ForeThought-SP AMI Reference Manual

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Software Version 1.0.x

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Legal Notices

FCC CLASS A NOTICE

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void this user's authority to operate this equipment.

NOTE: The MSC-900, TNX-210, and the TNX-1100 have been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of the equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

DOC CLASS A NOTICE

This digital apparatus does not exceed Class A limits for radio noise emission for a digital device as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

VCCI CLASS 1 NOTICE

　この装置は、第一種情報処理装置（商工業地域において使用されるべき情報処理装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会(VCCI)基準に適合しております。

　従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

　取扱説明書に従って正しい取り扱いをして下さい。

This equipment is in the Class 1 category (Information Technology Equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Information Technology Equipment aimed at preventing radio interference in commercial and/or industrial areas.Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc. Read the instructions for correct handling.

FCC REQUIREMENTS (Notice to Users of DS1 Service)

The following instructions are provided to ensure compliance with the Federal Communications Commission (FCC) Rules, Part 68.

(1) This device must only be connected to the DS1 network connected behind an FCC Part 68 registered channel service unit. Direct connection is not allowed.

(2) Before connecting your unit, you must inform the telephone company of the following information:

Port ID	REN/SOC	FIC	USOC
NM-6/DS1C	6.0N	04DU9-BN, 04DU9-DN,	RJ48C
NM-2/DS1C	6.0N	04DU9-1ZN, and 04DU9-1SN	RJ48C

(3) If the unit appears to be malfunctioning, it should be disconnected from the telephone lines until you learn if your equipment or the telephone line is the source of the trouble. If your equipment needs repair, it should not be reconnected until it is repaired.

(4) If the telephone company finds that this equipment is exceeding tolerable parameters, the telephone company can temporarily disconnect service, although they will attempt to give you advance notice if possible.

(5) Under the FCC Rules, no customer is authorized to repair this equipment. This restriction applies regardless of whether the equipment is in or out of warranty.

(6) If the telephone company alters their equipment in a manner that will affect use of this device, they must give you advance warning so as to give you the opportunity for uninterrupted service. You will be advised of your right to file a complaint with the FCC.

CANADIAN IC CS-03 COMPLIANCE STATEMENT

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada label does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

E1 AND E3 NOTICE

The E1 (NM-6/E1C and NM-2/E1C) and E3 (NM-4/E3C and NM-2/E3C) network modules that are described in this manual are approved for use in FORE Systems' host systems providing that the instructions below are strictly observed. Failure to follow these instructions invalidates the approval.

Pan European Approval - CE Marking

Pan European approval of the E1 network module was issued by BABT following assessment against CTR12. This means that it can be connected to ONP and unstructured PTO-provided private circuits with 120 Ω interfaces in all European countries, according to Telecommunications Terminal Equipment (TTE) Directive 91/263/EEC. Thus, the following CE mark applies:

CE168X

The E1 and E3 network modules conform to safety standard EN60950 1992 following the provisions of Low Voltage Product Safety Directive 73/23/EEC and CE Marking Directive 93/68/EEC, and can be marked accordingly with the CE symbol.

The E1 and E3 network modules conform to EN55022 1994 and EN50082-1 1992 following the provisions of the EMC Directive 89/336/EEC, and can be marked accordingly with the CE symbol.

National Approvals

UK

Network Module	Connects to	Approval Number
E1	Structured and unstructured PTO-provided private circuits with 75 Ω interfaces	AA60953
E3	PTO-provided private circuits with 75 Ω interfaces	NS / 4387 / 1 / T / 605954

Germany

Network Module	Connects to	Approval Number
E3	Structured PTO-provided private circuits with 75 Ω interfaces	A127535H for the TNX-1100 A127534H for the TNX-210

Switzerland

Network Module	Connects to	Approval Number
E1	Structured PTO-provided private circuits with 120 Ω interfaces	96.0872.J.N
E3	Structured PTO-provided private circuits with 75 Ω interfaces	96.0873.J.N

Required User Guide Statements - UK Installation

The use of auxiliary products not authorized by FORE Systems in FORE Systems ATM Switches may cause the power specification to be exceeded and is a potential safety hazard.

The equipment must be installed such that with the exception of the connections to the host, clearance and creepage distances shown in the table below are maintained between the network module and any other assemblies which use or generate a voltage shown in the table below. The larger distance shown in brackets applies where the local environment within the host is subject to conductive pollution or dry non-conductive pollution which could become conductive due to condensation. Failure to maintain these minimum distances invalidates the approval.

Clearance (mm)	Creepage (mm)	Voltage Used or Generated by Host or by Network Modules
2.0	2.4 (3.8)	Up to 50 V_{rms} or V_{dc}
2.6	3.0 (4.8)	Up to 125 V_{rms} or V_{dc}
4.0	5.0 (8.0)	Up to 250 V_{rms} or V_{dc}
4.6	6.4 (10.0)	Up to 300 V_{rms} or V_{dc}

For a host or other expansion card fitted in the host, using or generating voltages greater than 300V (rms or dc), advice from a competent telecommunications engineer must be obtained before installation of the relevant equipment.	Above 300 V_{rms} or V_{dc}

NOTE: Installing the network modules in the appropriate FORE Systems hosts, according to the installation instructions provided, satisfies the requirements listed above.

The following tables show the available ports and their safety status:

NM-6/E1C and NM-2/E1C

Ports	Safety Status
E1 Ports	TNV operating at SELV
Bus Connector	SELV

NM-4/E3C and NM-2/E3C

Ports	Safety Status
E3 Ports	TNV operating at SELV
Bus Connector	SELV

CE NOTICE

Marking by the symbol **CE** indicates compliance of this system to the EMC (Electromagnetic Compatibility) directive of the European Community and compliance to the Low Voltage (Safety) Directive. Such marking is indicative that this system meets or exceeds the following technical standards:

- EN 55022 - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1 - "Electromagnetic compatibility - Generic immunity standard Part 1: Residential, commercial, and light industry."
- IEC 1000-4-2 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 2: Electrostatic discharge requirements."
- IEC 1000-4-3 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 3: Radiate electromagnetic field requirements."
- IEC 1000-4-4 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 4: Electrical fast transient / burst requirements."

SAFETY CERTIFICATIONS

ETL certified to meet Information Technology Equipment safety standards UL 1950, CSA 22.2 No. 950, and EN 60950.

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Preface

This manual provides the technical information needed to configure FORE Systems' TNX ATM Switches and the MSC-900 via the ATM Management Interface (AMI). This document was created for users with various levels of experience. If you have any questions or problems, please contact FORE Systems' Technical Support.

Chapter Summaries

Chapter 1 - AMI Overview - Provides an overview of AMI and contains a text and graphical description of the root level AMI commands.

Chapter 2 - AMI Configuration Commands - Provides information about and examples of the configuration level AMI commands.

Chapter 3 - AMI Operation Commands - Provides information about and examples of the operation level AMI commands.

Chapter 4 - AMI Statistics Commands - Provides information about and examples of the statistics level AMI commands.

NOTE

A list of ATM networking acronyms and a glossary of terms are provided in the *TNX ATM Switch Network Configuration Manual*.

Technical Support

In the U.S.A., you can contact FORE Systems' Technical Support by any one of four methods:

1. If you have access to the Internet, you may contact FORE Systems' Technical Support via e-mail at:

   support@fore.com

2. You may telephone your questions to "support" at:

   800-671-FORE or **412-635-3700**

3. You may FAX your questions to "support" at:

   412-742-7900

4. You may send questions, via U.S. Mail, to:

   FORE Systems, Inc.
   1000 FORE Drive
   Warrendale, PA 15086-7502

Technical support for non-U.S.A. customers should be handled through your local distributor.

No matter which method is used for technical support, please be prepared to provide your support contract ID number, the serial number(s) of the product(s), and as much information as possible describing your problem / question.

Typographical Styles

Throughout this manual, all specific commands meant to be entered by the user appear on a separate line in bold typeface. In addition, use of the `Enter` or `Return` key is represented as `<ENTER>`. The following example demonstrates this convention:

cd /usr <ENTER>

File names that appear within the text of this manual are represented in the following style: "...the `fore_install` program installs this distribution."

Command names that appear within the text of this manual are represented in the following style: "...using the **flush-cache** command clears the bridge cache."

Subsystem names that appear within the text of this manual are represented in the following style: "...to access the **bridge** subsystem..."

Parameter names that appear within the text of this manual are represented in the following style: "...using *<seg-list>* allows you to specify the segments for which you want to display the specified bridge statistics."

Any messages that appear on the screen during software installation and network interface administration are shown in `Courier` font to distinguish them from the rest of the text as follows:

```
.... Are all four conditions true?
```

Important Information Indicators

To call your attention to safety and otherwise important information that must be reviewed to ensure correct and complete installation, as well as to avoid damage to the FORE Systems product or to your system, FORE Systems utilizes the following *WARNING/CAUTION/NOTE* indicators.

WARNING statements contain information that is critical to the safety of the operator and/or the system. Do not proceed beyond a ***WARNING*** statement until the indicated conditions are fully understood or met. This information could prevent serious injury to the operator, damage to the FORE Systems product, the system, or currently loaded software, and is indicated as follows:

WARNING!

Hazardous voltages are present. To reduce the risk of electrical shock and danger to personal health, follow the instructions carefully.

CAUTION statements contain information that is important for proper installation/operation. Compliance with **CAUTION** statements can prevent possible equipment damage and/or loss of data and are indicated as follows:

CAUTION

You risk damaging your equipment and/or software if you do not follow these instructions.

NOTE statements contain information that has been found important enough to be called to the special attention of the operator and is set off from the text as follows:

NOTE

If you change the value of the LECS control parameters while the LECS process is running, the new values do not take effect until the LECS process is stopped, and then restarted.

Laser Notice

Class 1 Laser Product:
This product conforms to applicable requirements of 21 CFR 1040 at the date of manufacture.

Class 1 lasers are defined as products which do not permit human access to laser radiation in excess of the accessible limits of Class 1 for applicable wavelengths and durations. These lasers are safe under reasonably foreseeable conditions of operation.

Every fiber optic interface on FORE Systems' network modules contains a Class 1 laser.

NOTE

This Laser Notice section only applies to products or components containing Class 1 lasers.

Safety Precautions

For your protection, observe the following safety precautions when setting up equipment:

- Follow all warnings and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source matches the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. FORE Systems, Inc., is not responsible for regulatory compliance of a modified FORE product.

CHAPTER 1 AMI Overview

The switch software provides switch and connection management, IP connectivity, and SNMP network management. The Switch Control Software (SCS) is the "brains" of the switch. The SCS controls the switch board(s) and handles connection set-up and tear-down duties. The SCS can also communicate with other FORE Systems switches to learn network topology and establish connections across multiple switches. In addition, there is an SNMP agent built into the SCS to allow SNMP management and control.

