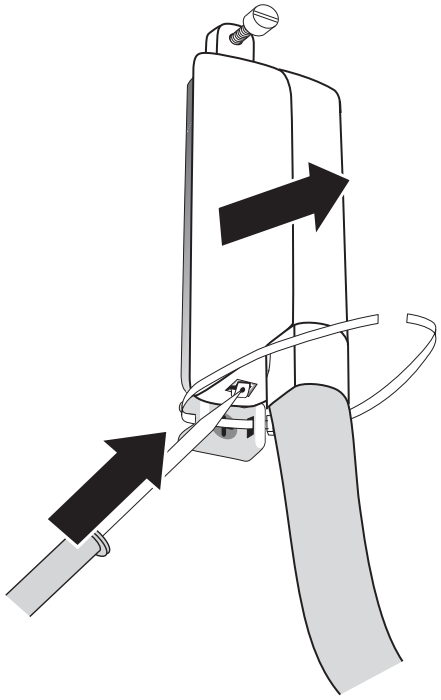
The locking tab on 50-pin connectors make these connectors less likely to become loose during operation. However, these tabs require additional attention when disconnecting the 50-pin connectors from the LPM.

Lucent Technologies recommends that you use the tip of a small probe or small screwdriver to disengage the latch when removing a 50-pin connector as described below.

To remove a 50-pin connector from the LPM perform the following steps:

1. Completely loosen the anchor screw on the connector
2. Using a small pair of diagonal cutters, cut the nylon tie-down strap, if equipped.
3. Depress the connector latch with a small probe or screwdriver, while gently pulling the connector away from the chassis, as shown in Figure 1-4.

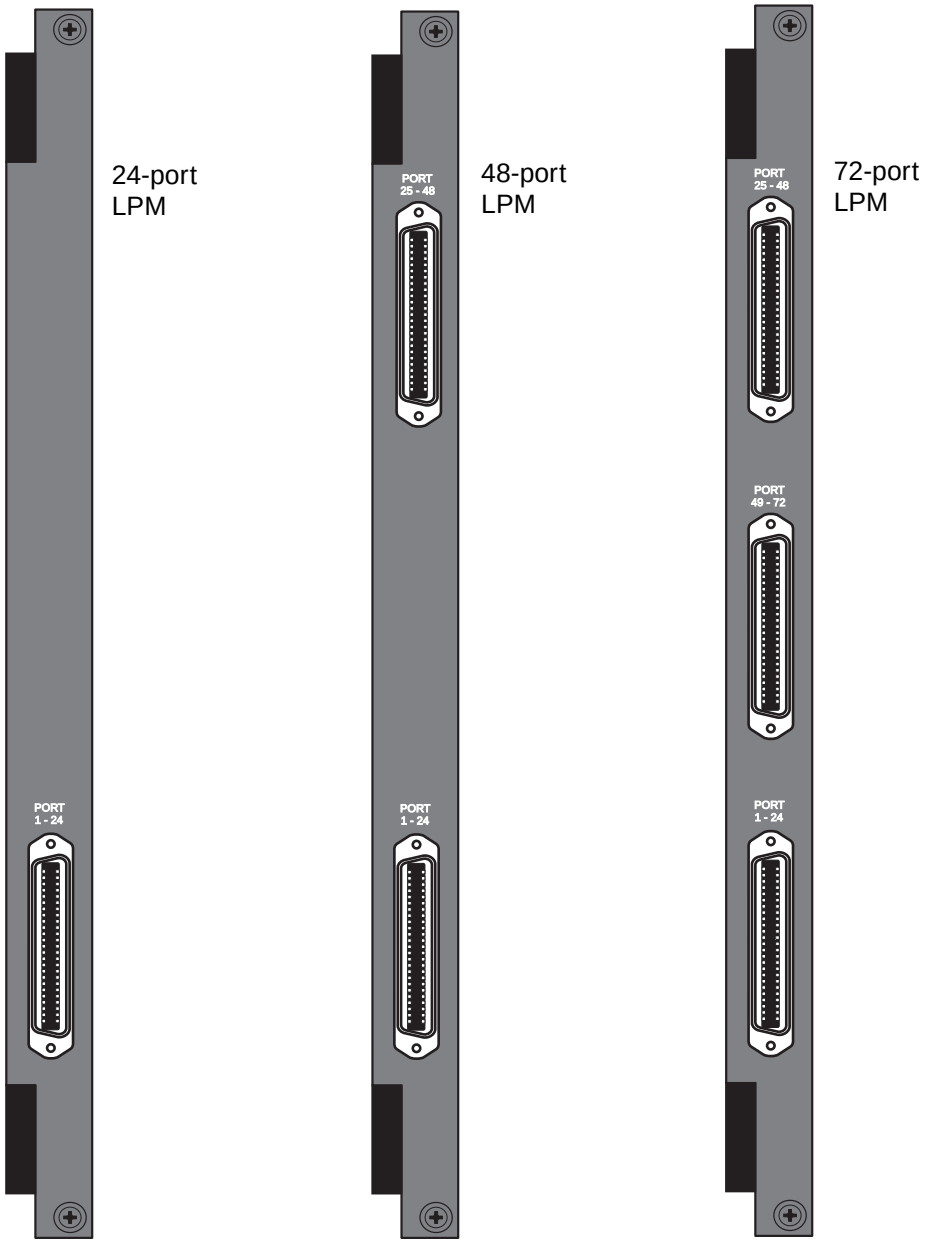
Figure 1-4. Removing the 50-pin connector



Faceplate Connector locations

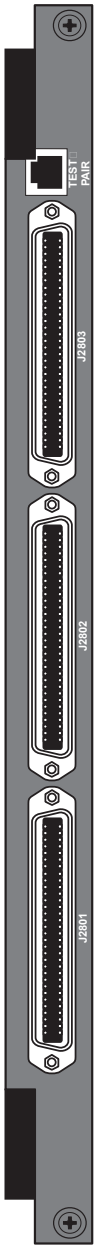
The arrangement of the 50-pin connectors on LPMs that support 24, 48, and 72 ports without splitters is shown in Figure 1-5. The arrangement of 64-pin connectors on the 48-port LPM with splitters is shown in Figure 1-6.

Figure 1-5. 50-pin connectors on LPMs without splitters (Stinger LS versions shown)



Note The LPMs shown above, with ejector latches on the left side of the faceplate, are for use in the Stinger LS. LPMs for use in the Stinger FS have ejector latches on the right side of the face plate.

Figure 1-6. Connectors on the 48-port LPM with splitters (Compact Remote model shown)



Module specifications

Except where noted, the following specifications apply to all LPM models.

Physical dimensions	Models for Stinger FS, FS+ Height: 15 inches (38.1cm). Width: 1.06 inches (2.69cm). Depth: 5 inches (12.7 cm). Weight: 1.6 pounds (0.7kg).
	Models for Stinger LS-1, LS-2, RT, CR Height: 15 inches (38.1cm). Width: 1.06 inches (2.69cm). Depth: 9 inches (22.8 cm). (Stinger FS, FS+) Weight: 2.6 pounds (1.2kg).
Power requirements	All redundant models: ~ .5W of additional power for each line that is switched to a redundant connection.
	(Additional power requirements for LPMs with redundant capability apply only while switched connections are maintained.)
Temperature range	All FS and LS models: 32°F through 131°F (0°C through 55°C)
	All RT models: -40°F through 149°F (-40°C through 65°C)
Connectors	Models without splitters: RJ-21X, 50 pin
	48-port LPM with splitters: 64-pin Tyco
Certifications	Bellcore GR-63-CORE (NEBS Level 1-3)
	Bellcore GR-1089-CORE
Electromagnetic compliance	FCC Part 15 Class A
	EN55022 Class A
	AS/NZS 3548 Class A
	VCCI Class 1
	CISPR Class A
	ICES 003 Class A (48-port LPM with splitters)

Configuring LIM and LIM Port Redundancy

2

You can configure LIM and LIM port redundancy for more than one kind of LIM in a single Stinger chassis. However each LIM must be associated with an LPM that supports redundancy (see Table 1-1, and Table 1-2, and Table 1-3 in Chapter 1) and, the LIM to be used as a spare must be associated with a path selector module (PSM) or copper loop test (CLT) module. For example, a single Stinger unit with both asymmetric digital subscriber line (ADSL) and symmetric digital subscriber line (SHDSL) LIMs that utilize LPMs with redundant support, can be configured with a spare ADSL LIM and a spare SHDSL LIM that utilize a PSM or CLT.

Overview of LIM and LIM port redundancy

LIM port redundancy transfers the logical connection from a particular failed *port* on a LIM to the corresponding port on the spare LIM. The remaining ports on the spare LIM remain available to provide additional LIM port redundancy.

The midplane redundancy bus in a Stinger unit only supports one redundant path at a time for each port number. For example, a failed port 1 on an SHDSL LIM can be replaced by a port on a spare SHDSL LIM. However, as long as redundancy is active for that port, no other failed port 1 on any other LIM in that unit can be replaced by a spare LIM port.

Full LIM redundancy transfers *all* logical connections from a failed LIM to the spare LIM. However, only one failed LIM at a time can be replaced by a spare LIM. Full LIM redundancy and LIM port redundancy are not supported at the same time on the same chassis.

Each LIM to be used as a spare must have either a path selector module (PSM) or copper loop test (CLT) module plugged in behind or next to it in place of a line protection module (LPM). All other LIMs must use an LPM with port redundancy (LPM-RP) for line protection.

Note Some older Stinger units are equipped with an interface redundancy module (IRM) located behind the spare LIM, and LPMs with redundancy (LPM-R) located behind the LIMs to be backed up. In this case, additional configuration steps might be needed. For more information, see “LIM redundancy with IRMs and LPM-Rs” on page 2-7.

Configuring LIM redundancy

LIM redundancy provides a one-to-one backup function for LIMs. Each type of LIM to be backed up requires a spare LIM with a PSM or CLT module plugged in behind or next to it. For example, a Stinger FS unit with 14 ADSL 24-port LIMs can be set up in the following way:

- 13 ADSL LIMs with 13 LPM-RP modules
- 1 ADSL LIM with a PSM or CLT module

The resulting system has 13 active ADSL LIMs and one spare that can be substituted for any one of the 13 LIMs if a failure occurs.