The user interface to the SCS is called the ATM Management Interface (AMI). This chapter contains a description of how to log in to AMI, how to open or close an AMI session, and how to perform other AMI root level commands. AMI allows you to configure and to make statistical queries of various hardware and software aspects of TNX switches and network modules by providing a hierarchical menu system similar to a UNIX file system. A single root menu provides a number of commands. Some of those commands, in turn, call submenus which provide a number of subcommands. At any given time, you work within a particular submenu which is indicated by the prompt. You can traverse a submenu one level at a time, or can traverse a number of levels simultaneously if the entire command string is known. For example, to show the current configuration of the network modules, enter the following at the prompt:

```
localhost::> configuration module show
```

rather than entering one command line at a time as follows:

```
localhost::> configuration

localhost::configuration> module

localhost::configuration module> show
```

Additionally, you only need to enter the minimum number of letters in a command which would make the command unique to that level. For example, you could enter **co m s** instead of **configuration module show**. However, the minimum number of letters entered must also distinguish the command from global commands, such as **top** or **up**. For example, you would have to enter **topo** to distinguish **topology** from the global command **top** or **upc** to distinguish **upc** from the global command **up**.

AMI is described throughout this chapter using the following conventions:

- All AMI output, including user prompts, is shown in `courier` font.
- All user input; e.g., sub-commands, is shown in **`bold courier`** font.
- Each submenu is described in a separate section.
- Commands that are submenus are immediately followed by a “>” symbol. The “>” should not be entered as part of the command.
- Required parameter values are indicated inside angle brackets “< >”. The “< >” should not be entered as part of the command.
- Optional parameter values are indicated inside square brackets “[ ]”. The “[ ]” should not be entered as part of the command.
- Parameter values that require a choice are separated by vertical bars and are enclosed in parentheses “(|)” Neither the vertical bar nor the parentheses should be entered as part of the command.
- Optional parameter names are indicated with dashes “-”.
- All port numbers are in BNP (board, network module, port) notation.

1.1 Initial Login from Serial Port

Initially, you must log in to the switch through the serial port.

1.1.1 Login from Serial Port

When connecting to the switch via the serial port, output similar to the following is displayed on your console:

```
S_ForeThought_SP_1.0.0 (1.18) (asx1000) (marketing)
```

Above, `S_ForeThought_SP_1.0.0 (1.18)` indicates the version of software, `(asx1000)` indicates what type of switch this is, and `(marketing)` indicates the name that has been assigned to this SCP. If `(ATM SWITCH)` is displayed for the switch name, this means that no host name has been assigned yet.

At the login prompt, if a password has been assigned to the switch, you should type **ami <ENTER>** and then type the password. For security reasons, the switch does not echo your keystrokes.

```
login: ami
Password:
```

If no password has been assigned, enter **ami <ENTER>** at the serial port. In either case, the following is displayed and a session is opened on the SCP:

```
AMI Management Interface v4.1
Copyright (c) 1994-1997 FORE Systems, Inc.
All Rights Reserved

General commands:
  '?' to get list of commands at the current level
  'up' to go up one menu level
  'top' to go to the root menu
  'exit' to leave AMI

Opening a session for "127.0.0.1", please wait...

Connected to "127.0.0.1" (asx1000).

localhost::>
```

1.1.2 Login from Telnet

To telnet to the SCP, enter the following parameters at the > prompt on the host:

```
> telnet <address>
```

address Enter the IP address of the SCP.

For example, to telnet to an SCP with the IP address 204.95.89.231, enter the following:

```
> telnet 204.95.89.231
```

When the telnet connection is established, something similar to the following is displayed:

```
Trying 204.95.89.231 ...
Connected to marketing.
Escape character is '^]'.

S_ForeThought_SP_1.0.0 (1.18)  (asx1000) (marketing)
```

Above, `S_ForeThought_SP_1.0.0 (1.18)` indicates the version of software, `(asx1000)` indicates what type of switch this is, and `(marketing)` indicates the name that has been assigned to this SCP. If `(ATM SWITCH)` is displayed for the switch name, this means that no host name has been assigned yet.

Only one user may open an AMI session on an SCP at a time. If you attempt to log in to a switch on which an AMI session is already in use, you receive a message similar to the following:

```
Another AMI is running on this switch.  Exiting...
Connection closed by foreign host.
```

When you are prompted to log in, enter **`ami`**. If you do not log in within 60 seconds, the telnet session times out with the following message:

```
login: Login timed out after 60 seconds
```

If a password has been assigned, then you are prompted for that password. The keystrokes of the password are not echoed for security reasons. If no password has been assigned (e.g., the very first time you log in), then you are not prompted for a password.

```
login: ami
Password:
```

If you are prompted for a password, but do not enter one within 60 seconds, then the telnet session times out with the following message:

```
login: ami
Password: Timed out after 60 seconds
```

When the proper password is entered, the following is displayed and a session is opened on the SCP:

```
AMI Management Interface v4.1
Copyright (c) 1994-1997 FORE Systems, Inc.
All Rights Reserved

General commands:
  '?' to get list of commands at the current level
  'up' to go up one menu level
  'top' to go to the root menu
  'exit' to leave AMI

Opening a session for "127.0.0.1", please wait...

Connected to "127.0.0.1" (asx1000).

localhost::>
```

If another user already has an AMI session open on that SCP, then you are not permitted to log in and you receive the following message:

```
Another ami is running on this switch. . Exiting...
Connection closed by foreign host.
```

1.2 AMI Commands Not Available Running Remotely

Some AMI commands are not available when you telnet or log in to a switch remotely. For example, if you are logged in locally to a switch called fishtank (you see `localhost::>` as your prompt) and you open a session to a switch called shark (you see `shark::>` as your prompt), there are some AMI commands that will not work on shark.

The following commands are not available remotely on a TNX-1100 or an MSC-900:

- configuration lane lecs get
- configuration system syslog
- configuration system timeout
- operation cdb backup
- operation cdb init
- operation cdb restore
- operation flash
- operation panic
- operation password
- operation reboot
- operation upgrade
- operation version

The following commands are not available remotely on a TNX-210:

- configuration lane lecs get
- configuration system syslog
- configuration system timeout
- operation cdb backup
- operation cdb init
- operation cdb restore
- operation flash
- operation panic
- operation password
- operation reboot
- operation upgrade
- operation version

1.3 AMI Root Menu for an Open Session

This menu is the root submenu for an AMI session. When AMI is first entered from the serial port or telnet, the localhost session is the only open session. The following information is displayed:

```
AMI Management Interface v4.1
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General commands:
  '?' to get list of commands at the current level
  'up' to go up one menu level
  'top' to go to the root menu
  'exit' to leave AMI

Opening a session for "127.0.0.1", please wait...

Connected to "127.0.0.1" (asx1000).

localhost::>
```

By typing a “**?**” at any prompt, a list of available commands at the current level is displayed. By typing a “**?**” at this root level prompt, the following command list is shown:

```
localhost::> ?

  about            close            configuration>   exit
  help             history          open             operation>
  ping             redo             rows             statistics>
  top              up
```

Each of these root level commands is described in the following subsections.

1.3.1 About Command

By entering the **about** command at the root level prompt, you can display information regarding AMI and how to begin an AMI session on a host or on a switch.

```
localhost::> about

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  AMI uses SNMP to manage FORE Systems' ATM switches and MSC-900s.
  AMI is platform independent and runs on hosts and FORE ATM switches.
  When AMI is executed on a host, you must first use the OPEN command
  to specify the switch to manage.  If AMI is started on a switch, it
  immediately opens a connection to itself.
```

1.3.2 Close Command

Any number of sessions may be opened to remote SCPs from your local SCP. However, only one AMI session may be open at a time on a TNX-210, TNX-1100, or an MSC-900. By typing **`close`** at the prompt, you can end the current AMI session.

If an individual session is closed, you are sent back to the last session that is still open. For example, if you opened a session on switch1 and on switch2 from your local SCP, and you wanted to close the session on switch2, you would be sent back to the last open session which is on switch1 as follows:

```
switch2::> close
switch1::>
```

If you decided to close the session on switch1, you would be sent back to the last open session which is on your local SCP as follows:

```
switch1::> close
localhost::>
```

If all sessions are closed, you are sent back to the root prompt as follows:

```
localhost::> close
>
```

At this point, you can open another session or exit the switch.

1.3.3 Configuration Commands

By entering **`configuration`** at the root level, you can access several subcommands that allow you to configure specific parts of the hardware or specific properties of the software. These commands are described fully in Chapter 2 of this manual.

1.3.4 Exit Command

The **exit** command lets you log out of the main AMI system. When entered, this command ends all open sessions on the SCP. Enter the following:

```
localhost::> exit
Connection closed by foreign host.
```

1.3.5 Help Command

By typing **help** at any submenu level, a list of available commands at the current level, and a short description of each command, is shown. By typing **help** at the root level, the following commands and descriptions are shown:

```
localhost::> help
General commands:
  '?' to get list of commands at the current level
  'up' to go up one menu level
  'top' to go to the root menu
  'exit' to leave AMI

  about                  - Display program information
  close                  - Close this connection
  configuration>         - System configuration submenu
  exit                   - Exit AMI
  help                   - Display help for each command
  history                - Display command history
  open                   - Open a connection
  operation>             - Switch operation submenu
  ping                   - Ping a host or switch
  redo                   - Repeat a history command
  rows                   - Get/set number of rows
  statistics>            - Switch statistics submenu
  top                    - Go to the root menu
  up                     - Go up 1 menu level
```

1.3.6 History Command

By typing **history** at any prompt, you can list up to the last 20 previously typed commands for that particular session as follows:

```
localhost::> history
    1  open fishtank
    2  stat
    3  ?
    4  module
    5  show
    6  port
    7  spans
    8  tcp
    9  udp
    10  vcc
    11  vpc
    12  up
       13  help
   14  history
```

1.3.7 Open Command

The **open** command lets you begin a session on a remote switch. At the prompt, enter the following parameters:

```
localhost::> open <switch> [<community>]
```

switch Indicates the IP address of the remote switch on which you want to open a session.

community Enter the SNMP community string that indicates the level of access that you have on the switch. The default is `public`, which allows read-only access.

NOTE

Although the default SNMP community string is `public`, you must use the `private` SNMP community string if you wish to make any changes on the remote SCP (e.g., if you want to create a SPANS SPVC to that SCP).

For example, to log in to a remote switch that has an IP address of 192.25.6.113 using the `private` community string, enter the following parameters:

```
localhost:> open 192.25.6.113 private
Opening a session for “192.25.6.113”, please wait...
Connected to “192.25.6.113” (asx1000).
192.25.6.113::>
```

If another user already has an AMI session open on that SCP, then you are not permitted to log in to that SCP. You receive the following message:

```
Another ami is running on this switch. . Exiting...
Connection closed by foreign host.
```

If the remote switch to which you are connecting is running a different software version than the local switch, you receive the following caution:

```
localhost::> open 192.25.6.128
Opening a session for “192.25.6.128”, please wait...
Connected to “192.25.6.128” (asx1000).
Host 192.25.6.128 running a different version. There may be some
incompatibilities.
```

1.3.8 Operation Commands

By entering **`operation`** at the root level prompt, you can access several subcommands that allow you to manage various parts of the switch. These commands are described fully in Chapter 3 in this manual.