In the same way, a unit can be equipped with the following modules:

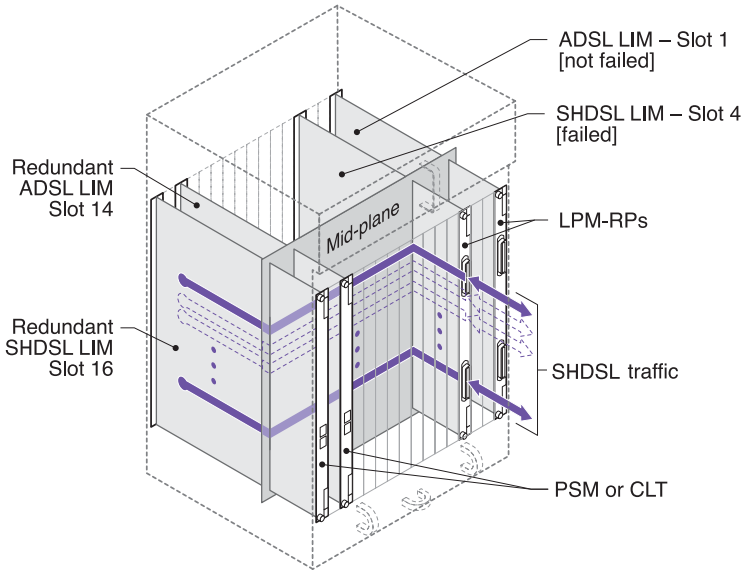
- 6 SHDSL LIMs with 6 LPM-RP modules
- 1 SHDSL LIM with a PSM or CLT module
- 6 ADSL LIMs with 6 LPM-RP modules
- 1 ADSL LIM with a PSM or CLT module

The resulting system has 6 active SHDSL LIMs and 6 active ADSL LIMs, with 1 spare LIM of each type available in case of failure.

When the redundancy function is invoked, the primary LIM is deactivated. Its logical connections are terminated and reestablished on the spare (secondary) LIM. When the redundancy function is disabled, the spare LIM is deactivated. Its logical connections are terminated and reestablished on the primary LIM.

Figure 2-1 illustrates LIM redundancy for a failed SHDSL LIM in slot 4 of a Stinger FS chassis. A Stinger LS chassis has its LPMs and PSMs or CLT modules *next to* its LIMs rather than behind them as shown here.

Figure 2-1. LIM redundancy in a Stinger FS unit



Overview of the lim-sparing-config profile

When a Stinger unit is booted, it checks for the presence of PSMs or CLT modules. A `lim-sparing-config` profile is created for each PSM or CLT module detected. You manage LIM redundancy by configuring the `lim-sparing-config` profile on a spare LIM of the same type as the LIM to be backed up.

Following is a listing of a `lim-sparing-config` profile with all parameters set to their default values:

```
[in LIM-SPARING-CONFIG/{ any-shelf any-slot 0 }]

physical-address* = { any-shelf any-slot 0 }
spare-slot-type = none
sparing-mode = inactive
spare-slot-number = slot-16
manually-spared-slot-number = any-slot
if-sparing-config = [ any-slot any-slot any-slot any-slot any-slot any-slot
any+
auto-lim-sparing-config = { [ { yes 10 100 12 } { yes 10 100 12 } { yes 10
100 +
```

The `auto-lim-sparing-config` subprofiles are discussed separately in "Automatic LIM redundancy" on page 2-5.

Parameter	Setting
`spare-slot-type`	Type of spare LIM installed in the slot. This value is automatically detected and set by the software when the Stinger starts.
`sparing-mode`	Enable/disable redundancy. You can enable two LIM redundancy modes. ■ `inactive` setting—disables the LIM redundancy function. ■ `manual` setting—deactivates the LIM specified in the `manually-spared-slot-number` parameter, terminating its connections and then reestablishing them on the spare LIM. For more information, see "Manual LIM redundancy" on page 2-5. ■ `automatic` setting—allows automatic LIM redundancy to be activated as defined in the `auto-lim-sparing-config` subprofile. See "Automatic LIM redundancy" on page 2-5.
`spare-slot-number`	Number of the slot containing the spare LIM and PSM or CLT module. This parameter value is automatically set by the software when the Stinger unit is turned on.
`manually-spared-slot-number`	Slot number of the primary LIM to be manually deactivated and replaced by the spare LIM.
`if-sparing-config`	Not used.

For example, suppose a Stinger unit is configured with an ADSL LIM in slot 1 and an SHDSL LIM in slot 4. Slot 14 contains a spare ADSL LIM with a PSM, and slot 16 contains a spare SHDSL LIM also with a PSM.

The system creates two `lim-sparing-config` profiles like the following:

```
admin> dir lim-sparing-config

    72  06/20/1999 01:21:15  { shelf-1 slot-14 0 }
    72  06/21/1999 17:14:09  { shelf-1 slot-16 0 }
```

The spare ADSL LIM has the following profile:

```
admin> read lim-sparing-config { 1 14 0 }
LIM-SPARING-CONFIG/{ shelf-1 slot-14 0 } read
admin> list
[in LIM-SPARING-CONFIG/{ shelf-1 slot-14 0 }]
physical-address* = { shelf-1 slot-14 0 }
spare-slot-type = al-dmtadsl-atm-card
sparing-mode = inactive
spare-slot-number = slot-14
manually-spared-slot-number = slot-any
auto-lim-sparing-config = { [ { yes 10 100 12 } { yes 10 100 12 } { yes 10
100 +
```

Similarly, you can display the profile for the spare SHDSL LIM:

```
admin> read lim-sparing-config { 1 16 0 }
LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } read
admin> list
[in LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 }]
physical-address* = { shelf-1 slot-16 0 }
spare-slot-type = shdsl-card
sparing-mode = inactive
spare-slot-number = slot-16
manually-spared-slot-number = slot-any
auto-lim-sparing-config = { [ { yes 10 100 12 } { yes 10 100 12 } { yes 10
100 +
```

LPM power dependency

When a 72 port GS (Globespan) LIM is used in combination with a 72 port LPM that provides redundancy support (LPM2-72-RP), sparing will not work unless the slot-static-config:power-slot-rear field is turned on, by setting it to yes. This is the only combination of cards with this LPM power sparing requirement. (See below.)

```
[in SLOT-STATIC-CONFIG/{ shelf-1 slot-1 0 }]
name = 1:1
physical-address* = { shelf-1 slot-1 0 }
...
power-rear-slot = yes
```

LIM sparing interaction with control module redundancy

When a system switches to a redundant control module while a primary LIM is being spared using automatic redundancy, the system will initially abort the redundant operation and return control to the primary LIM. This will occur regardless of the status or presence of the primary LIM at that time.

Manual LIM redundancy

You can invoke the redundancy function manually by setting the `sparing-mode` parameter to `manual`. To disable manual redundancy, set the `sparing-mode` parameter to `inactive`.

If manual redundancy is currently in use, setting the parameter to `inactive` causes the spare LIM to become inactive again, terminating its connections and then reestablishing them on the primary LIM that was replaced.

For example, referring to Figure 2-1, suppose that the SHDSL LIM in slot 4 fails. To enable the spare SHDSL LIM in slot 16, proceed as follows:

```
admin> read lim-sparing-config { 1 16 0 }
LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } read
admin> set manually-spared-slot-number = 4
admin> set sparing = manual
admin> write
LIM-SPARING-CONFIG/{ shelf-1 slot-160 } written

LOG notice, Shelf 1, Slot 8, Time: 01:30:02--
  LIM 16 ACTIVATED as spare for LIM 4
```

Automatic LIM redundancy

Automatic LIM redundancy detects a LIM failure and automatically sets up all the virtual channels of that LIM on the spare. When automatic LIM redundancy is activated, the primary LIM is monitored. If modem errors exceed the specified thresholds, all connections to the primary LIM are transferred to the spare (secondary) LIM. However, if the spare LIM fails, sparing will be disabled in that chassis until the next system reset.

Monitoring continues on the secondary LIM. If modem errors exceed thresholds, the connections are transferred back to the primary LIM and the automatic redundancy process stops. You can restart the process by resetting the system or by setting the `sparing-mode` parameter to `inactive` and then back to `automatic`.

The parameters related to automatic LIM redundancy are found in the `auto-lim-sparing-config` subprofiles. The subprofiles are numbered according to the LIM slot numbers. These subprofiles apply only to those LIMs that are of the same type as the LIM specified by the spare-slot-type parameter in the `lim-sparing-config` profile.

For example, suppose slot 16 in a Stinger FS units contains a spare SHDSL LIM, slots 1 through 7 contain SHDSL LIMs, but slots 10 through 15 contain ADSL LIMs. Only the parameters contained in `lim-sparing-config` subprofiles 1 through 7 are applied to automatically replace the SHDSL LIMs in slots 1 through 7.

Note Following an automatic LIM or LIM port redundancy switch-over, some sessions might not start up even though the physical port switch-over is successful.

Following is a listing of an `auto-lim-sparing-config` subprofile with all parameters set to their default values:

```
[in LIM-SPARING-CONFIG:auto-lim-sparing-config:lim-sparing-config[1]]
active = yes
error-averaging-period = 10
error-threshold = 100
up-down-threshold = 3
modem-failure-threshold = 12
```

Parameter	Specifies
`active`	When redundancy mode is set to `automatic`, this parameter enables or disables the LIM slot to participate in automatic LIM redundancy. Only slots for which this parameter is set to `yes` can be backed up by the spare. The default value is `yes`.
`error-averaging-period`	Number of seconds during which the number of errors specified by `error-threshold` must be observed on the line before the modem is considered nonfunctional. The default value is 10.
`error-threshold`	Number of errors that can occur during the specified `error-averaging-period` interval before a modem on this LIM is considered nonfunctional. The default value is 100.
`up-down-threshold`	Number of times during the specified `error-averaging-period` interval that the line is connected and disconnected by the modem before the modem is considered nonfunctional. The default value is 3.
`modem-failure-threshold`	Number of modems on this LIM that are considered nonfunctional before this LIM is considered nonfunctional. The default value is 12.

To activate automatic LIM redundancy for a particular LIM, you must set the following two parameters:

- In the `lim-sparing-config` profile for the spare LIM, set the following `active` parameter to `yes`: auto-`lim-sparing-config:lim-sparing-config` [*`slot number of backed-up LIM`*]:`active`.
- In the `lim-sparing-config` profile for the spare LIM, set the `sparing-mode` parameter to `automatic`.

For example, if you install a spare SHDSL LIM in slot 15 of a Stinger FS unit and want to activate automatic LIM redundancy for the SHDSL LIMs in slots 1 through 7, proceed as follows:

1 List the `auto-lim-sparing-config` profile for slot 1.

```
admin> list 1
[in LIM-SPARING-CONFIG/{ shelf-1 slot-15 0}
:auto-lim-sparing-config:lim-sparing-config[1]]
```

```
active = yes
error-averaging-period = 10
error-threshold = 100
up-down-threshold = 3
modem-failure-threshold = 12
```

Because the `auto-lim-sparing-config` subprofiles are numbered according to the LIM slot numbers, the `list 1` command here lists the `lim-sparing-config` subprofile for the LIM in slot 1.

Note that the `active` parameter is set to `yes`. Because this is the default value for all seven slots, you do not have to set it unless you have previously changed it.

2 Set the redundancy mode.

```
admin> list
[in LIM-SPARING-CONFIG/{ shelf-1 slot-15 0 }]
physical-address* = { shelf-1 slot-15 0 }
spare-slot-type = shdsl-card
sparing-mode = inactive
spare-slot-number = slot-15
manually-spared-slot-number = any-slot
auto-lim-sparing-config = { [ { yes 10 100 3 12 } { yes 10}]}

admin> set sparing-mode = automatic
admin> write
LIM-SPARING-CONFIG/{ shelf-1 slot-15 0 } written
```

Assuming that the `active` parameters in the `lim-sparing-config` subprofiles for slots 2 through 7 are also set to the default, LIM redundancy is now activated for the SHDSL LIMs in slots 1 through 7.

LIM redundancy with IRMs and LPM-Rs

If you upgrade the software from a version earlier than TAOS 7.11.4, a previously existing `lim-sparing-config` profile is automatically converted to a redundancy profile indexed to the spare LIM slot. Enter the `dir lim-sparing-config` command to verify that the profile has been created.

For example, suppose a Stinger FS unit already has a spare SHDSL LIM and IRM installed and configured in slot 16 before the software upgrade. Enter the `dir` command to show the profile:

```
admin> dir lim-sparing-config

   213  06/20/1999 02:25:18  { shelf-1 slot-16 0 }
```

Then list the profile:

```
admin> read lim-sparing-config { 1 16 0 }
admin> list
[in LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } ]

physical-address* = { shelf-1 slot-16 0 }
spare-slot-type = shdsl-card
sparing-mode = inactive
spare-slot-number = slot-16
manually-spared-slot-number = any-slot
if-sparing-config = [ any-slot any-slot any-slot any-slot any-slot any-slot
any+
```

```
auto-lim-sparing-config = { [ { yes 10 100 3 12 } { yes 10 100 3 12 } { yes
10 +
```

If a profile exists, nothing further needs to be done until the LIM redundancy function is activated. If no profile exists, you must create the profile manually for the slot number containing the spare LIM and IRM. All the LIMs to be backed up must have either LPM-Rs or LPM-RPs installed in the slots behind or next to them.

When the profile is created, the software automatically assigns a value to the `spare-slot-type` and `spare-slot-number` parameters.

For example, if a Stinger unit has an SHDSL LIM and an IRM installed in slot 16, and it also has an SHDSL LIM with an LPM-R installed in slot 4, you must first create a `lim-sparing-config` profile for slot 16:

```
admin> new lim-sparing-config { 1 16 0 }
LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } read

admin> write
LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } written

admin> list
[in LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } (new)]

physical-address* = { shelf-1 slot-16 0 }
spare-slot-type = shdsl-card
sparing-mode = inactive
spare-slot-number = slot-16
manually-spared-slot-number = any-slot
if-sparing-config = [ any-slot any-slot any-slot any-slot any-slot any-slot
any+
auto-lim-sparing-config = { [ { yes 10 100 3 12 } { yes 10 100 3 12 } { yes
10 +
```

If the SHDSL LIM in slot 4 fails. You can then activate manual LIM redundancy as follows:

```
admin> set manually-spared-slot-number = 4
admin> set sparing-mode = manual
admin> write

LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 } written
LOG notice, Shelf 1, Slot 8, Time: 26:30:01--
   LIM 16 ACTIVATED as spare for LIM 4
```

Monitoring LIM redundancy

To determine if sparing activity has occurred, check the sparing-state parameter LIM-sparing-status profile for the primary and secondary spare LIMs.

```
[in LIM-SPARING-STATUS:lim-sparing-status[1]]
active = yes
lim-status-ok = yes
sparing-state = sparing-none

Sting4>set sparing-state ?
sparing-state:
 The sparing state of the line interface module ( LIM ).
Enumerated field, values:
```

```
 sparing-none:  Sparing is not activated for this LIM.
 primary-active:  This primary LIM is active with inactive secondary LIM.
 primary-inactive:  This primary LIM is inactive with active secondary LIM.
 secondary-active:  This secondary LIM is active with an inactive primary
LIM.
 secondary-inactive:  This secondary LIM is inactive with an active primary
LIM.

 not-applicable:  The LIM sparing is not applicable to this module.
```

Configuring LIM port redundancy

LIM port redundancy allows an individual port of a LIM to be backed up by the corresponding port of a spare LIM. The LIM to be backed up (the primary LIM) must be of the same type as the spare. The remaining ports on the spare LIM remain available to back up other failed ports on any LIMs of the same type in the system.

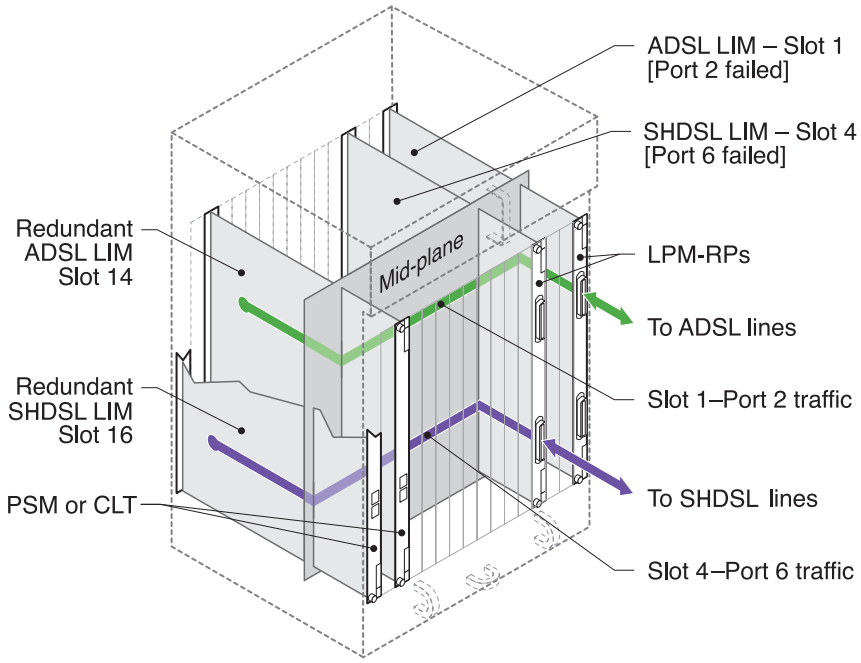
More than one kind of LIM port can be backed up. An additional LIM-PSM pair (or LIM-CLT module pair) of another type installed in a Stinger unit can be used to back up other LIMs of that type in the system. For example, a spare SHDSL LIM in slot 16 can back up any failed port on any other SHDSL LIMs in a Stinger FS chassis. Likewise, a spare ADSL LIM in slot 14 can back up any failed ADSL ports.

However, because the midplane redundancy bus in a Stinger unit contains only one path for each port number, port redundancy can back up only one path of a particular number at a time. For example, suppose port 1 on an SHDSL LIM fails and is replaced. As long as redundancy is active on that port, no other failed SHDSL or ADSL port 1 on that unit can be replaced by a spare LIM port.

For example, port 2 on an ADSL LIM in slot 1 can be backed up by port 2 of the spare ADSL LIM in slot 14. A subsequent failure of port 6 on an SHDSL LIM in slot 4 can be backed up by port 6 on the spare SHDSL LIM in slot 16. This example is illustrated for a Stinger FS chassis in Figure 2-2. A Stinger LS chassis has its LPMs and PSMs or CLT modules *next to* its LIMs rather than behind them.

Note Following an automatic LIM or LIM port redundancy switch-over, some sessions might not start up even though the physical port switch-over is successful.

Figure 2-2. LIM port redundancy on a Stinger FS unit



When a port on a LIM that is being backed up is replaced, the virtual channels for that port are terminated and set up on the spare. All other line parameters are also transferred to the spare port.

Enabling LIM port redundancy

Redundancy for a particular slot and port is controlled by the `sparing-mode` parameter in the appropriate LIM profile.

The `sparing-mode` parameter appears in all LIM profiles, as in the following SHDSL profile for slot 2, port 6:

```
[in SHDSL/{ shelf-1 slot-2 6 }]
name = 1:2:32
physical-address* = { shelf-1 slot-2 6 }
enabled = yes
sparing-mode = inactive
line-config = { 0 1 15 static shelf-1 slot-2 6 } coe no not-eligible +
```

Parameter	Setting
sparing-mode	Enables or disables port redundancy and specifies the mode. You can set the following port-redundancy modes: ■ inactive—disables LIM port redundancy. This is the default. ■ manual—deactivates the LIM port and then reestablishes the connection on the same port of the spare LIM. ■ automatic—activates automatic redundancy for the port. The error threshold parameters specified in the auto-lim-sparing-config subprofile of the LIM-Sparing-Config [*slot number*]profile are used.

Manual LIM port redundancy

You can invoke the redundancy function manually by setting the sparing-mode parameter in the LIM profile to manual. The connection on the primary LIM is transferred to the spare (secondary) LIM. To disable manual port redundancy, set the sparing-mode parameter to inactive.

If manual redundancy is currently in use, setting the parameter to inactive causes the spare LIM port to become inactive again, terminating its connections and then reestablishing them on the primary LIM port that was replaced.

For example, suppose a Stinger FS unit is equipped with an ADSL LIM in slot 1 and an SHDSL LIM in slot 4. Spare LIMs are located in slots 14 and 16 respectively. Port 2 fails on the ADSL LIM, and port 6 fails on the SHDSL LIM. To provide redundancy for these ports, proceed as follows:

1 Activate redundancy for failed port 2 in slot 1:

```
admin> read al-dmt {1 1 2}
admin> set sparing-mode = manual
admin> write
LOG notice, Shelf 1, Slot 8, Time: 11:58:49--
     LIM 14 port 2 ACTIVATED as spare for LIM 1 Port 2
```

2 Activate redundancy for failed port 6 in slot 4:

```
admin> read shdsl {1 4 6}
admin> set sparing-mode = manual
admin> write
LOG notice, Shelf 1, Slot 8, Time: 12:07:51--
 LIM 16 port 6 ACTIVATED as spare for LIM 4 Port 6
```

Interaction between automatic LIM redundancy and manual port redundancy

Automatic LIM redundancy and manual port redundancy can both be configured simultaneously, however only one redundancy mode will work at a time. If manual port redundancy is in use, automatic LIM redundancy will not work until manual port redundancy is reset. When manual port redundancy is used to test a DSL line and then reset, automatic LIM redundancy will be available again, immediately.

If the system resets while manual port redundancy is being used, the call will come up on the manually redundant port. If a LIM resets while manual port redundancy is being used, no automatic LIM redundancy will occur upon reset, all calls on a redundant LIM will go down, unless they are being manually spared.

Automatic LIM redundancy will not work for LIMs in slots that are set to a down status during a system reset. Manual LIM redundancy must be used for cards in these slots. If manual LIM redundancy is set for the slot, the spare LIM will resume taking calls for the redundant LIM after a system reset.

Automatic LIM port redundancy

Automatic LIM port redundancy detects a LIM port failure and automatically transfers the port connection to the same port on the spare LIM. When automatic LIM port redundancy is activated, the primary LIM port is monitored. If modem errors exceed the specified thresholds, the port connection to the primary LIM is transferred to the spare (secondary) LIM.