1.3.9 Ping Command

The **ping** command lets you send a ping to another switch or a host to see if it is "alive," or reachable, by sending it an ICMP echo request and waiting for a response. You can access this command by entering **ping** at the root level. Enter the following parameters:

```
localhost::> ping <IP-address>
```

IP-address Indicates the IP address of the host or switch to which the ping is sent.

NOTE The ping is always sent from the first switch or host on which AMI was originally started. For example, you are logged into switch A. From there, you open a session to switch B. If you enter the **ping** command while in your session on switch B, the ping is sent from switch A, NOT from switch B.

1.3.10 Redo Command

The **redo** command can be used in conjunction with the **history** command. It lets you repeat a command that was given in the same open session. You can access this command by entering **redo** at any level. To repeat the last command that was performed, enter **redo** with no additional parameters as follows:

```
localhost::> redo
```

To repeat a command given within the last 20 commands in the same open session, enter the following parameters:

```
localhost::> redo <command-number>
```

command-number This is the command and the number associated with that command which was previously performed by the switch during this same session. You should enter the **history** command to list the previous commands and their associated numbers as shown in the following example.

Type **history** at the prompt to list the last 20 previously typed commands for that particular session as follows:

```
localhost::> history

    1  open localhost
    2  stat
    3  ?
    4  module
    5  show
    6  port
    7  spans
    8  tcp
    9  udp
    10  vcc
      11  help
   12  history
```

Then, to repeat a previously given command, type **redo** and the command number at the prompt. For example, to repeat command number 8, which is listing statistics for `tcp`, enter the following:

```
localhost::> redo 8

tcp Counter                     Value
------------------------------ --------------------
tcpActiveOpens                                    1
tcpPassiveOpens                                  49
tcpAttemptFails                                   0
tcpEstabResets                                    1
tcpCurrEstab                                      1
tcpInSegs                                     14060
tcpOutSegs                                     9967
tcpRetransSegs                                    0
```

1.3.11 Rows Command

The **rows** command allows users to show the number of rows that their terminal displays. Users can access this command by entering **rows** at the root level as follows:

```
localhost::> rows
Terminal Rows = 24
```

To change this setting, enter the **rows** command followed by the number of rows that you want your terminal to display, as follows:

```
localhost::> rows [<rows>]
```

rows Indicates the number of terminal rows to be used.

1.3.12 Statistics Commands

By entering **statistics** at the root level, you can access several commands that display operational performance and error information for the various hardware and software features of the switch and the network modules. These commands are described fully in Chapter 4 in this manual.

1.3.13 Top Command

By entering **top** at any level, you are sent to the root level of AMI. For example, if you are at the **operation cdb** level and you want to go directly to the root level, simply enter **top** at the prompt as follows:

```
localhost::operation cdb> top
localhost::>
```

1.3.14 Up Command

Entering **up** allows you to go up one menu level. For example, if you are at the **configuration port traffic** level and you want to go one level above that to **configuration port**, simply enter **up** at the prompt as shown here.

```
localhost::configuration port traffic> up
localhost::configuration port>
```

Entering the characters **..** has the same effect as entering the command **up**. For example,

```
localhost::configuration port traffic> ..
localhost::configuration port>
```

CHAPTER 2 AMI Configuration Commands

This chapter contains a detailed description of the AMI **configuration** commands. The main `configuration` menu can be found at the root level. There are several commands available under **configuration**. Commands that are submenus are immediately followed by a “>” symbol. Typing **configuration ?** at the prompt at the root level displays the **configuration** commands as follows:

```
localhost::> configuration ?
  alarms>          atmarp>          av>              board>
  cec>             ces>             ilmiproxy>       ip>
  lane>            module>          nsap>            port>
  rs232>           snmp>            spans>           spvc>
  switch>          system>          topology>        uni>
  upc>             vcc>             vpc>             vpt>
```

Each of these commands has a submenu of commands which are described in the following subsections.

2.1 Alarms Configuration Commands

This submenu allows you to configure alarms. You can display the list of available subcommands by typing **alarms ?** at the `configuration` level.

```
localhost::configuration> alarms ?
  show             enable           disable          reset
```

2.1.1 Displaying Alarm Conditions

This command lets you display the status of all alarms. All alarms are available on all TNX switches, except `fanBankFailed`, which is available only on the TNX-1100 and the MSC-900. Enter the following parameters:

```
localhost::configuration alarms> show

 AlarmType                      AlarmStatus    MinorAlarm   MajorAlarm
 powerSupplyInputFailed         inactive       disabled     enabled
 powerSupplyOutputFailed        inactive       disabled     enabled
 fanBankFailed                  inactive       disabled     enabled
 tempSensorOverTemp             inactive       disabled     enabled
 linkFailed                     inactive       enabled      disabled
 spansFailed                    inactive       enabled      disabled
 powerSupplyOverCurrent         inactive       disabled     enabled
 powerSupply5VoltFailed         inactive       disabled     enabled

 Major alarm relay status: off
 Minor alarm relay status: off
```

The fields in this display have the following meanings:

AlarmType Displays the name of the alarm.

AlarmStatus Shows whether the state of the alarm is active (alarming) or inactive (not alarming). An alarm is active if the underlying condition is detected. For power supplies, the input failed alarm condition is active if the input voltage is not within the nominal range for the supply. This does not necessarily mean that an output failure will result. A power supply output failure condition is active if any power supply is failing or if it is physically removed.

MinorAlarm **`Disabled`** means that this alarm type will not cause a minor alarm. **`Enabled`** means that this alarm type will cause a minor alarm.

MajorAlarm **`Disabled`** means that this alarm type will not cause a major alarm. **`Enabled`** means that this alarm type will cause a major alarm.

Major alarm relay status **Off** means that no major alarms are currently active. **On** means that one or more major alarms are currently active. Look at the AlarmStatus field to see which condition is in a state of alarm.

Minor alarm relay status **Off** means that no minor alarms are currently active. **On** means that one or more minor alarms are currently active. Look at the AlarmStatus field to see which condition is in a state of alarm.

2.1.2 Enabling an Alarm

This command lets you enable an alarm. Enter the following parameters:

```
localhost::configuration alarms> enable (major | minor) <alarm type>
```

major|minor Designates whether the alarm type causes a major alarm or a minor alarm when that condition occurs.

alarm type Indicates the kind of alarm condition. Valid parameters are displayed in the `AlarmType` field when the command string **configuration alarms show** is entered at the prompt.

For example, to enable an overtemperature condition that is detected by the overtemperature sensor as a major alarm, enter the following parameters:

```
localhost::configuration alarms> enable major tempSensorOverTemp
```

To verify that the change has taken effect, you can display the alarms:

```
localhost::configuration alarms> show

 AlarmType                      AlarmStatus    MinorAlarm   MajorAlarm
 powerSupplyInputFailed         inactive       disabled     enabled
 powerSupplyOutputFailed        inactive       disabled     enabled
fanBankFailed                  inactive       disabled     enabled
 tempSensorOverTemp             inactive       disabled     enabled
 linkFailed                     inactive       enabled      disabled
 spansFailed                    inactive       enabled      disabled

Major alarm relay status: off
 Minor alarm relay status: off
```

AMI Configuration Commands

2.1.3 Disabling an Alarm

This command lets you disable an alarm. Enter the following parameters:

```
localhost::configuration alarms> disable (major | minor) <alarm type>
```

major|minor Designates whether the alarm type causes a major alarm or a minor alarm when that condition occurs.

alarm type Indicates the alarm condition. Valid parameters are displayed in the `AlarmType` field when the command string **`configuration alarms show`** is entered at the prompt.

For example, to disable a link failure as a minor alarm, enter the following parameters:

```
localhost::configuration alarms> disable minor linkFailed
```

To verify that the change has taken effect, you can display the alarms:

```
localhost::configuration alarms> show

 AlarmType                      AlarmStatus    MinorAlarm   MajorAlarm
 powerSupplyInputFailed         inactive       disabled     enabled
 powerSupplyOutputFailed        inactive       disabled     enabled
fanBankFailed                  inactive       disabled     enabled
 tempSensorOverTemp             inactive       disabled     enabled
 linkFailed                     inactive       disabled     enabled
 spansFailed                    inactive       enabled      disabled

Major alarm relay status: off
 Minor alarm relay status: off
```

2.1.4 Resetting an Alarm

This command lets you reset either the `linkFailed` alarm, the `spansFailed` alarm, or both alarms. Enter the following parameters:

```
localhost::configuration alarms> reset (<alarm type> | all)
```

alarm type Indicates which alarm to reset. Can be either `linkFailed` or `spansFailed`.

all Indicates that both the `linkFailed` and the `spansFailed` alarms will be reset.

For example, to reset the `linkFailed` alarm, enter the following parameters:

```
localhost::configuration alarms> reset linkFailed

Alarm linkFailed reset.
```

To verify that the change has taken effect, you can display the alarms:

```
localhost::configuration alarms> show

 AlarmType                      AlarmStatus    MinorAlarm   MajorAlarm
 linkFailed                     inactive       enabled      disabled
 spansFailed                    active         enabled      disabled

 Major alarm relay status: off
 Minor alarm relay status: on
```

AMI Configuration Commands

2.2 ATM ARP Configuration Commands

These commands allow you to manage the ATM ARP (address resolution protocol) features. You can display the list of available subcommands by typing **atmarp ?** at the configuration level.

```
localhost::configuration> atmarp ?
arpserver>       delete          flush           getnsap
mapnsap          newclassicalip  newforeip       show
```

2.2.1 ARP Server Configuration Commands

These commands let you configure the RFC-1577 ATM ARP server. You can get to this level by entering `arpserver` at the configuration level. By entering **arpserver ?** at this level, the list of available subcommands for `arpserver` is displayed.

```
localhost::configuration atmarp> arpserver ?
  show              set
```

2.2.1.1 Displaying the ARP Server Address

This command shows which interfaces are enabled to be the RFC-1577 ATM ARP server for the IP network. Enter the following parameters:

```
localhost::configuration atmarp arpserver> show <interface>
localhost::configuration atmarp arpserver> show
Interface   ARP Server Addr                                         Enabled
qaa0        0x47.0005.80.ffe100.0000.f215.11ba.002048100be6.00 No
qaa1        0x47.0005.80.ffe100.0000.f215.11ba.0020481511ba.01 Yes
qaa2        0x47.0005.80.ffe100.0000.f21a.0123.0020481a0123.02 No
qaa3        0x47.0005.80.ffe100.0000.f21a.0123.002048100be6.03 No
```

The fields in this display have the following meanings:

Interface Shows the classical IP interfaces for this switch.

ARP Server Addr Shows the ARP server address for this interface.

Enabled Shows whether or not ARP server service is enabled for this interface.

2.2.1.2 Setting the ARP Server Address

This command allows you to set the address of the RFC-1577 ATM ARP server. Enter the following parameters:

```
localhost::configuration atmarp arpserver> set <NSAPaddress> [<interface>]
```

NSAPaddress Indicates the ATM network layer address for the RFC-1577 ATM ARP server.

interface Enter the name of one of the Classical IP interfaces, such as `qaa0`, `qaa1`, `qaa2`, or `qaa3`. The default is `qaa0`.

The switch itself can be used as an ARP server. To do this, set the ARP server address to be the NSAP address of the switch's control port.

2.2.2 Deleting an ARP Entry

This command allows you to remove an ARP entry from the ATM ARP cache. Enter the following parameters:

```
localhost::configuration atmarp> delete <host>
```

host Indicates the IP address of the endstation for which the outgoing ARP entry is to be deleted.

NOTE If you have ILMI enabled on your switch, ILMI creates an ATM ARP cache entry for each address that it registers. These entries cannot be deleted using this command.

2.2.3 Flushing the ATM ARP Cache

This command enables you to delete the contents of the ATM ARP cache. Only dynamic ARP cache entries are removed. The switch asks you to verify that flushing the ARP cache is the desired action. Enter the following parameters:

```
localhost::configuration atmarp> flush

Flush the ATM ARP cache [n]? n
```

To cancel the command, type **n** and press **<ENTER>**, or simply type **<ENTER>**.

To flush the ARP cache, type **y** and press **<ENTER>**.

2.2.4 Getting the NSAP Address for a Classical IP Interface

This command displays the NSAP address of a Classical IP interface. Enter the following parameters:

```
localhost::configuration atmarp> getnsap [<interface>]

qaa0 NSAP address: 47000580ffe1000000f12400de0020481900de00
```

interface Indicates the name of the Classical IP interface (qaa0, qaa1, qaa2, or qaa3) to be displayed. If no interface is specified, the NSAP address of qaa0 is displayed.

2.2.5 Creating an IP to NSAP Address Mapping

This command allows you to create an ATM ARP cache entry mapping a particular IP address to its corresponding NSAP address. Enter the following parameters:

```
localhost::configuration atmarp> mapnsap <host> <NSAPaddress> [<interface>]
```

host Designates the IP address to be mapped.

NSAPaddress Designates the NSAP address to be mapped.

interface Designates the Classical IP interface (qaa0, qaa1, qaa2, or qaa3) that should be used to open connections to this NSAP address.

2.2.6 Creating a Classical IP PVC

This command allows you to create a new Classical IP PVC ARP entry. All data is sent LLC/SNAP encapsulated. Enter the following parameters:

```
localhost::configuration atmarp> newclassicalip <host> <vpi> <vci> [<interface>]
```

host Indicates the host IP address of the remote IP endstation.

vpi Indicates the virtual path number of the Classical IP PVC.

vci Indicates the virtual channel number of the Classical IP PVC.

interface Indicates the name of the Classical IP interface (`qaa0`, `qaa1`, `qaa2`, or `qaa3`) to be used for this connection. The default is `qaa0`.

2.2.7 Creating a FORE IP PVC ARP Entry

This command enables you to create a FORE IP PVC ARP entry. Data on this PVC is encapsulated using null encapsulation (also known as VC-based multiplexing) as specified in RFC-1483. Enter the following parameters:

```
localhost::conf atmarp> newforeip <host> <vpi> <vci> (4|5) [<interface>]
```

host Indicates the IP address of the remote host.

vpi Indicates the virtual path number. This must be 0.

vci Indicates the virtual channel number.

4|5 Designates the connection's ATM Adaptation Layer (AAL) type.

interface Indicates the FORE IP interface to be used. The default is `asx0`.

2.2.8 Displaying the ATM ARP Entries

This command displays the current ATM ARP cache. Enter the following parameters:

```
localhost::configuration atmarp> show
localhost::configuration atmarp>
```

When the prompt is returned with no information displayed, as shown above, then the ATM ARP cache is empty.

The following is an example of an ATM ARP cache.

```
localhost::configuration atmarp> show
 IPaddress        If    VPI   VCI   AAL    Type              Direction
 198.29.22.9      asx0  0     63    aal5   foreIpSVC         outgoing
 198.29.22.15     asx0  0     231   aal5   foreIpSVC         pending
 198.29.22.37     asx0  0     65    aal34  foreIpSVC         pending
  IPaddress        If    NSAP Address
 198.29.17.3      qaa0  0x47.0005.80.ffe100.0000.f21b.0138.002048102754.00
 198.29.17.10     qaa0  0x47.0005.80.ffe100.0000.f21b.0137.002048100be6.00
 198.29.17.15     qaa0  0x47.0005.80.ffe100.0000.f21b.0137.00204810048d.00
 198.29.17.52     qaa0  0x47.0005.80.ffe100.0000.f21b.0138.0020481b0138.00
```

The fields in this display have the following meanings:

IPaddress Indicates the IP address for this connection.

If Shows the name of the IP interface for this connection.

VPI Displays the virtual path number.

VCI Displays the virtual channel number.

AAL Displays the AAL type of the given connection.

Type Lists the kind of connection. Can be `foreIpPVC`, `foreIpSVC`, `classicalIpPVC`, or `classicalIpSVC`.

Direction `Pending` means that a connection has not (yet) been established. `Incomplete` means that the IP-to-ATM address mapping is not yet known for the given IP address.

NSAP Address Lists the NSAP address for this connection.

2.3 Address Validation Commands

These commands let you configure address validation (av) information to be used on the network side of a public UNI connection to filter incoming calls. You can display the list of available subcommands by typing **av ?** at the **configuration** level.

```
localhost::configuration> av ?
  show            on              off             default_address
```

2.3.1 Displaying Address Validation Information

This command allows you to list address validation (av) information for all ports on an individual switch fabric. Enter the following parameters:

NOTE

In the following display, for the AV and DEF_INS fields, the (+) symbol indicates that the feature is enabled on that path and the (-) symbol indicates that it is disabled on that path.

For the Information Element filtering options (CG, CGS, CDS, BHLI, BLLI, BLLI23, and AAL), (+) means that the filter is disabled. The corresponding Information Element is passed to the called party (not filtered). (-) means that the filter is enabled. The corresponding Information Element is filtered (not passed to the called party).

```
localhost::configuration av> show
 Port  VPI  AV    DEF_INS  CG    CGS   CDS   BHLI  BLLI  BLLI23  AAL
 1A1   0    -     -        -     +     +     +     +     +       +
 1A2   0    -     -        -     +     +     +     +     +       +
 1A3   0    -     -        -     +     +     +     +     +       +
 1A4   0    -     -        -     +     +     +     +     +       +
 1A5   0    -     -        -     +     +     +     +     +       +
 1A6   0    -     -        -     +     +     +     +     +       +
 1D1   0    -     -        -     +     +     +     +     +       +
 1D2   0    -     -        -     +     +     +     +     +       +
 1D3   0    -     -        -     +     +     +     +     +       +
 1D4   0    -     -        -     +     +     +     +     +       +
 1CTL  0    -     -        -     +     +     +     +     +       +
```

The fields in this display have the following meanings:

Port Shows the port number of the network modules that are currently installed in the switch.

VPI Shows the virtual path on which address validation features are enabled or disabled.

AV Shows whether address validation is enabled (+) or disabled (-). If it is disabled, then Default Calling Party Address Insertion and IE Filtering are also disabled.

DEF_INS Shows whether default address insertion is enabled (+) or disabled (-).

CG Shows whether or not the address of the call originating entity is filtered.

CGS Shows whether or not the subaddress of the call originating entity is filtered.

CDS Shows whether or not the subaddress of the called party is filtered.

BHLI Shows whether or not the Broadband High Layer Information (BHLI) is filtered.

BLLI Shows whether or not all (first, second, and third) Broadband Low Layer Information (BLLI) layers are filtered.

BLLI23 Shows whether or not the second and third Broadband Low Layer Information (BLLI) layers are filtered.

AAL Shows whether or not the AAL (ATM Adaptation Layer) information is filtered.

To list av information for a specific port and path, (for example, port 1a6 and VPI 0), enter the following parameters:

```
localhost::configuration av> show [<port> [<vpi>]]
localhost::configuration av> show 1a6 0
 Port  VPI  AV    DEF_INS  CG    CGS   CDS   BHLI  BLLI  BLLI23  AAL
 1A6   0    -     -        -     +     +     +     +     +       +
```

2.3.2 Enabling Address Validation Parameters

This command allows you to enable one or more address validation (av) filters or to modify the existing filters on a specific port and path. Enter the following parameters:

```
localhost::configuration av> on <port> <vpi>
     [-iefilter (one or more of: [av,def_ins,cg,cgs,cds,blli,blli23,bhli,aal])]
```

-iefilter Indicates the information element filter which controls the filtering of signalling elements. Filters can be applied to the following information elements: `av`, `def_ins`, `cg`, `cgs`, `cds`, `blli`, `blli23`, `bhli`, `aal`.

av Enables address validation. This means that the calling party NSAP addresses for the specified port and path are validated. If a default calling party address is supplied, it is used in all call setup attempts that do not provide a calling party NSAP address. The Information Elements selected by the `-iefilter` options are filtered (removed from) all call setup attempts.

def_ins Enables default address insertion for the specified port and path. This means that the default calling party address is inserted if one has not been provided.

NOTE

For the Information Element filtering options (CG, CGS, CDS, BHLI, BLLI, BLLI23, and AAL), `on` DISABLES the IE Filtering Options so that the named Information Elements are passed to the called party for the specified port and path.

cg Disables filtering of the address of the call originating entity.

cgs Disables filtering of the subaddress of the call originating entity.

cds Disables filtering of the subaddress of the called party.

blli Disables filtering of all (first, second, and third) Broadband Low Layer Information (BLLI) layers, which provides compatibility checking by an addressed entity. This information is normally transferred transparently between the call originator and the call recipient.

blli23 Disables filtering of only the second and third Broadband Low Layer Information (BLLI) layers.

bhli Disables filtering of the Broadband High Layer Information (BHLI), which provides compatibility checking by an addressed entity (e.g., a recipient of a call).

aal Disables filtering of the AAL (ATM Adaptation Layer) information.

2.3.3 Disabling Address Validation Parameters

This command allows you to disable one or more address validation (av) parameters on a specific port and path. Enter the following parameters:

```
localhost::configuration av> off <port> <vpi>
     [-iefilter (one or more of: [av,def_ins,cg,cgs,cds,blli,blli23,bhli,aal])]
```

-iefilter Indicates the information element filter which controls the filtering of signalling elements. Filters can be applied to the following information elements: `av`, `def_ins`, `cg`, `cgs`, `cds`, `blli`, `blli23`, `bhli`, `aal`.

av Disables address validation. This means that all calling party NSAP addresses are assumed valid for the specified port and path. A default calling party address is not inserted if none is supplied in a call setup attempt. All Information Elements are passed to the called party (no IEs are removed).

def_ins Disables default address insertion for the specified port and path. This means that the default calling party address is not inserted if one has not been provided.