Monitoring continues on the secondary LIM port. If modem errors again exceed thresholds, the connection is transferred back to the primary LIM port and the automatic redundancy process stops. You can restart the process by resetting the system or by setting the `sparing-mode` parameter to `inactive` and then back to `automatic`.

The parameters used for automatic LIM port redundancy are found in the `auto-lim-sparing-config` subprofile of the `lim-sparing-config` profile for the spare LIM of the same type.

For example, suppose you want to set up automatic port redundancy for port 1 in an SHDSL LIM in slot 5 with an error threshold of 50. The spare SHDSL LIM is located in slot 16 of a Stinger FS.

The threshold parameters reside in the `auto-lim-sparing-config` subprofile of the `lim-sparing-config` profile in slot 16.

1 List the parameters:

```
admin> list 1
[in LIM-SPARING-CONFIG/{ shelf-1 slot-16 0 }:
auto-lim-sparing-config:lim-sparing-config[1]]
active = yes
error-averaging-period = 10
error-threshold = 100
up-down-threshold = 3
modem-failure-threshold = 12
```

2 Set the `error-threshold` parameter:

```
admin > set error-threshold = 50
admin > write
SHDSL/{ shelf-1 slot-16 0 } written
```

3 Activate automatic redundancy for port 1 in slot 5:

```
admin > read shdsl {1 5 1}
admin > set sparing-mode = automatic
admin > write
SHDSL/{ shelf-1 slot-5 1 } written
```

Monitoring port redundancy

To monitor port sparing activity, use the `splimpo -s` command to list and identify any spared ports. Then observe the sparing-state field in the DSL line status profile of the spare and spared ports. for example: `al-dmt-stat { 1 3 20 }`

Checking and monitoring redundancy status

TAOS provides information in several locations that help you monitor the status and settings for LIM and LIM port redundancy.

Checking LIM redundancy status

You can check the status of LIM redundancy by examining the `lim-sparing-status` profile. Following are the parameters with sample read-only values:

```
[in LIM-SPARING-STATUS]
spare-slot-type = none
sparing-mode = primary-inactive
spare-slot-number = any-slot
spared-slot-number = any-slot
sparing-change-reason = unknown
sparing-change-time = 0
sparing-change-counter = 0
lim-sparing-status = [ { yes yes sparing-none } { yes yes sparing-none } {
yes +
```

A `lim-sparing-status` subprofile is defined for each slot as follows:

```
[in LIM-SPARING-STATUS:lim-sparing-status[1]]
active = yes
lim-status-ok = yes
sparing-state = sparing-none
```

Parameter	Indicates
`spare-slot-type`	Shelf, slot, and port number of the spare LIM.
`sparing-mode`	State of the redundancy function. If redundancy is not enabled, `sparing-none` is the value. If redundancy is enabled and the LIM slot is a primary LIM, the value can be `primary-active` or `primary-inactive`. If redundancy is enabled and the LIM slot is the secondary (spare) LIM, the value can be `secondary-active` or `secondary-inactive`.
`spare-slot-number`	Slot number of the spare LIM for that type of LIM.
`spared-slot-number`	Slot number of the LIM being replaced by the spare LIM.
`sparing-change-reason`	How redundancy is activated. Valid values are `inactive`, `automatic`, and `manual`.
`sparing-change-time`	Time that the last change in redundancy state occurred.

Parameter	Indicates
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 is turned on.
active	Valid values are yes and no.
lim-status-ok	Valid values are yes and no.
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 is a primary LIM, the value can be primary-active or primary-inactive. If redundancy is enabled and the LIM slot is the secondary (spare) LIM, the value can be secondary-active or secondary-inactive. A value of not-applicable indicates that LIM redundancy is not applicable to this module.

Checking individual port redundancy status

The status profile for a particular LIM shows port redundancy status for the selected port, and information about a spare LIM if one exists. The LIM port status profiles have five parameters to indicate the port redundancy status.

Following are the relevant parameters, shown with sample read-only settings for an active line using an SHDSL LIM:

```
[in SHDSL-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
```

Parameter	Indicates
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 is a primary LIM, the value can be primary-active or primary-inactive. If redundancy is enabled and the LIM slot is the secondary (spare) 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.

Parameter	Indicates
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.

Checking redundancy assignments and status

The if-sparing-config profile is composed of four read-only subprofiles that display information about the redundancy assignments and status of the Stinger chassis.

```
[in IF-SPARING-CONFIG]
if-spared-slot = [ any-slot any-slot any-slot any-slot any-slot any-slot
any-sl+
if-spare-slot = [ any-slot any-slot any-slot any-slot any-slot any-slot
any-slo+
if-auto-spare-info = [ 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 +
lim-auto-spare-info = [ any-slot any-slot any-slot any-slot any-slot
any-slot a+
```

Parameter	Indicates
if-spared-slot	For each of the 72 possible ports, the number of the slot for a port is currently being spared by manual or automatic sparing.
if-spare-slot	For each of the 72 possible ports, the number of the slot providing a spare port for a port is currently being spared by manual or automatic sparing.
if-auto-spare-info	For each of the 72 ports, a decimal value represents the LIMs that have been configured for automatic sparing. The binary bitmap of the decimal value indicates the LIMs that have been configured for automatic sparing for each port. For example: `if-auto-spare-info[2] = 24` The number 24 (decimal) equals 11000 (binary). The bits that are set in this binary value (bits 4 and 5) map to the LIMs that have been configured for automatic sparing on this port (LIMs 4 and 5).

Parameter	Indicates

`lim-auto-spare-info`	For each of the 16 possible slots, parameters list the slot that has a compatible spare LIM.
	
	The following parameters indicate slot 1 contains a spare LIM of the same type as the LIMs in slots 4 and 5. These parameters track and display this information because the `sparing-mode` of the `lim-sparing-config` profile for slot 1 is set to `automatic`.
	
	`lim-auto-spare-info[4] = slot-1`
	`lim-auto-spare-info[5] = slot-1`
	
	Note See "Overview of the lim-sparing-config profile" on page 2-3 for additional details about this related profile.

Checking status with the rearslot command

The `rearslot` command shows the status of all the slots used for LPMs, PSMs, and CLT modules. It also reports on the status of the midplane redundancy bus. Slots that are equipped with IRMs or LPM-Rs are reported as `Empty` by the `rearslot` command.

Note When a copper loop is being tested on a Stinger LS unit with a PSM or a CLT module, the `rearslot` command does not display any midplane sparing bus usage.

For example, suppose that a Stinger FS+ is equipped with ADSL LIMs and SHDSL LIMs. The ADSL 48-port LIM in slot 1 has failed and is being replaced by the ADSL 48-port LIM in slot 14. The `rearslot` command reports the following information.

```
admin> rearslot
  Slot    Slot ID
 [  1 ]   91  48 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
.... .... .... .... .... .... .... XXXX XXXX
       3           2           1
6543 2109 8765 4321 0987 6543 2109 8765 4321
XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX
```

Test Access for LPMs with splitters

3

The 48-port LPM with splitters provides test access to the ADSL copper facilities through an RJ-11 test connector at the top of the module. The test connector can be used as an access point for testing any line served by any LPM in the Stinger chassis. Different versions of this LPM are available for installation in the Stinger Compact Remote, the Stinger FS and FS+, and the Stinger LS or RT chassis (see Table 1-2 on page 1-2 for details).

Note Currently, the 48-port LPM with splitters for the Stinger Compact Remote (STGRCR-LPM2-48-S) is the only LPM supported for that chassis.

Alternatives for testing Stinger subscriber lines

Stinger units can be equipped to provide several options for testing the subscriber lines to which they provide service.

Units equipped with the 48-port LPM with splitters can use an external test head, connected to RJ-11 `TEST PAIR` port of the LPM, to test any line in the chassis that is connected to an LPM with redundant switching capability. The commands and parameters that configure a connection for this method of testing are described in this chapter.

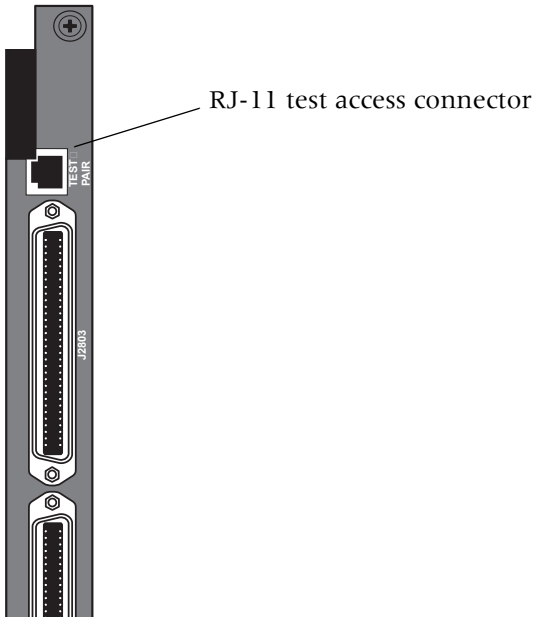
Units equipped with PSMs can utilize similar external test access by connecting an external test head to the PSM. Any line in the chassis that is connected to an LPM with redundant switching capability can be also be tested through this type of connection.

Units equipped with a CLT can utilize the internal testing capabilities of the CLT through the TAOS interface to conduct tests and view test results for any line in the chassis. The CLT has extensive testing capabilities that can be used to qualify any line in the chassis that is connected to an LPM with redundant switching capability. The CLT can also be used as an external test head for testing lines in other chassis. For more complete information about using the CLT and PSM for line testing see the *Stinger Copper Loop Test (CLT) Module Guide*.

LPM test connections

The location of the test connector on the 48-port LPM with splitters is shown in Figure 3-1.

Figure 3-1. 48-port LPM with splitters test access connector (Compact Remote model shown)



Note Left-right orientation of the RJ-11 test connector shown in Figure 3-1 is reversed on the 48-port LPM designed for use in Stinger FS units.

Note POTS lines, carrying voice service from the central office switch, are not accessible from this test connector.

Proper profile settings, or commands at the command line interface, select the line being tested. This line is available on the RJ-11 test connector as shown in Table 3-1.

Table 3-1. LPM test connector tip and ring assignment

Pair side	RJ-11 pin
Ring	3
Tip	4

Configuring test access

Tester access on the 48-port LPM with splitters can be activated by means of the TAOS profile `clt-ms-access`. This profile allows control of LPMs on all remote Stinger CR shelves from the command interface of the host Stinger. A test connection specified by the parameters in this profile takes effect when the profile is saved.

The `cltactivate` and `cltdeactivate` commands can also be used from the command line to control test access. A test connection specified by the variables of this command takes effect as soon as the command is entered.