NOTE For the Information Element filtering options (CG, CGS, CDS, BHLI, BLLI, BLLI23, and AAL), `off` ENABLES the IE Filtering Options so that the named Information Elements are FILTERED from (not passed to) the called party for the specified port and path.

cg Enables filtering of the address of the call originating entity.

cgs Enables filtering of the subaddress of the call originating entity.

cds Enables filtering of the subaddress of the called party.

blli Enables filtering of all (first, second, and third) Broadband Low Layer Information (BLLI) layers, which provides compatibility checking by an addressed entity. This information is normally transferred transparently between the call originator and the call recipient.

blli23 Enables filtering of only the second and third Broadband Low Layer Information (BLLI) layers.

bhli Enables filtering of the Broadband High Layer Information (BHLI), which provides compatibility checking by an addressed entity (e.g., a recipient of a call).

aal Enables filtering of the AAL (ATM Adaptation Layer) information.

2.3.4 Setting the Default Address for Address Validation

This command allows you to configure the default address that is used for address validation (av). Enter the following parameters:

```
localhost::configuration av> default_address <port> <vpi> [<default>]
```

port Indicates the port on which you want to configure a default address to be used for address validation.

vpi Indicates the virtual path for which you want to configure a default address to be used for address validation.

default Indicates the NSAP address that is used as the default address for address validation.

2.4 Switch Board Configuration Commands

This submenu lets you configure default values for the switch board. Type **`board ?`** at the **`configuration`** level to display the available subcommands.

```
localhost::configuration> board ?
  clockscale       show            timing>         topology
```

2.4.1 Configuring the Clock Scaling Factor on a Switch Board

This is an advanced command that lets you set the clock scaling factor for traffic policing on a switch board. The switch board represents units of time (i.e., burst tolerances) in internal units of clock ticks. Because of the 40 MHz clock used on the switch fabric, the maximum unit of time that can be used by the traffic policing hardware is 0.838 seconds. However, the burst tolerance of some VBR connections is larger than 0.838 seconds, so they can not be correctly policed by the switch. To accommodate these cases, it is possible to scale the clock to represent larger amounts of time with the same number of ticks. Enter the following parameters:

NOTE This command is only useful when performing traffic policing on VBR traffic with an extremely large burst tolerance that is destined for a very low speed (DS1) link. If these conditions are not represented in your network, it is recommended that you leave this value at the default setting.

NOTE The HDCOMP ASIC must be version 1 or greater to support changing the clockscale. To display the ASIC version, use the **`conf board show advanced`** command.

```
localhost::configuration board> clockscale <board> <factor>
```

board Indicates the number of the board being managed.

factor Indicates the factor by which you want to scale the clock. The scaling factor multiplied by 0.838 seconds should be greater than the burst tolerance of the connection. The default is `1`.

If you change the clockscale setting, the following warning is displayed:

```
  ***** WARNING *****
Changing the Clock Scale Factor will have undesired effects on
existing policed connections until the switch software is restarted.
Restart the switch software [n]?
```

2.4.2 Displaying the Board Configuration

This command shows the current configuration of the switch board. Enter the following parameters:

```
localhost::configuration board> show
Board Version Model     S/N    NMs MulticastMode   ATM/OAM
3     0       asx1000   12     5   extended        disabled
```

The fields in this display are defined as follows:

Board Shows the number of the board (switch fabric).

Version Shows the hardware version of this board. If `0` is displayed, the version is unknown.

Model Shows what type of board this is.

S/N Shows the serial number.

NMs Shows the number of installed network modules.

MulticastMode If the switch contains any Series A or B network modules, the switch operates in mixed (non-extended) mode. Otherwise, the switch uses the added Series C, Series LC, or Series LE functionality and operates in extended mode. For more information about non-extended and extended mode, please see Chapter 3 in the *TNX ATM Switch Installation and Maintenance Manual*.

NOTE Series A and B network modules cannot operate in the same switch fabric as Series LC network modules.

ATM/OAM Shows the state of Operations, Administration and Maintenance (OAM) cells (`enabled` or `disabled`).

You can also display advanced features about a switch board. Enter the following parameters:

```
localhost::configuration board> show [<board>] [advanced]
localhost::configuration board> show advanced
Board   ClockScale   HDCOMPversion
3                1                1
```

Board Shows the number of the board (switch fabric).

ClockScale Lists the factor by which the clock is being scaled for traffic policing.

HDCOMPversion Shows the version number of the HDCOMP ASIC on this switch board.

NOTE

`HDCOMPversion` must be 1 or greater to support the AAL5 partial packet policing command under **`conf port pppolicing`** and to support changing the clockscale under **`conf board clockscale`**.

2.4.3 Configuring Board Timing on a TNX-1100 or MSC-900

These commands let you configure timing across the switch fabrics in a TNX-1100 and the multiplexer modules in an MSC-900. Type **`timing ?`** at the **`board`** level to display the available subcommands.

```
localhost::configuration board> timing ?
  exportclock      show
```

2.4.3.1 Configuring the Export Clock on a TNX-1100 or MSC-900

This command lets you configure the outgoing fabric clock to be taken from one of the network modules resident on that fabric on a TNX-1100 or multiplexer module on an MSC-900. Enter the following parameters:

```
localhost::conf board timing> exportclock <board> (primary|secondary) (A|B|C|D)
```

board Indicates this switch board. Look at the `Board` field under **`conf board show`** to determine this number.

primary Indicates the source of the primary 8kHz clock for this board.

secondary Indicates the source of the secondary 8kHz clock for this board.

A|B|C|D Indicates from which network module the primary or secondary 8kHz clock is to be taken.

2.4.3.2 Displaying Board Timing on a TNX-1100 or MSC-900

This command lets you display current timing configuration for a switch board in a TNX-1100 or multiplexer module in an MSC-900. Enter the following parameters:

```
localhost::configuration board timing> show
       Export            Export
Board  Primary  Status  Secondary  Status
2      2A       Down    2A         Down
```

Board Shows this switch board number.

Export Primary Shows which network module on this board is the source of the primary 8kHz clock.

Status Shows the current status of the exported primary 8kHz clock. `Up` means this clock is currently being exported. `Down` means this clock is not currently being exported.

Export Secondary Shows which network module on this board is the source of the secondary 8kHz clock.

Status Shows the current status of the exported secondary 8kHz clock. `Up` means this clock is currently being exported. `Down` means this clock is not currently being exported.

If this command is entered on any device other than a TNX-1100 or MSC-900, the following message is displayed:

```
localhost::configuration board timing> show
No board timing information is available
```

CAUTION

If you must hotswap a network module or switch fabric that is the primary timing source, ensure that you reconfigure the timing source to a network module on another switch fabric before you remove the module or fabric.

2.4.4 Displaying the Board Topology

This command displays the SPANS topology of the ATM network of which this switch is a part. All SPANS-NNI links appear in the topology. Enter the following parameters:

```
localhost::configuration board> topology
B Source           Ipaddress       Destination      Ipaddress       Capacity Age
1 f21a013a.08.0    198.29.22.46    f21a013a.09.0    198.29.22.46        1544    0
1 f21a013a.09.0    198.29.22.46    f21a013a.08.0    198.29.22.46        1544    0
```

The fields in this display are defined as follows:

B Indicates the number of the board (switch fabric).

Source Lists the source SPANS address of the link.

IpAddress Shows the IP address mapping to the source SPANS address, if it is known. Otherwise, displays - - -.

Destination Indicates the destination SPANS address of the link.

IpAddress Shows the IP address mapping to the destination SPANS address, if it is known. Otherwise, displays - - -.

Capacity Displays the link capacity in Kbps. A negative value in this field indicates that the link has gone down, but it has not timed out yet.

Age Shows the age of the link. A value of -1 indicates that the link is no longer present.

If this switch is not connected to any other switches, then the following is displayed:

```
localhost::configuration board> topology
No topology information is available
```

2.5 CEC Configuration

```
localhost::configuration cec> ?
  alarms>          slotx>           sloty>           timing>
```

2.5.1 Alarms Configuration Commands

This submenu lets you configure alarm conditions that are a result of various environmental and synchronization timing conditions. You can display the list of available subcommands by typing **alarms ?** at the **cec** level.

```
localhost::configuration cec> alarms ?
  disable          enable           relays>          show
```

2.5.1.1 Disabling an Alarm

This command lets you disable an alarm. Enter the following parameters:

```
localhost::configuration cec alarms> disable (major | minor) <alarm type>
```

major|minor	Designates whether the alarm type causes a major alarm or a minor alarm when that condition occurs.
alarm type	Indicates the alarm condition. Valid parameters are displayed in the AlarmType field when the command string **conf alarms show** is entered.

For example, to disable an overtemperature condition that is detected by the overtemperature sensor as a minor alarm, enter the following parameters:

```
localhost::configuration alarms> disable minor tempSensorOverTemp
```

To verify that the change has taken effect, you can display the alarms:

```
localhost::configuration alarms> show
 AlarmType                      AlarmStatus    MinorAlarm   MajorAlarm
 powerSupplyInputFailed         active         disabled     enabled
 powerSupplyOutputFailed        active         disabled     enabled
 fanBankFailed                  active         disabled     enabled
 tempSensorOverTemp             inactive       disabled     enabled
 Major alarm relay status: on
 Minor alarm relay status: off
```

2.5.1.2 Enabling an Alarm

This command lets you enable an alarm. Enter the following parameters:

```
localhost::configuration cec alarms> enable (major | minor) <alarm type>
```

major|minor Designates whether the alarm type causes a major alarm or a minor alarm when that condition occurs.

alarm type Indicates the kind of alarm condition. Valid parameters are displayed in the `AlarmType` field when the command string **`configuration alarms show`** is entered at the prompt.

For example, to enable an overtemperature condition that is detected by the overtemperature sensor as a major alarm, enter the following parameters:

```
localhost::configuration cec alarms> enable major tempSensorOverTemp
```

To verify that the change has taken effect, you can display the alarms:

```
localhost::configuration alarms> show
 AlarmType                      AlarmStatus    MinorAlarm   MajorAlarm
 powerSupplyInputFailed         active         disabled     enabled
 powerSupplyOutputFailed        active         disabled     enabled
 fanBankFailed                  active         disabled     enabled
 tempSensorOverTemp             inactive       disabled     enabled
 Major alarm relay status: on
 Minor alarm relay status: off
```

2.5.1.3 Configuring an Alarm Relay

These commands let you configure or display alarm relays. You can show the list of available subcommands by typing **relays ?** at the **alarms** level. Enter the following parameters:

```
localhost::configuration alarms> relays ?
  set              show
```

2.5.1.3.1 Setting an Alarm Relay

This command lets you set an alarm relay. Enter the following parameters:

```
localhost::conf alarms relays> set <relay number> (major | minor | unused)
```

relay number Indicates the number which corresponds to one of the five alarm relay LEDs on the front of the SCP.

major|minor |unused Indicates if you want the alarm relay to be `major`, `minor`, or `unused`.

2.5.1.3.2 Displaying the Alarm Relays

This command lets you display the alarm relays. Enter the following parameters:

```
localhost::conf alarms relays> show
 Relay            Alarm          Current
 Number          Function         State
    1             major            on
    2             minor            on
    3             unused           off
    4             unused           off
    5             major            on
```

Relay Number Shows the number which corresponds to one of the five alarm relay LEDs on the front of the SCP.

Alarm Function Shows whether the alarm relay has been configured as `major`, `minor`, or `unused`.

Current State Shows whether the alarm relay is `on` (in a state of alarm) or `off` (not in a state of alarm).

2.5.1.4 Displaying Alarm Conditions

This command lets you display the status of all alarms. Enter the following:

```
localhost::configuration alarms> show
 AlarmType                     AlarmStatus    MinorAlarm   MajorAlarm
 powerSupplyInputFailed        active         disabled     enabled
 powerSupplyOutputFailed       active         disabled     enabled
 fanBankFailed                 active         disabled     enabled
 tempSensorOverTemp            inactive       disabled     enabled
 Major alarm relay status: on
 Minor alarm relay status: off
```

The fields in this display have the following meanings:

AlarmType Displays the name of the alarm.

AlarmStatus Shows whether the state of the alarm is active (alarming) or inactive (not alarming). An alarm is active if the underlying condition is detected. For power supplies, the input failed alarm condition is active if the input voltage is not within the nominal range for the supply. This does not necessarily mean that an output failure will result. A power supply output failure condition is active if any power supply is failing or if it is physically removed.

MinorAlarm `Disabled` means that this alarm type will not cause a minor alarm. `Enabled` means that this alarm type causes a minor alarm.

MajorAlarm `Disabled` means that this alarm type will not cause a major alarm. `Enabled` means that this alarm type causes a major alarm.

Major alarm relay status `Off` means that no major alarms are currently active. `On` means that one or more major alarms are currently active. Look at the AlarmStatus field to see which condition is in a state of alarm.

Minor alarm relay status `Off` means that no minor alarms are currently active. `On` means that one or more minor alarms are currently active. Look at the AlarmStatus field to see which condition is in a state of alarm.

2.5.2 TCM Selection

The `slotx` and `sloty` submenus allow you to choose a TCM for further configuration. To configure parameters on the TCM in slot X (the top slot), type **`slotx`** at the **`cec`** level. To configure the TCM in slot Y (the bottom slot), type **`sloty`** at the **`cec`** level.

2.5.3 TCM Configuration Commands

Once an individual TCM has been selected for configuration, you can configure IP parameters, change the name of the TCM, display information about the TCM, and so on. You can display the list of available subcommands by typing **`?`** at the **`slotx`** or **`sloty`** sublevel.

```
localhost::configuration cec slotx> ?
  ip>              name             rs232>           show
  snmp>            timezone
```

2.5.3.1 IP Configuration Commands

NOTE

The `ie1` interface of all installed TCMs and the `ie0` interface of all installed SCPs must all reside on the same subnet, and the subnet mask address must be `255.255.255.0`.

These commands let you change the IP configuration of the TCM's interfaces. You can display the list of available subcommands by typing **`ip ?`** at the **`configuration`** level.

```
localhost::configuration cec slotx ip> ?
  address          admin            broadcast        mask
  route>           show
```

2.5.3.1.1 Configuring the IP Address

This command lets you configure an IP address for one of the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip> address <interface> <address>
```

interface Indicates the name of the IP interface to be managed.

address Indicates the IP address for this interface.

2.5.3.1.2 Configuring the IP State

This command lets enable or disable the IP interfaces on the TCM. Enter the following parameters:

```
localhost::configuration cec slotx ip> admin <interface> (up|down)
```

interface Indicates the name of the IP interface to be managed.

up|down Entering `up` enables the designated interface. Entering `down` disables the designated interface.

2.5.3.1.3 Configuring the IP Broadcast Address

This command allows you to modify the broadcast address for one of the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip> broadcast <interface> (0|1)
```

interface Indicates the name of the IP interface.

0|1 Indicates the IP broadcast type for this interface. This is the host portion of the IP address that is used for routing. Entering `1` causes the host portion of the IP address to be set to all 1s. Entering `0` causes the host portion of the IP address to be set to all 0s.

2.5.3.1.4 Configuring the IP Subnet Mask

This command allows you to modify the IP subnet mask of one of the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip> mask <interface> <mask>
```

interface Indicates the name of the IP interface.

mask Indicates the subnet mask for this IP interface. It should be entered in dotted decimal notation (e.g., 255.255.255.0).

2.5.3.1.5 Configuring IP Routes

This command allows you to add a static IP route to the local IP routing table, delete a static IP route from the local IP routing table, or list the current static IP routes in the local IP routing table for one of the TCM's IP interfaces. You can display the list of available subcommands by typing **route ?** at the **ip** level.

```
localhost::configuration cec slotx ip> route ?
  new             delete          show
```

2.5.3.1.5.1 Adding an IP Route

This command lets you create an IP route for one of the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip route> new (default|<destination-ipad-
dress>) <gateway> [<metric>] [(host | net)]
```

default This parameter must be specified to create a default route.

destination -ipaddress Indicates the destination IP network number.

gateway Indicates the gateway address to the destination IP network number.

metric Indicates the number of hops to the destination IP network. The default value of `1` is used if no value is entered by the user. If `1` is specified, the route is created with the RTF_GATEWAY flag set.

AMI Configuration Commands

host|net Using `host` indicates that this is a host-specific route with the destination being a specific node's IP address. Using `net` indicates that this is a network-specific route with the destination being a network IP address. The default value of `net` is used if no value is entered by the user.

2.5.3.1.5.2 Deleting an IP Route

This command lets you delete an IP route from one of the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip route> delete (default|<destination-ipaddress>) <gateway>
```

default A default must be specified to delete a default route.

destination-ipaddress Indicates the destination IP network number.

gateway Indicates the gateway address to the destination IP network number.

2.5.3.1.5.3 Showing the IP Routes

This command lets you display the current IP routes for the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip route> show
Destination       Gateway             Metric         Interface      Flags
default           198.29.31.75        1              ie0            G
127.0.0.1         127.0.0.1           0              lo0
169.144.85.3      198.29.31.75        1              ie0            G
198.29.31.0       198.29.31.28        0              ie0
```

The fields in this display are defined as follows:

Destination Shows the destination IP network.

Gateway Shows the gateway address to the destination IP network number.

Metric Shows the number of hops to the destination IP network. The default is `1`.

Interface Shows the local IP interface used to get to the destination IP network.

Flags Shows H if the route is host-specific (created with the RTF_HOST flag set). Lists G if the route is network-specific (created with the RTF_GATEWAY flag set).

2.5.3.1.6 Displaying the IP Interface Configuration

This command allows you to display information about the configuration of the TCM's IP interfaces. Enter the following parameters:

```
localhost::configuration cec slotx ip> show
interface  state        address         netmask         broadcast
ie0        up           169.144.28.125  255.255.255.0   169.144.28.255
ie1        up           169.144.28.225  255.255.255.0   169.144.28.255
lo0        up           127.0.0.1       255.0.0.0       N/A
```

The fields in this display are defined as follows:

interface Indicates the name of the IP interface.

state Lists the administrative state of the IP interface.

address Displays the IP address of the IP interface.

netmask Shows the netmask address of the IP interface.

broadcast Indicates the broadcast address of the IP interface.

You may also designate a single interface to be displayed by entering **show** and the specific interface name at the prompt as follows:

```
localhost::configuration cec slotx ip> show ie0
interface  state        address         netmask         broadcast
ie0        up           169.144.28.125  255.255.255.0   169.144.28.255
```

The fields in this display are defined in the same manner as those listed above in the example for showing the configuration of all of the IP interfaces.

2.5.3.2 Setting or Changing the TCM’s Name

This command lets you set or change the name of the TCM. Enter the following parameters:

```
localhost::configuration cec slotx> name <name>
```

name Indicates the new system name for the TCM.

For example, to set the TCM’s name to `linus`, enter the following parameters:

```
localhost::configuration cec slotx> name linus
```

2.5.3.3 Serial Port Configuration

This command lets you display configuration information for the RS-232 serial port on the front panel of the TCM. You can display the available subcommand by typing **`rs232 ?`** at the **`configuration`** level.

```
localhost::configuration cec slotx> rs232 ?
  show
```

2.5.3.3.1 Displaying Serial Port Information

This command allows you to display the settings for the RS-232 serial port on the TCM. Enter the following parameters:

```
localhost::configuration cec slotx rs232> show
Port     Type         Speed   Flow     Bits   Stops      Parity
A        rs232         9600   none        8   one        none
```

The fields in this display are defined as follows:

Port Shows the physical port designation.

Type Shows the signalling standard used.

Speed Shows the receive/transmit rate in bits per second.

Flow Shows the type of flow control implemented on the given port.

Bits Shows the number of bit times in a single character.

Stops Shows the number of stop bits in a character frame.

Parity Shows the parity setting for the ports.

2.5.3.4 Displaying TCM Information

This command lets you display information about the TCM to which you are logged in. Enter the following parameters:

```
localhost::configuration cec slotx> show
TCM 'linus', Type cec-plus, up 2 days 18:27
Hardware version 2, Software version CEC_ForeThought_1.0.0 (1.1)
Serial number                           10
Slot                                    X
State                                   active
Time zone                               N/A
External Inputs (1-5)                   off off off off off
Change to active operation occurred at Dec 2  15:29:08 1996
ESI option is present.
```

The fields in this display have the following meanings:

TCM Shows this TCM's system name.

Type Shows what type of TCM this is.

up Shows the amount of time (in days, hours, and minutes) since this TCM has been rebooted.

Hardware version Shows the hardware version of this TCM.

Software version Shows the software version being used by this TCM.

Serial number Shows the serial number of this TCM card.

Slot Shows the slot in which this TCM resides. `X` indicates the top slot and `Y` indicates the bottom slot.

State Shows the current state of this TCM. `active` means this TCM is the controller and is functioning properly. `standby` means this is the standby TCM. `offline` means the timing has failed on this TCM.

Time zone Shows the time zone configured for this TCM. If this field reads `N/A`, then this value has not been configured yet.

External Inputs Shows the current state of each of the five front panel external inputs from the viewpoint of this TCM. Can be either `on` (input being received) or `off` (no input).

Active operation Shows when this TCM control software switched to the current operating mode.

ESI option Shows the External Synchronization Interface (ESI) card status from the viewpoint of this TCM. Can be either `present` or `absent`.

Other TCM status If another TCM is not plugged in, then nothing is displayed. If another TCM is plugged in, shows the software status of the other TCM from the viewpoint of this TCM. If this TCM is the controller, `normal` means the standby TCM is actively updating and waiting to be called into service, and `unknown` means the standby TCM is down. If this TCM is the standby, `active` means the controller TCM is functioning normally.

2.5.3.5 SNMP Configuration Commands

These commands enable you to manage the SNMP communities and traps. You can display the list of available subcommands by typing **snmp ?** at the **configuration** level.

```
localhost::configuration cec slotx> snmp ?
community              trap>
```

2.5.3.5.1 Configuring the SNMP Community Access

This command lets you modify the SNMP community access to EMI. Enter the following parameters:

```
localhost::configuration cec slotx snmp> community (read|write) <community>
```

read|write Indicates the access level for this community.

community Indicates the community string associated with `read` or with `write`. The default community string associated with `read` is `public`. The default community string associated with `write` is `private`.