After a system reset, sparing related testing should not be attempted until sparing initialization is complete. The following log-level alert message appears approximately 3 minutes after a reset, and indicates when sparing initialization is complete:

```
LOG alert, Shelf 1, Controller-2, Time: 12:30:59--
  Sparing Initialization complete.
```

Note On Stinger Compact Remote chassis, the test access (TA) status light on the COP will light and remain lit whenever test access is activated for any of the LPMs in the chassis.

Available shelves can be determined using the `dir` command:

```
admin> dir clt-ms-access
     3  11/08/2003 18:48:02  shelf-1
     3  11/14/2003 11:44:18  shelf-2
     3  11/14/2003 11:47:47  shelf-3
```

Only connections that look out onto the copper DSL facilities toward the subscriber are supported. This type of testing is supported in two scenarios:

- The RJ-11 test jack on the LPM is used to test facilities that pass through the LPM and are served by the LIM associated with that LPM
- The RJ-11 test jack on the LPM is used to test facilities that pass through another LPM in the same Stinger CR chassis.

The following example shows the `clt-ms-access` profile parameters with their default values for remote shelf 2.

```
[in CLT-MS-ACCESS/shelf-2]

cltm-shelf = shelf-2
cltm-slot = slot-16
access-slot = slot-16
access-port = 1
access-loop = 1
access-mode = looking-out
access-terminal = internal-tester-terminal
activate-access = no
access-result = idle
```

Parameter	Specifies
`cltm-shelf`	A read-only field that shows the shelf number where the LPM, CLT module, or PSM is installed.
`cltm-slot`	Slot number where the LPM, CLT module, or PSM is installed.
`access-slot`	Slot number of the LIM containing the copper loop to be tested.
`access-port`	Port number of the copper loop to be tested.

Parameter	Specifies
`access-loop`	Copper loop number of the T1 or EI port. This parameter applies only to copper loops connected to T1 or E1 LIMs and is ignored for all other LIMs. 1—Transmit copper loop. 2—Receive copper loop.
`access-mode`	Connection configuration of the copper loop: `bridged`—*Not supported on the 48-port LPM with splitters.* Copper loop is connected to the test head and the corresponding port of the spare LIM. `looking-out`—Copper loop is connected only to the test head. This is the default value.
`access-terminal`	Connection point of the copper loop: `internal-tester-terminal`—*Not supported for the 48-port LPM with splitters.* Copper loop is connected to the internal test terminals of the LPM, CLT module, or PSM. `external-tester-terminal`—Copper loop is connected to the external test terminals of the LPM, CLT module, or PSM. `auxiliary-tester-terminal`—*Not supported for the 48-port LPM with splitters.* Copper loop is connected to the auxiliary test terminals of the CLT module or PSM. `external-loop`—*Not supported for the 48-port LPM with splitters.* Internal test head of CLT module is connected to the TEST PAIR connector of the CLT module.
`activate-access`	Activates tester connection to the copper loop. `yes`—Copper loop is connected as specified. `no`—Copper loop is disconnected from test head or test terminals
`access-result`	Result of tester connection to the copper loop. This value is updated by the system after changes to the profile have been written. `idle`—Test head is inactive and no copper loops are connected. `access-activated`—Test head is active and copper loop is connected as specified. `resource-busy`—The resource to enable CLT module access is in use. Access failed.

The `cltactivate` and `cltdeactivate` commands can also be used from the command line to control test access. These commands use the following format:

`cltactivate [-s` *`shelf`*`]` *`slot port [cltslot [mode [terminal [loop]]]]`*

Note On the 48-port LPM with splitters only `looking-out` and `external` are supported for the `mode` and `terminal` parameters.

```
cltdeactivate [-s shelf]
```

Note When a `cltactivate` or `cltdeactivate` command is used without the optional `[-s shelf]` parameter, the command is applied by default on the local chassis supporting the current administrative session.

For additional details about the TAOS profiles and commands used for testing Stinger facilities, see the *Stinger Copper Loop Test (CLT) Module Guide*.

Testing facilities for LPM and LIM modules in the same numbered slots

The following examples illustrate the procedures for establishing a test connection on a Stinger designated as shelf 2. This test connection is from the RJ-11 test port on a 48-port LPM with splitters in LPM slot 1 to DSL line 3 of the LIM in LIM slot 1.

Setting up the test with the `clt-ms-access` profile

The following procedure will set up the test using the `clt-ms-access` profile:

```
admin> read clt-ms-access shelf-2
CLT-MS-ACCESS/shelf-2 read
admin> set cltm-slot = 1
admin> set access-slot = 1
admin> set access-port = 3
admin> set access-terminal = external-tester-terminal
admin> set activate-access = yes
admin> write
CLT-MS-ACCESS/shelf-2 written
```

Setting up the test from the command line

The following command will set up the test from the command line using the cltactivate command:

```
admin> cltActivate -s 2 1 3 1 looking-out external
```

Testing facilities LPM and LIM modules in different numbered slots

The following examples illustrate the procedures for establishing a test connection on a Stinger designated as shelf 2. This test connection is from the RJ-11 test port on a 48-port LPM with splitters in LPM slot 1 to DSL line 3 on the LIM in LIM slot 2.

Note The test connection established on the RJ-11 port of the LPM requesting the test is duplicated on the RJ-11 port of the LPM associated with the LIM port being tested. It does not appear on other LPMs in a chassis.

Setting up the test with the `clt-ms-access` profile

The following procedure will set up the test using the `clt-ms-access` profile:

```
admin> read clt-ms-access shelf-2
CLT-MS-ACCESS/shelf-2 read
admin> set cltm-slot = 1
admin> set access-slot = 2
admin> set access-port = 3
admin> set access-terminal = external-tester-terminal
admin> set activate-access = yes
```

```
admin> write
CLT-MS-ACCESS/shelf-2 written
```

Setting up the test from the command line

The following command will set up the test from the command line using the cltactivate command:

```
admin> cltActivate -s 2 2 3 1 looking-out external
```

Clearing a test

When clearing a test it is only necessary to specify the shelf on which the test is active, and then deactivate it in the `clt-ms-profile`, or with the `cltdeactivate` command. The following examples show both methods for clearing a test on a unit designated as shelf 2.

```
admin> read clt-ms-access shelf-2
CLT-MS-ACCESS/shelf-2 read
admin> set activate-access = no
admin> write
CLT-MS-ACCESS/shelf-2 written
```

```
admin> cltdeactivate -s 2
```

LPM-48 with VDSL2 splitters

The R9.10 release makes available the following new LPMs:

- LPM-48 with VDSL splitters, for the Stinger Compact remote, LS and RT systems.
- LPM-48 with splitters for FS system. However, it provides it provides only line protection functionality. Support for port sparing or CLT test is not available for the LPM-48 with splitter for the FS system.

Note LPM does not support accessing CLT and applying for sealing current simultaneously.

Additional functionalities of LPM-48

Apart from being a regular LPM, the LPM-48 supports the following three additional functionalities for the Stinger Compact remote, LS and RT systems only. They do not apply to the LPM-48 used in the FS+ system.

- "Accessing Copper loop test using external test head" on page 3-6
- "Configuring periodical sealing current" on page 3-7
- "Viewing on-demand sealing current test status" on page 3-7

Accessing Copper loop test using external test head

The interface of the CLT-ACCESS test remains unchanged. However, if the LPM is under sealing current applying either normal sealing current mod or on-demand sealing current test, the CLT ACCESS test fails with the message `resource busy`.

Configuring periodical sealing current

Updates to the AL-DMT and SYSTEM profile support configuring periodical sealing current.

Configuring per port sealing-current

The new parameter `AL-DMT:sealing current` enables configuring per port sealing-current.

The parameter sealing current is enabled only when the rear LPM is Compact Remote or LS VDSL LPM. Valid values are yes and no. Setting sealing current to yes enables configuring per port sealing current and setting to no disables configuring per port sealing.

The following listing of the AL-DMT profile lists the new parameter in the profile with the default value of sealing-current.

```
admin>read al-dmt {1 2 1}
AL-DMT/{ shelf-1 slot-2 1 } read
admin>list
[in AL-DMT/{ shelf-1 slot-2 1 }]
...
sealing-current = no
```

Configuring pulse width and frequency

The new parameters `SYSTEM: sealing-current-pulse-width` and `SYSTEM:sealing-current-frequency` enable configuring pulse width and frequency per system.

Both the parameters are system-wide variables.

The parameter `sealing-current-pulse-width` is the value of the sealing current pulse width in seconds. The range is 1 - 10.

The parameter `sealing-current frequency` is the value of the sealing current frequency pulse per day. The range is 1 - 10.

The following listing of the SYSTEM profile lists the new parameters with their default values.

```
admin>read system
SYSTEM read
admin>list
[in SYSTEM]
...
sealing-current-pulse-width = 1
sealing-current-frequency = 1
```

Viewing on-demand sealing current test status

The sealing current test applies continuous sealing to a port for a length of time set by the command.

The new command `scDiagMode` enables viewing the status of the on-demand sealing current test. You can enable, disable and view the status of the on-demand sealing current test for each LPM slot.

Usage `scDiagMode -[e | t | d | s]`

Command element	Description
`-e slot port [-t timeout]`	Enables SC diagnostic on slot/port. Default timeout is five minutes.
`t`	Enables SC diagnostic on slot/port. Default time out is five minutes. Sealing current test is disabled for the slot after the time-out period. If time out equals 0, then time out is disabled. The sealing current test is disabled on issuing the disable command.
`-d` *slot*	Disables SC diagnostic on slot.
`-s`	Displays SC diagnostic status for slot.

Example

```
admin>rear
Shelf 1 (standalone) :
  Slot    Slot ID
 [  1 ]    0  Empty ( IRM, LPM )
 [  2 ]   ec  48 port VDSL2 LPM for CR/LS/RT/LSPLUS <== the lpm
 [  3 ]   9a  LSRT 48 port LPM
 [  4 ]    0  Empty ( IRM, 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 ]    0  Empty ( IRM, LPM )
 [ 15 ]    0  Empty ( IRM, LPM )
 [ 16 ]    0  Empty ( IRM, LPM )

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 in use

admin>scdiagmode -s 2
Slot 2 don't have sealing current diagnostic enabled.
admin>scdiagmode -e 2 3

LOG notice, Shelf 1, Controller-1, Time: 16:49:38--
  Sealing Current Diagnostic enabled for 2/3.

admin>scdiagmode -s 2
Slot 2 has sealing current diagnostic on port 3.
admin>scdiagmode -d 2

LOG notice, Shelf 1, Controller-1, Time: 16:50:01--
  Sealing Current Diagnostic disabled for slot 2.

admin>scdiagmode -s 2
Slot 2 don't have sealing current diagnostic enabled.

admin>scdiagmode -e 2 1 -t 1

LOG notice, Shelf 1, Controller-1, Time: 16:50:37--
  Sealing Current Diagnostic enabled for 2/1.

admin>scdiagmode -s 2
Slot 2 has sealing current diagnostic on port 1.

After 1 minute:
admin>
LOG notice, Shelf 1, Controller-1, Time: 16:51:37--
  Sealing Current Diagnostic expired for slot 2.


admin>scdiagmode -s 2
Slot 2 don't have sealing current diagnostic enabled.
```

CLT support restriction

Support for simultaneous CLT-ACCESS and sealing current test is not available.