2.5.3.5.2 Configuring SNMP Traps

These commands help you to manage SNMP traps. You can display the list of available sub-commands by typing **`trap ?`** at the **`snmp`** level.

```
localhost::configuration cec slotx snmp> trap ?
delete          new             show
```

2.5.3.5.2.1 Deleting an SNMP Trap Entry

This command allows you to delete an existing SNMP trap destination. Before deleting a trap that may need to be recreated later, show the list of current SNMP traps and either copy and save the screen or write down the trap destinations. You will also need to show the list of current SNMP traps in order to find the number of the trap to be deleted. Enter the following parameters to delete a trap entry:

```
localhost::configuration cec slotx snmp trap> delete <trap>
```

trap Indicates the number of the trap destination in the list of current SNMP traps that is to be removed.

For example, to delete trap 198.29.31.130, first list the traps to find its number and copy the address in case you want to recreate it later:

```
localhost::configuration cec slotx snmp trap> show
Trap    Destination
1       192.88.243.18
2       198.29.16.14
3       198.29.16.18
4       198.29.23.39
5       198.29.31.130
```

Then enter the following parameters:

```
localhost::configuration cec slotx snmp trap> delete 5
```

You can display the list again to verify that the trap has been deleted:

```
localhost::configuration cec slotx snmp trap> show
Trap    Destination
1       192.88.243.18
2       198.29.16.14
3       198.29.16.18
4       198.29.23.39
```

2.5.3.5.2.2 Creating an SNMP Trap Entry

This command allows you to specify a host to which an TCM can send SNMP traps. Enter the IP address of the SNMP trap destination to be added. Repeat this for as many SNMP trap destinations as needed. Traps are active as soon as they are set. Enter the following parameters:

```
localhost::configuration cec slotx snmp trap> new <ipaddress>
```

ipaddress Indicates the IP address of the trap destination to be created.

2.5.3.5.2.3 Displaying the SNMP Trap Entries

This command enables you to list all of the current SNMP traps. Enter the following parameters:

```
localhost::configuration cec slotx snmp trap> show
Trap    Destination
1       192.88.243.18
2       198.29.16.14
3       198.29.16.18
4       198.29.23.39
5       198.29.31.130
```

If no SNMP traps have been configured, the following message is displayed:

```
No trap information is available
```

2.5.3.6 Setting or Changing the Timezone

This command enables you to set or change the timezone on the TCM. Enter the following parameters:

```
localhost::configuration cec slotx> timezone <timezone>
```

timezone The time zone configured for this TCM. The TCM supports and automatically converts from Standard to Daylight Savings time for the following time zones: `EST5EDT` (Eastern Standard Time), `CST6CDT` (Central Standard Time), `MST7MDT` (Mountain Standard Time), `PST8PDT` (Pacific Standard Time), `AKST9AKDT` (Alaska Standard Time).

Locations outside of the time zones listed above must supply the following POSIX standard 1003.1-1988 formula for switching between Daylight Savings Time and Standard Time:

`stdoffset [dst[offset][, start[/time], end[/time]]]`

std and dst Indicates 3 or more bytes that designate standard (`std`) or Daylight Savings Time (`dst`). Only `std` is required; if `dst` is omitted, then it does not apply in this location. Can use uppercase or lowercase letters and any characters, except a leading colon(:), digits, comma (,), minus (-), plus (+), and ACSII NUL.

offset Indicates the value to add to local time to equal Greenwich Mean Time. `offset` is of the form:

hh[:mm[:ss]]

Hour (`hh`) is required and can be a single digit between `0` and `24`. Minutes (`mm`) and seconds (`ss`) are optional and are between `0` and `59`. If no `offset` follows `dst`, it is assumed to be one hour ahead of `std`. If preceded by a "`-`", the time zone is east of the Prime Meridian; otherwise it is west (with an optional "`+`").

start[/time], end[/time]

`start` indicates the date when the change occurs from `std` to `dst`. `end` indicates the date when you change back. Both `start` and `end` are of the form:

Mm.n.d

`d` is the `d`-th day ($0 \le d \le 6$) of week `n` of month `m` of the year ($1 \le n \le 5$, $1 \le m \le 12$), where week 5 is the last `d` day in month `m`, which can occur in either the fourth or the fifth week). Week 1 is the first week in which the `d`-th day occurs. Day 0 is Sunday. `time` is of the same format as `offset`, except that no leading "`-`" or "`+`" is allowed. If `time` is not entered, the default of `02:00:00` is used.

2.5.4 CEC Timing Configuration

These commands let you configure external synchronization timing. Type **`timing ?`** at the **`cec`** level to display the list of available subcommands.

```
localhost::configuration cec> timing ?
  bits>            failover>        mode             primary
  references       revertive>       secondary        show
```

2.5.4.1 BITS Timing Configuration Commands

These commands let you configure the timing input and output for the BITS clock. You can display the list of available subcommands by entering **`bits ?`** at the **`timing`** level. Enter the following:

```
localhost::configuration cec timing> bits ?
  coding           framing          level
```

2.5.4.1.1 DS1 BITS Coding Configuration

This command lets you configure the coding of the DS1 BITS interface for this TCM. You can get to this level by entering **coding** at the **bits** level. Enter the following parameters:

```
localhost::configuration cec timing bits> coding <ami|b8zs>
```

ami Indicates that Alternate Mark Inversion (AMI) coding should be used for the BITS interface on the TCM. This means zeros are represented by 01 during each bit cell, and ones are represented by 11 or 00, alternately, during each bit cell. This technique requires that the sending device maintain ones density. Ones density is not maintained independent of the data stream.

b8zs Indicates that Binary 8-Zero Substitution (B8ZS) coding should be used for the TCM. This means a special code is substituted whenever eight consecutive zeros are sent through the link. This code is then interpreted at the remote end of the connection. This technique guarantees ones density independent of the data stream.

2.5.4.1.2 E1 BITS Coding Configuration

This command lets you configure the coding of the E1 BITS interface for this TCM. You can get to this level by entering **coding** at the **bits** level. Enter the following parameters:

```
localhost::configuration cec timing bits> coding <ami|hdb3>
```

ami Indicates that Alternate Mark Inversion (AMI) coding should be used for the BITS interface on the TCM. This means zeros are represented by 01 during each bit cell, and ones are represented by 11 or 00, alternately, during each bit cell. This technique requires that the sending device maintain ones density. Ones density is not maintained independent of the data stream.

hdb3 Indicates that High Density Bipolar (HDB3) coding should be used for the TCM. HDB3 is a bipolar coding method that does not allow more than 3 consecutive zeroes.

2.5.4.1.3 DS1 BITS Framing Configuration

This command allows you to configure the framing format of the DS1 BITS interface for this TCM. You can get to this level by entering **format** at the **bits** level. Enter the following parameters:

```
localhost::configuration cec timing bits> format <d4|esf>
```

d4 Indicates that D4 (also known as Superframe (SF)) framing should be used for the BITS interface on the TCM. SF consists of 12 frames of 192 bits each, with the 193rd bit providing error checking and other functions.

esf Indicates that Extended Superframe (ESF) framing should be used for the BITS interface on the TCM. ESF provides frame synchronization, cyclic redundancy, and data link bits.

2.5.4.1.4 E1 BITS Framing Configuration

This command allows you to configure the framing format of the E1 BITS interface for this TCM. You can get to this level by entering **format** at the **bits** level. Enter the following parameters:

```
localhost::configuration cec timing bits> format <mf | crc4mf>
```

mf MF indicates that multiframe E1 framing is used.

crc4mf CRC4MF indicates that multiframe E1 framing with CRC-4 checksums is used.

2.5.4.1.5 BITS Level Configuration

This command lets you configure the output level (dB) of the DS1 BITS interface for an TCM.

```
localhost::configuration cec timing bits> level (0.6 | 1.2 | 1.8 | 2.4 | 3.0)
```

0.6 Indicates that the output level for the BITS interface is 0.6 dB.

1.2 Indicates that the output level for the BITS interface is 1.2 dB.

1.8 Indicates that the output level for the BITS interface is 1.8 dB.

2.4 Indicates that the output level for the BITS interface is 2.4 dB.

3.0 Indicates that the output level for the BITS interface is 3.0 dB.

2.5.4.2 Failover Timing Configuration

This command lets you configure the timing failover delay. You can display the available sub-command by typing **`failover ?`** at the **`timing`** level.

```
localhost::configuration cec timing> failover ?
  delay
```

2.5.4.2.1 Configuring the Failover Timing Delay

This command lets you set the delay, in whole seconds, between the time that the primary reference fails and the time that the TCM is told to switch over to the secondary reference. Enter the following parameters:

```
localhost::configuration cec timing failover> delay <seconds>
```

seconds Indicates the amount of time after the failure of the primary reference before the TCM is instructed to switch to the secondary reference. The default is `0` seconds.

NOTE

The failover delay should be left at `0` under normal circumstances. This parameter is only meaningful when the timing mode is `automatic`.

2.5.4.3 Timing Mode Configuration

This command lets you configure the timing reference to be used on the TCM. You can get to this level by entering **`mode`** at the **`timing`** level. Enter the following parameters:

```
localhost::conf timing> mode (freerun | primary | secondary | automatic | bits)
```

freerun Indicates that the TCM must use the local oscillator as its timing source.

primary Indicates that the TCM must use the primary timing source.

secondary Indicates that the TCM must use the secondary timing source.

NOTE

It is recommended that the `freerun`, `primary`, and `secondary` modes only be used during diagnostics and maintenance because the TCM will not failover to another source when it is in one of these modes.

automatic This is the default mode. See Section 1.2 in Chapter 1 for a description of how this mode works.

NOTE

`automatic` mode is only valid when the primary and secondary sources are recovered from network modules.

bits Indicates that the TCM will automatically use the most appropriate BITS input.

2.5.4.4 Primary Timing Configuration

This command enables you to select the primary clock source from any of the switch fabrics' exported clocks. Enter the following parameters:

```
localhost::configuration cec timing> primary fabric (1 | 2 | 3 | 4)
(primary | secondary)
```

fabric (1|2|3|4) (primary| secondary) Indicates the primary timing source is to be taken from one of the exported clocks (either primary or secondary) from one of the switch fabrics (1 - first (leftmost slot), 2 - second slot, 3 - third slot, 4 fourth slot) switch fabric.

Before you configure the primary timing source, use the **`conf timing references`** command to display all of the possible clocking references, their specific sources, and whether or not they are actually available for you to use. The freerun oscillator is not listed there because it is always available.

2.5.4.5 Displaying Timing References

This commands lets you display all of the possible timing references from the switch. Enter the following parameters:

```
localhost::configuration cec timing> references
Reference               Source          Status
fabric 1 primary        1A1             available
fabric 1 secondary      1B2             available
fabric 2 primary        2A1             available
fabric 2 secondary      2B2             available
fabric 3 primary        3A1             available
fabric 3 secondary      3B2             available
fabric 4 primary        4A1             available
fabric 4 secondary      4B2             available
tcm X                   BITS1           available
tcm Y                   BITS2           unavailable
```

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The fields in this display are defined as follows:

Reference Shows the name of the timing reference.