The following example shows that CLT fails when sealing current diagnostic is enabled. However, when you disable the sealing current diagnostic, CLT-ACCESS can be enabled.

```
admin>scdiagmode -e 2 1

LOG notice, Shelf 1, Controller-1, Time: 16:52:43--
  Sealing Current Diagnostic enabled for 2/1.

admin>cltactivate 2 1 2 looking-out external
admin>
```

```
LOG notice, Shelf 1, Controller-1, Time: 16:53:01--
  Copper loop access resources busy at shelf 1
<== clt access failed here

admin>scdiagmode -d 2

LOG notice, Shelf 1, Controller-1, Time: 16:53:43--
  Sealing Current Diagnostic disabled for slot 2.

admin>cltde
 Copper loop access not activated

LOG notice, Shelf 1, Controller-1, Time: 16:53:49--
  Copper loop access idle at shelf 1
admin>cltactivate 2 1 2 looking-out external
admin>
LOG notice, Shelf 1, Controller-1, Time: 16:53:54--
  Copper loop access activated at shelf 1

<== disable the sealing current on-demand test and clt access activated.
```

The following example shows that when CLT is activated, then the sealing current on-demand test fails.

```
scdiagmode -e 2 5
Slot enable sealing current diagnostic failed.
 Possible reasons: test access on, diagnostic already on
                   or normal sealing current is sending.
<= with clt access activated sealing current on-demand test fails.

admin>cltde
admin>
LOG notice, Shelf 1, Controller-1, Time: 17:05:16--
  Copper loop access idle at shelf 1
admin>scdiagmode -e 2 5

LOG notice, Shelf 1, Controller-1, Time: 17:05:19--
  Sealing Current Diagnostic enabled for 2/5.
<== after clt deactivated sealing current test is enabled successful.
```

Displaying the LPM VDSL for Stinger FS

The `rear` command displays the LPM VDSL for FS system.

Usage shelf-router-1/8> **rear**

```
Shelf 1 (master) :
Slot    Slot ID
 [  1 ]    3  Empty ( IRM, LPM )
 [  2 ]    3  Empty ( IRM, LPM )
 [  3 ]   92  48 port Enhanced LPM
 [  4 ]   92  48 port Enhanced LPM
 [  5 ]    3  Empty ( IRM, LPM )
 [  6 ]   eb  48 port VDSL2 LPM for FSPLUS <== this
 [  7 ]    3  Empty ( IRM, LPM )
 [ 10 ]    3  Empty ( IRM, LPM )
 [ 11 ]    3  Empty ( IRM, LPM )
 [ 12 ]    3  Empty ( IRM, LPM )
 [ 13 ]    3  Empty ( IRM, LPM )
 [ 14 ]    3  Empty ( IRM, LPM )
 [ 15 ]   92  48 port Enhanced LPM
 [ 16 ]    3  Empty ( IRM, LPM )

 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
```

SNMP changes to support VDSL LPM with splitters

Two following two new slotTypes support the two new VDSL LPM with splitters:

- rear-cr-lpm-48-vdsl(266), -- Stinger-10 48 port VDSL2+ LPM with splitter for LS/RT/CR
- rear-fs-lpm-48-vdsl(267) -- Stinger-10 48 port VDSL2+ LPM with splitter for FSPLUS

On a LS system with the LPM for CR/LS/RT

```
slotType.1 = empty(2)
slotType.2 = gs-a-dadsl-atm-48ports(116)
slotType.3 = empty(2)
slotType.4 = empty(2)
slotType.5 = empty(2)
slotType.8 = stinger-control-module-v2(133)
slotType.9 = empty(2)
slotType.17 = empty(2)
slotType.18 = empty(2)
slotType.19 = empty(2)
```

```
slotType.20 = rear-cr-lpm-48-vdsl(266) <==
slotType.21 = rearslot-ls-lpm-48-rp(115)
slotType.22 = empty(2)
slotType.23 = empty(2)
```

On a FS system with LPM for FS

```
slotType.1 = empty(2)
slotType.2 = empty(2)
slotType.3 = empty(2)
slotType.4 = empty(2)
slotType.5 = empty(2)
slotType.6 = empty(2)
slotType.7 = empty(2)
slotType.8 = stinger-ip21-control-module(240)
slotType.9 = empty(2)
slotType.10 = empty(2)
slotType.11 = empty(2)
slotType.12 = empty(2)
slotType.13 = empty(2)
slotType.14 = empty(2)
slotType.15 = empty(2)
slotType.16 = empty(2)
slotType.17 = empty(2)
slotType.18 = slotOc12Daughter-ir(209)
slotType.19 = empty(2)
slotType.20 = empty(2)
slotType.21 = rearslot-lpm-48-rp(109)
slotType.22 = rearslot-lpm-48-rp(109)
slotType.23 = empty(2)
slotType.24 = rear-fs-lpm-48-vdsl(267) <==
slotType.25 = empty(2)
slotType.26 = empty(2)
slotType.27 = empty(2)
slotType.28 = empty(2)
slotType.29 = empty(2)
slotType.30 = empty(2)
slotType.31 = rearslot-lpm-48-rp(109)
slotType.32 = empty(2)
```

Cabling Connections

A

This section contains information about the pin assignments for the 50-pin and 64-pin connectors on LPMs. Information about lines and ports associated with the connector pins and the color codes for wiring to these connectors is also included.

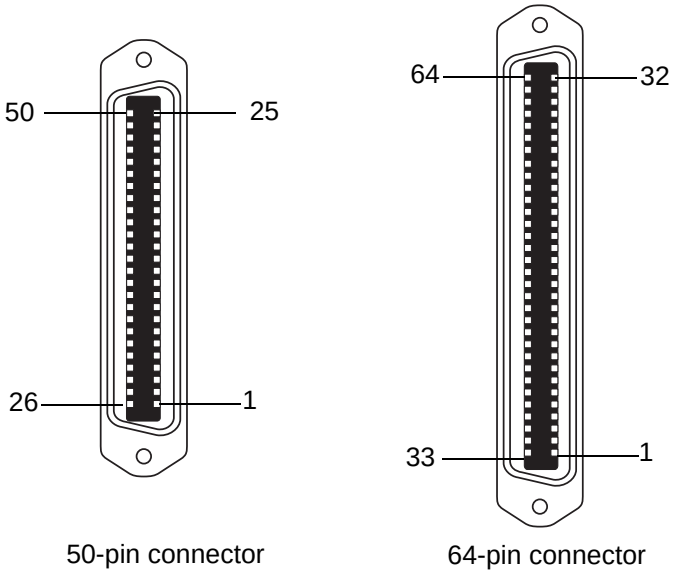
Details about wiring to connectors within enclosure for Compact Remote units are covered in the *Stinger Compact Remote ATM DSLAM Getting Started Guide* and the *Stinger Compact Remote IP DSLAM Getting Started Guide*.

Note When attaching cables to LPMs with multiple connectors, attach the cable for the bottom connector first and the cable for the top connector last. When removing cables, remove the top connector first and the bottom connector last. Cables for connectors that attach to the LPMs extend from the bottom of the cable connectors. Cables that are attached to upper connectors restrict access to cables connectors that are below them.

LPM connectors

All LPMs, except the 48-port LPM with splitters, have one, two, or three, RJ-21X, 50-pin telephone company connectors. The 48-port LPM with splitters has three 64-pin Tyco connectors. Both types of connectors and their pin numbering assignments are illustrated in Figure A-1.

Figure A-1. LPM connectors



LPMs without splitters

The 24-port, 48-port, and 72-port LPMs have one 50-pin connector for each group of 24 ports. Connections for the connectors on these LPMs are detailed in Table A-1, Table A-2, and Table A-3.

Table A-1. Cable pinouts for the PORT 1-24 connector

Pin	Signal	Color code	Pin	Signal	Color code
1	Line 1 ring	Blue/white	26	Line 1 tip	White/blue
2	Line 2 ring	Orange/white	27	Line 2 tip	White/orange
3	Line 3 ring	Green/white	28	Line 3 tip	White/green
4	Line 4 ring	Brown/white	29	Line 4 tip	White/brown
5	Line 5 ring	Slate/white	30	Line 5 tip	White/slate
6	Line 6 ring	Blue/red	31	Line 6 tip	Red/blue
7	Line 7 ring	Orange/red	32	Line 7 tip	Red/orange
8	Line 8 ring	Green/red	33	Line 8 tip	Red/green
9	Line 9 ring	Brown/red	34	Line 9 tip	Red/brown
10	Line 10 ring	Slate/red	35	Line 10 tip	Red/slate
11	Line 11 ring	Blue/black	36	Line 11 tip	Black/blue

Table A-1. Cable pinouts for the PORT 1-24 connector (Continued)

Pin	Signal	Color code	Pin	Signal	Color code
12	Line 12 ring	Orange/black	37	Line 12 tip	Black/orange
13	Line 13 ring	Green/black	38	Line 13 tip	Black/green
14	Line 14 ring	Brown/black	39	Line 14 tip	Black/brown
15	Line 15 ring	Slate/black	40	Line 15 tip	Black/slate
16	Line 16 ring	Blue/yellow	41	Line 16 tip	Yellow/blue
17	Line 17 ring	Orange/yellow	42	Line 17 tip	Yellow/orange
18	Line 18 ring	Green/yellow	43	Line 18 tip	Yellow/green
19	Line 19 ring	Brown/yellow	44	Line 19 tip	Yellow/brown
20	Line 20 ring	Slate/yellow	45	Line 20 tip	Yellow/slate
21	Line 21 ring	Blue/violet	46	Line 21 tip	Violet/blue
22	Line 22 ring	Orange/violet	47	Line 22 tip	Violet/orange
23	Line 23 ring	Green/violet	48	Line 23 tip	Violet/green
24	Line 24 ring	Brown/violet	49	Line 24 tip	Violet/brown
25	NC	N/A	50	NC	N/A

Table A-2. Cable pinouts for the PORT 25-48 connector

Pin	Signal	Color code	Pin	Signal	Color code
1	Port 25 ring	Blue/white	26	Port 25 tip	White/blue
2	Port 26 ring	Orange/white	27	Port 26 tip	White/orange
3	Port 27 ring	Green/white	28	Port 27 tip	White/green
4	Port 28 ring	Brown/white	29	Port 28 tip	White/brown
5	Port 29 ring	Slate/white	30	Port 29 tip	White/slate
6	Port 30 ring	Blue/red	31	Port 30 tip	Red/blue
7	Port 31 ring	Orange/red	32	Port 31 tip	Red/orange
8	Port 32 ring	Green/red	33	Port 32 tip	Red/green
9	Port 33 ring	Brown/red	34	Port 33 tip	Red/brown

Table A-2. Cable pinouts for the PORT 25-48 connector (Continued)

Pin	Signal	Color code	Pin	Signal	Color code
10	Port 34 ring	Slate/red	35	Port 34 tip	Red/slate
11	Port 35 ring	Blue/black	36	Port 35 tip	Black/blue
12	Port 36 ring	Orange/black	37	Port 36 tip	Black/orange
13	Line 37 ring	Green/black	38	Line 37 tip	Black/green
14	Line 38 ring	Brown/black	39	Line 38 tip	Black/brown
15	Line 39 ring	Slate/black	40	Line 39 tip	Black/slate
16	Line 40 ring	Blue/yellow	41	Line 40 tip	Yellow/blue
17	Line 41 ring	Orange/yellow	42	Line 41 tip	Yellow/orange
18	Line 42 ring	Green/yellow	43	Line 42 tip	Yellow/green
19	Line 43 ring	Brown/yellow	44	Line 43 tip	Yellow/brown
20	Line 44 ring	Slate/yellow	45	Line 44 tip	Yellow/slate
21	Line 45 ring	Blue/violet	46	Line 45 tip	Violet/blue
22	Line 46 ring	Orange/violet	47	Line 46 tip	Violet/orange
23	Line 47 ring	Green/violet	48	Line 47 tip	Violet/green
24	Line 48 ring	Brown/violet	49	Line 48 tip	Violet/brown
25	NC	N/A	50	NC	N/A

Table A-3. Cable pinouts for the PORT 49-72 connector

Pin	Signal	Color code	Pin	Signal	Color code
1	Port 49 ring	Blue/white	26	Port 49 tip	White/blue
2	Port 50 ring	Orange/white	27	Port 50 tip	White/orange
3	Port 51 ring	Green/white	28	Port 51 tip	White/green
4	Port 52 ring	Brown/white	29	Port 52 tip	White/brown
5	Port 53 ring	Slate/white	30	Port 53 tip	White/slate
6	Port 54 ring	Blue/red	31	Port 54 tip	Red/blue
7	Port 55 ring	Orange/red	32	Port 55 tip	Red/orange

Table A-3. Cable pinouts for the PORT 49-72 connector (Continued)

Pin	Signal	Color code	Pin	Signal	Color code
8	Port 56 ring	Green/red	33	Port 56 tip	Red/green
9	Port 57 ring	Brown/red	34	Port 57 tip	Red/brown
10	Port 58 ring	Slate/red	35	Port 58 tip	Red/slate
11	Port 59 ring	Blue/black	36	Port 59 tip	Black/blue
12	Port 60 ring	Orange/black	37	Port 60 tip	Black/orange
13	Line 61 ring	Green/black	38	Line 61 tip	Black/green
14	Line 62 ring	Brown/black	39	Line 62 tip	Black/brown
15	Line 63 ring	Slate/black	40	Line 63 tip	Black/slate
16	Line 64 ring	Blue/yellow	41	Line 64 tip	Yellow/blue
17	Line 65 ring	Orange/yellow	42	Line 65 tip	Yellow/orange
18	Line 66 ring	Green/yellow	43	Line 66 tip	Yellow/green
19	Line 67 ring	Brown/yellow	44	Line 67 tip	Yellow/brown
20	Line 68 ring	Slate/yellow	45	Line 68 tip	Yellow/slate
21	Line 69 ring	Blue/violet	46	Line 69 tip	Violet/blue
22	Line 70 ring	Orange/violet	47	Line 70 tip	Violet/orange
23	Line 71 ring	Green/violet	48	Line 71 tip	Violet/green
24	Line 72 ring	Brown/violet	49	Line 72 tip	Violet/brown
25	NC	N/A	50	NC	N/A

LPMs without splitters used for 4-wire connections

A LIM that supports 24 four-wire connections, such as a T1 or E1 module, must use a 48-port LPM. Optionally, a 24-port LPM can be used for any LIM supporting 12 or fewer four-wire ports. Table B-7 shows the USOC RJ-21X cable pinouts for the lower 50-pin connector for four-wire connection. Table B-8 shows the cable pinouts for the upper 50-pin connector.

Table A-4. Lower connector pin assignments for four-wire connections

Four-wire interface	Transmit tip	Transmit ring	Receive tip	Receive ring
1	Pin 26	Pin 1	Pin 27	Pin 2

Table A-4. Lower connector pin assignments for four-wire connections (Continued)

Four-wire interface	Transmit tip	Transmit ring	Receive tip	Receive ring
2	Pin 28	Pin 3	Pin 29	Pin 4
3	Pin 30	Pin 5	Pin 31	Pin 6
4	Pin 32	Pin 7	Pin 33	Pin 8
5	Pin 34	Pin 9	Pin 35	Pin 10
6	Pin 36	Pin 11	Pin 37	Pin 12
7	Pin 38	Pin 13	Pin 39	Pin 14
8	Pin 40	Pin 15	Pin 41	Pin 16
9	Pin 42	Pin 17	Pin 43	Pin 18
10	Pin 44	Pin 19	Pin 45	Pin 20
11	Pin 46	Pin 21	Pin 47	Pin 22
12	Pin 48	Pin 23	Pin 49	Pin 24

Table A-5. Upper connector pin assignments for four-wire connections

Four-wire interface	Transmit tip	Transmit ring	Receive tip	Receive ring
13	Pin 26	Pin 1	Pin 27	Pin 2
14	Pin 28	Pin 3	Pin 29	Pin 4
15	Pin 30	Pin 5	Pin 31	Pin 6
16	Pin 32	Pin 7	Pin 33	Pin 8
17	Pin 34	Pin 9	Pin 35	Pin 10
18	Pin 36	Pin 11	Pin 37	Pin 12
19	Pin 38	Pin 13	Pin 39	Pin 14
20	Pin 40	Pin 15	Pin 41	Pin 16
21	Pin 42	Pin 17	Pin 43	Pin 18
22	Pin 44	Pin 19	Pin 45	Pin 20
23	Pin 46	Pin 21	Pin 47	Pin 22

Table A-5. Upper connector pin assignments for four-wire connections (Continued)

Four-wire interface	Transmit tip	Transmit ring	Receive tip	Receive ring
24	Pin 48	Pin 23	Pin 49	Pin 24

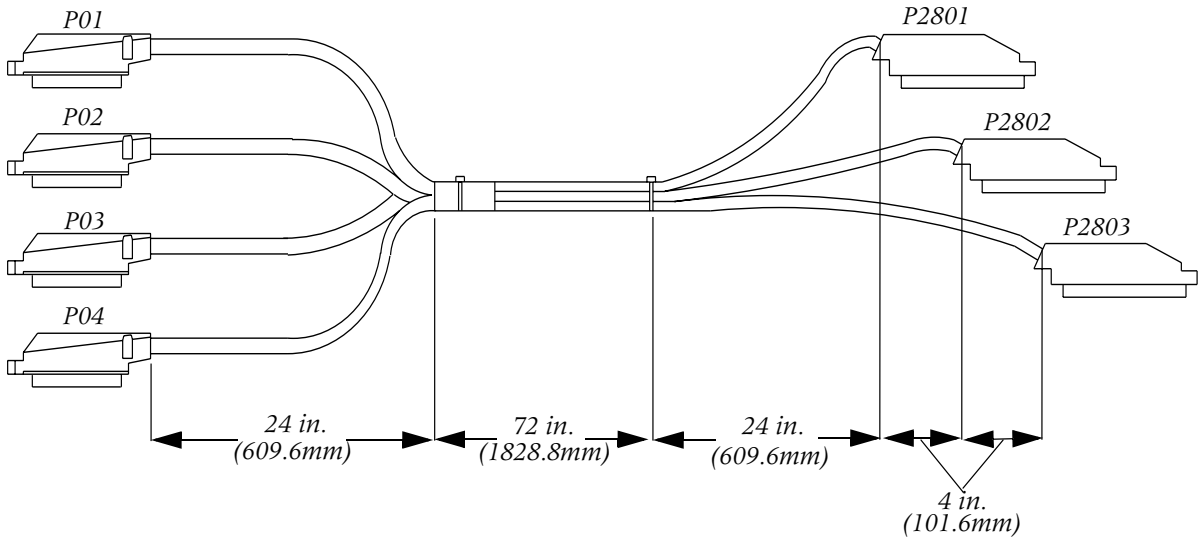
48-port LPM with splitters

The 48-port LPM with splitters has three 64-pin connectors, labeled J2801, J2802, and J2803. Cables that connect to the LPM have 3 matching connectors labeled P2801, P2802, and P2803.

In the Stinger Compact Remote chassis, cabling to the 48-port LIM with splitters is hardwired to the protection blocks in the enclosure. For detailed wiring information for the Stinger Compact Remote enclosure, see The *Stinger Compact Remote Installation and Configuration Guide*.

The cable for the 48-port LPM with splitters designed for use in Stinger FS, LS, and RT chassis (STGR-LPM-CABLE) also connect to the LPM with three 64-pin connectors, labeled P2801, P2802, and P2803. The other end of these cables terminate in four 50-pin connectors, labeled P01, P02, P03, and P04. This is illustrated in Figure A-2.

Figure A-2. Cable for 48-port LPM with splitters in Stinger FS, LS, and RT chassis



The connections and color codes between the three 64-pin connectors and the four 50-pin connectors of the 48-port LPM with splitters are detailed in Table A-6.

Note The wiring information in Table A-6 is organized starting with the first pair (tip and ring) of connector P2803 at the top of the LPM, and ending with the last pair of connector P2801 at the bottom of the LPM.

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P03	1	Blue/White	1R(POTS)	1	P2803
P03	26	White/Blue	1T(POTS)	33	P2803
P03	2	Orange/White	2R(POTS)	2	P2803
P03	27	White/Orange	2T(POTS)	34	P2803
P03	3	Green/White	3R(POTS)	3	P2803
P03	28	White/Green	3T(POTS)	35	P2803
P03	4	Brown/White	4R(POTS)	4	P2803
P03	29	White/Brown	4T(POTS)	36	P2803
P03	5	Slate/White	5R(POTS)	5	P2803
P03	30	White/Slate	5T(POTS)	37	P2803
P03	6	Blue/Red	6R(POTS)	6	P2803
P03	31	Red/Blue	6T(POTS)	38	P2803
P03	7	Orange/Red	7R(POTS)	7	P2803
P03	32	Red/Orange	7T(POTS)	39	P2803
P03	8	Blue	8R(POTS)	8	P2803
P03	33	White	8T(POTS)	40	P2803
P03	9	Orange	9R(POTS)	9	P2803
P03	34	White	9T(POTS)	41	P2803
P03	10	Green	10R(POTS)	10	P2803
P03	35	White	10T(POTS)	42	P2803
P03	11	Brown	11R(POTS)	11	P2803
P03	36	White	11T(POTS)	43	P2803

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P03	12	Slate	12R(POTS)	12	P2803
P03	37	White	12T(POTS)	44	P2803
P03	13	Blue	13R(POTS)	13	P2803
P03	38	Red	13T(POTS)	45	P2803
P03	14	Orange	14R(POTS)	14	P2803
P03	39	Red	14T(POTS)	46	P2803
P03	15	Green	15R(POTS)	15	P2803
P03	40	Red	15T(POTS)	47	P2803
P03	16	Brown	16R(POTS)	16	P2803
P03	41	Red	16T(POTS)	48	P2803
P03	17	Slate	17R(POTS)	17	P2803
P03	42	Red	17T(POTS)	49	P2803
P03	18	Blue	18R(POTS)	18	P2803
P03	43	Black	18T(POTS)	50	P2803
P03	19	Orange	19R(POTS)	19	P2803
P03	44	Black	19T(POTS)	51	P2803
P03	20	Green	20R(POTS)	20	P2803
P03	45	Black	20T(POTS)	52	P2803
P03	21	Brown	21R(POTS)	21	P2803
P03	46	Black	21T(POTS)	53	P2803
P03	22	Slate	22R(POTS)	22	P2803
P03	47	Black	22T(POTS)	54	P2803
P03	23	Blue	23R(POTS)	23	P2803
P03	48	Yellow	23T(POTS)	55	P2803
P03	24	Orange	24R(POTS)	24	P2803
P03	49	Yellow	24T(POTS)	56	P2803

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P04	1	Green	25R(POTS)	25	P2803
P04	26	Yellow	25T(POTS)	57	P2803
P04	2	Brown	26R(POTS)	26	P2803
P04	27	Yellow	26T(POTS)	58	P2803
P04	3	Slate	27R(POTS)	27	P2803
P04	28	Yellow	27T(POTS)	59	P2803
P04	4	Blue	28R(POTS)	28	P2803
P04	29	Violet	28T(POTS)	60	P2803
P04	5	Orange	29R(POTS)	29	P2803
P04	30	Violet	29T(POTS)	61	P2803
P04	6	Green	30R(POTS)	30	P2803
P04	31	Violet	30T(POTS)	62	P2803
P04	7	Brown	31R(POTS)	31	P2803
P04	32	Violet	31T(POTS)	63	P2803
P04	8	Slate	32R(POTS)	32	P2803
P04	33	Violet	32T(POTS)	64	P2803
P02	9	Blue/White	33R(ADSL+POTS)	1	P2802
P02	34	White/Blue	33T(ADSL+POTS)	33	P2802
P02	10	Orange/White	34R(ADSL+POTS)	2	P2802
P02	35	White/Orange	34T(ADSL+POTS)	34	P2802
P02	11	Green/White	35R(ADSL+POTS)	3	P2802
P02	36	White/Green	35T(ADSL+POTS)	35	P2802
P02	12	Brown/White	36R(ADSL+POTS)	4	P2802
P02	37	White/Brown	36T(ADSL+POTS)	36	P2802
P02	13	Slate/White	37R(ADSL+POTS)	5	P2802
P02	38	White/Slate	37T(ADSL+POTS)	37	P2802

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P02	14	Blue/Red	38R(ADSL+POTS)	6	P2802
P02	39	Red/Blue	38T(ADSL+POTS)	38	P2802
P02	15	Orange/Red	39R(ADSL+POTS)	7	P2802
P02	40	Red/Orange	39T(ADSL+POTS)	39	P2802
P02	16	Blue	40R(ADSL+POTS)	8	P2802
P02	41	White	40T(ADSL+POTS)	40	P2802
P02	17	Orange	41R(ADSL+POTS)	9	P2802
P02	42	White	41T(ADSL+POTS)	41	P2802
P02	18	Green	42R(ADSL+POTS)	10	P2802
P02	43	White	42T(ADSL+POTS)	42	P2802
P02	19	Brown	43R(ADSL+POTS)	11	P2802
P02	44	White	43T(ADSL+POTS)	43	P2802
P02	20	Slate	44R(ADSL+POTS)	12	P2802
P02	45	White	44T(ADSL+POTS)	44	P2802
P02	21	Blue	45R(ADSL+POTS)	13	P2802
P02	46	Red	45T(ADSL+POTS)	45	P2802
P02	22	Orange	46R(ADSL+POTS)	14	P2802
P02	47	Red	46T(ADSL+POTS)	46	P2802
P02	23	Green	47R(ADSL+POTS)	15	P2802
P02	48	Red	47T(ADSL+POTS)	47	P2802
P02	24	Brown	48R(ADSL+POTS)	16	P2802
P02	49	Red	48T(ADSL+POTS)	48	P2802
P04	9	Slate	33R(POTS)	17	P2802
P04	34	Red	33T(POTS)	49	P2802
P04	10	Blue	34R(POTS)	18	P2802
P04	35	Black	34T(POTS)	50	P2802

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P04	11	Orange	35R(POTS)	19	P2802
P04	36	Black	35T(POTS)	51	P2802
P04	12	Green	36R(POTS)	20	P2802
P04	37	Black	36T(POTS)	52	P2802
P04	13	Brown	37R(POTS)	21	P2802
P04	38	Black	37T(POTS)	53	P2802
P04	14	Slate	38R(POTS)	22	P2802
P04	39	Black	38T(POTS)	54	P2802
P04	15	Blue	39R(POTS)	23	P2802
P04	40	Yellow	39T(POTS)	55	P2802
P04	16	Orange	40R(POTS)	24	P2802
P04	41	Yellow	40T(POTS)	56	P2802
P04	17	Green	41R(POTS)	25	P2802
P04	42	Yellow	41T(POTS)	57	P2802
P04	18	Brown	42R(POTS)	26	P2802
P04	43	Yellow	42T(POTS)	58	P2802
P04	19	Slate	43R(POTS)	27	P2802
P04	44	Yellow	43T(POTS)	59	P2802
P04	20	Blue	44R(POTS)	28	P2802
P04	45	Violet	44T(POTS)	60	P2802
P04	21	Orange	45R(POTS)	29	P2802
P04	46	Violet	45T(POTS)	61	P2802
P04	22	Green	46R(POTS)	30	P2802
P04	47	Violet	46T(POTS)	62	P2802
P04	23	Brown	47R(POTS)	31	P2802
P04	48	Violet	47T(POTS)	63	P2802

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P04	24	Slate	48R(POTS)	32	P2802
P04	49	Violet	48T(POTS)	64	P2802
P01	1	Blue/White	1R(ADSL+POTS)	1	P2801
P01	26	White/Blue	1T(ADSL+POTS)	33	P2801
P01	2	Orange/White	2R(ADSL+POTS)	2	P2801
P01	27	White/Orange	2T(ADSL+POTS)	34	P2801
P01	3	Green/White	3R(ADSL+POTS)	3	P2801
P01	28	White/Green	3T(ADSL+POTS)	35	P2801
P01	4	Brown/White	4R(ADSL+POTS)	4	P2801
P01	29	White/Brown	4T(ADSL+POTS)	36	P2801
P01	5	Slate/White	5R(ADSL+POTS)	5	P2801
P01	30	White/Slate	5T(ADSL+POTS)	37	P2801
P01	6	Blue/Red	6R(ADSL+POTS)	6	P2801
P01	31	Red/Blue	6T(ADSL+POTS)	38	P2801
P01	7	Orange/Red	7R(ADSL+POTS)	7	P2801
P01	32	Red/Orange	7T(ADSL+POTS)	39	P2801
P01	8	Blue	8R(ADSL+POTS)	8	P2801
P01	33	White	8T(ADSL+POTS)	40	P2801
P01	9	Orange	9R(ADSL+POTS)	9	P2801
P01	34	White	9T(ADSL+POTS)	41	P2801
P01	10	Green	10R(ADSL+POTS)	10	P2801
P01	35	White	10T(ADSL+POTS)	42	P2801
P01	11	Brown	11R(ADSL+POTS)	11	P2801
P01	36	White	11T(ADSL+POTS)	43	P2801
P01	12	Slate	12R(ADSL+POTS)	12	P2801
P01	37	White	12T(ADSL+POTS)	44	P2801

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P01	13	Blue	13R(ADSL+POTS)	13	P2801
P01	38	Red	13T(ADSL+POTS)	45	P2801
P01	14	Orange	14R(ADSL+POTS)	14	P2801
P01	39	Red	14T(ADSL+POTS)	46	P2801
P01	15	Green	15R(ADSL+POTS)	15	P2801
P01	40	Red	15T(ADSL+POTS)	47	P2801
P01	16	Brown	16R(ADSL+POTS)	16	P2801
P01	41	Red	16T(ADSL+POTS)	48	P2801
P01	17	Slate	17R(ADSL+POTS)	17	P2801
P01	42	Red	17T(ADSL+POTS)	49	P2801
P01	18	Blue	18R(ADSL+POTS)	18	P2801
P01	43	Black	18T(ADSL+POTS)	50	P2801
P01	19	Orange	19R(ADSL+POTS)	19	P2801
P01	44	Black	19T(ADSL+POTS)	51	P2801
P01	20	Green	20R(ADSL+POTS)	20	P2801
P01	45	Black	20T(ADSL+POTS)	52	P2801
P01	21	Brown	21R(ADSL+POTS)	21	P2801
P01	46	Black	21T(ADSL+POTS)	53	P2801
P01	22	Slate	22R(ADSL+POTS)	22	P2801
P01	47	Black	22T(ADSL+POTS)	54	P2801
P01	23	Blue	23R(ADSL+POTS)	23	P2801
P01	48	Yellow	23T(ADSL+POTS)	55	P2801
P01	24	Orange	24R(ADSL+POTS)	24	P2801
P01	49	Yellow	24T(ADSL+POTS)	56	P2801
P02	1	Green	25R(ADSL+POTS)	25	P2801
P02	26	Yellow	25T(ADSL+POTS)	57	P2801

Table A-6. Stinger FS, LS and RT cable connections for 48-port LPM with splitters

Connector	Pin No.	Color Code	Signal	Pin No.	Connector
P02	2	Brown	26R(ADSL+POTS)	26	P2801
P02	27	Yellow	26T(ADSL+POTS)	58	P2801
P02	3	Slate	27R(ADSL+POTS)	27	P2801
P02	28	Yellow	27T(ADSL+POTS)	59	P2801
P02	4	Blue	28R(ADSL+POTS)	28	P2801
P02	29	Violet	28T(ADSL+POTS)	60	P2801
P02	5	Orange	29R(ADSL+POTS)	29	P2801
P02	30	Violet	29T(ADSL+POTS)	61	P2801
P02	6	Green	30R(ADSL+POTS)	30	P2801
P02	31	Violet	30T(ADSL+POTS)	62	P2801
P02	7	Brown	31R(ADSL+POTS)	31	P2801
P02	32	Violet	31T(ADSL+POTS)	63	P2801
P02	8	Slate	32R(ADSL+POTS)	32	P2801
P02	33	Violet	32T(ADSL+POTS)	64	P2801