Source Shows from which network module port or BITS clock the timing is being derived for this fabric or TCM. If the port is listed in regular BNP notation (e.g., 3B2), this indicates the exported timing source from this port. If the port is listed as 3B (no timing), then this network module does not support distributed timing. If the port is listed as 3B OSC, this indicates the timing source is the crystal oscillator on that network module. If the port is listed as 3B (down), then this network module has been removed.

Status Shows if the timing source is available or not.

2.5.4.6 Revertive Timing Configuration

These commands allow you to enable or to disable revertive switching, or to configure the length of the delay between the time that the failed primary clock is restored and the time that the TCM is told to switch back to the primary clock again. You can get to this level by entering **`revertive ?`** at the **`timing`** level.

```
localhost::configuration cec timing> revertive ?
  delay             disable           enable
```

NOTE Revertive timing is only available when the mode is configured to be **`automatic`** under **`conf timing mode`**.

2.5.4.6.1 Configuring the Revertive Timing Delay

When revertive timing is enabled and the primary clock fails, the TCM is told of the failure and is instructed to switch to the timing source that is configured as the secondary clock. To ensure that the primary source is good when it returns, this command lets you configure the amount of time, in whole seconds, between the time that the primary clock is restored and the time that the TCM is told to switch back to the primary clock again. Enter the following parameters:

```
localhost::configuration cec timing revertive> delay <seconds>
```

delay Indicates the amount of time after the restoration of the primary timing reference before the TCM is instructed to return to the primary timing reference. The default is 3 seconds.

2.5.4.6.2 Disabling Revertive Timing Delay

This command lets you disable the revertive switching for timing sources on this TCM. When you disable revertive switching, you only turn it off. If you enable it again, the TCM uses the value that you last configured for the delay using **`conf timing revertive delay`**. To disable the revertive timing delay, enter the following parameters:

```
localhost::configuration cec timing revertive> disable
```

disable Indicates that the revertive timing delay is going to be turned off.

NOTE This command takes effect as soon as you enter it.

2.5.4.6.3 Enabling the Revertive Timing Delay

This command lets you enable the revertive switching delay for timing sources on this TCM. When you enable the delay, the TCM uses the value that you last configured for the delay using **`conf timing revertive delay`**. To enable the revertive timing delay, enter the following parameters:

```
localhost::configuration cec timing revertive> enable
```

enable Indicates that the revertive timing delay is going to be turned on.

NOTE This command takes effect as soon as you enter it.

2.5.4.7 Secondary Timing Configuration

This command enables you to select the secondary clock source from any of the switch fabrics' exported clocks. You can get to this level by entering **`secondary`** at the **`timing`** level. Enter the following parameters:

```
localhost::configuration cec timing> secondary  fabric (1 | 2 | 3 | 4)
(primary | secondary)
```

fabric (1|2|3|4) (primary| secondary) Indicates the secondary timing source is to be taken from one of the exported clocks (either primary or secondary) from one of the switch fabrics (1 - first (leftmost slot), 2 - second slot, 3 - third slot, 4 fourth slot) switch fabric.

Before you configure the secondary timing source, use the **`conf timing references`** command to display all of the possible clocking references, their specific sources, and whether or not they are actually available for you to use. The freerun oscillator is not listed there because it is always available.

2.5.4.8 Displaying Timing

This command lets you display the timing information that has been configured. Enter the following parameters:

```
localhost::configuration cec timing> show

ESI module on 'Raven21', Card type DS1 Stratum 4
Hardware version 0, PLL status freerun

DS1 BITS interface framing esf, line coding b8zs
output level 0.6 dB

Operation Status                        enabled
Current Timing Reference                freerun
Requested Timing Reference              freerun

Primary Reference (1 (Down))            unavailable
Secondary Reference (1 (Down))          unavailable

BITS1 Reference                         unavailable
BITS2 Reference                         unavailable

Revertive Switching                     enabled
Revertive Switching Delay               3
Failover Switching Delay                0
```

The fields in this display are defined as follows:

ESI module Shows the name of the TCM.

Card type Shows the ESI card type for this TCM.

Hardware version Shows the card version for this TCM.

PLL status Shows the phase-locked loop (PLL) status for this TCM. Can be `freerun` meaning the local oscillator on the TCM is being used, `locked` meaning the current clock is good, `holdover` meaning the TCM has detected a clock source error and is using the last valid clock source, `acquire` meaning the TCM is trying to lock on to the current clock (this may take up to five minutes), or `refqual` meaning the reference quality of the new clock is out of specification.

DS1 BITS interface framing Shows the framing format of the DS1 BITS interface for this TCM. Can be `d4` or `esf`.

line coding	Shows the coding format of the DS1 BITS interface for this TCM. Can be `ami` or `b8zs`.
output level	Shows the output level, in dB, of the DS1 BITS interface for this TCM. Can be `0.6`, `1.2`, `1.8`, `2.4`, or `3.0`.
Operation Status	Shows the status of the TCM. Should always be `enabled`.
Current Timing Reference	Shows the actual timing reference that is currently being used. Can be `BITS1`, `BITS2`, `primary`, `secondary`, or `freerun`.
Requested Timing Reference	Shows the timing reference that was configured. If this source fails, it will not match what is currently being used. Can be `BITS`, `automatic`, `primary`, `secondary`, or `freerun`.
Primary Reference	Shows the timing source configured as the primary source. Can be one of the primary or secondary clocks exported from one of the switch fabrics (1A1, 1B2, 2A1, 2B2, 3A1, 3B2, 4A1, 4B2).
Primary Status	Shows whether the timing source configured as the primary source is currently `available` or `unavailable`.
Secondary Reference	Shows the timing source configured as the secondary source. Can be one of the primary or secondary clocks exported from one of the switch fabrics (1A1, 1B2, 2A1, 2B2, 3A1, 3B2, 4A1, 4B2).
Secondary Status	Shows whether the timing source configured as the secondary source is currently `available` or `unavailable`.
Revertive Switching	Shows whether revertive switching is `enabled` or `disabled`.
Revertive Switching Delay	Shows the amount of time, in seconds, between the time that the primary clock is restored and the time that the TCM switches back to the primary clock again.
Failover Switching Delay	Shows the amount of time, in seconds, after the failure of the primary clock source before the TCM switches to the secondary clock source.

2.6 CES Configuration Commands

The **ces** commands let the user create and delete CES connections, as well as display the status of existing connections. Type **ces ?** at the prompt:

```
localhost:: configuration> ces ?
  new              delete           show
```

2.6.1 Creating a New CES Connection

To create a new CES connection, the user must set several parameters. Enter the following to create a new CES connection:

```
localhost::configuration ces> new <port> <timeslots>
```

The CES **new** command can also be used as shown below. When the following parameters are used, by default, an appropriate entry is made in the UPC table and a bidirectional PVC is created with the proper UPC index.

```
new <port> <timeslots> -oport <oport> -ots <ots>
new <port> <timeslots> -oport <oport> -ovpi <ovpi> -ovci <ovci>
```

The following advanced options can be used when creating CES connections:

```
[-srts (on|off)] [-fupc <index>] [-bupc <index>]
[-cas (basic|cas)] [-partialfill <partialfill>] [-reasscdvt <cdvt>]
[-bufSize <bufSize>] [-integ <integ>]
```

NOTE

SRTS is only available on unstructured connections, which are created by specifying **all** for the *<timeslots>* parameter.

The **-cas** and **-partialfill** options are not applicable to unstructured mode.

Structured mode is selected by indicating the exact timeslots to be used. For example, timeslots 1, 2, and 3 would be entered as 1-3, timeslots 2, 4, and 6 would be entered as 2:4:6, and combinations such as 1-4:9-11:12 are allowed.

The parameters in the **new** command have the following meanings:

port Indicates the network module port on which the CES connection is to be created.

timeslots Indicates which timeslots (1-24 for DS1, 1-31 for E1) are being configured for a particular PVC. **all** indicates unstructured service. The time slot assignments may be either contiguous or non-contiguous DS0s.

oport Indicates the output port of the CES connection, which can be a CES port or an ATM port.

ovpi Indicates the output Virtual Path Identifier (VPI) of the CES connection when the output port is not a CES port.

ovci Indicates the output Virtual Channel Identifier (VCI) of the CES connection when the output port is not a CES port.

ots Indicates the output timeslots of the CES connection when the output port is a CES port.

srts Indicates whether Synchronous Residual Time Stamp (SRTS) clock recovery is to be enabled on this connection. `on` indicates that SRTS is enabled, `off` indicates that SRTS is disabled. By default, SRTS is disabled.

fupc Indicates the UPC contract type to be used in the ingress direction of the connection. (See Chapter 2 in this manual for more information about UPC contracts.)

bupc Indicates the UPC contract type to be used in the egress direction of the connection. (See Chapter 2 in this manual for more information about UPC contracts.)

cas Indicates whether Channel Associated Signalling (CAS) is to be used on the connection. `basic`, which applies to structured connections only, indicates that CAS will not be used, `cas` indicates that CAS will be used. The default is `basic`.

partialfill Indicates how many of the available 47 payload bytes in each cell are used before they are deemed “full” and ready for transmission across the ATM network (i.e. how much of the ATM cell contains data and how much is filler). The range for this parameter is 5 to 47. The default value is 47, for 47 bytes of data.

`partialfill` is used to minimize network transmission latency and is useful especially with time-sensitive, robbed-bit signalling sources.

reasscdvt <cdvt> Indicates the Cell Delay Variation Tolerance for cells being received by the segmentation and reassembly (SAR) engine. The range for this parameter is 100 to 24000 (in μs), and the default is 2000 (i.e., 2 ms).

bufSize Indicates the amount of reassembly buffer space allocated for the connection. The default is 512 bytes per timeslot.

integ Indicates the amount of time allocated to re-establish the connection before, while, or after the call is established, or in the case of interruption. The default value is 2500μs.

2.6.2 Deleting a CES Connection

To delete a CES connection, enter the following parameters:

```
localhost::configuration ces> delete <service>
```

The parameters in the delete command have the following meanings:

service Indicates the CES service ID of the connection to be deleted.

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2.6.3 Displaying CES Connections

To display the current CES connections, enter the following:

```
localhost::configuration ces> show

         CES           Input                                      Output
         Service State Port   Timeslots     VPI VCI   Type Port TimeSlots     VPI VCI
         24      down  1A1    1             0   129   -    -    -             -   -
         31      down  1A1    2-3           0   130   spvc 1D3  -             0   32
         32      down  1A1    4-5           0   131   pvc  1D4  -             0   150
         33      down  1A1    6-7           0   132   spvc 1D3  -             0   35
```

The fields in this display are explained in Section 2.6.1, except for the following:

CES Service Indicates the identification number (assigned by the switch) of the CES connection.

State Indicates whether the CES connection is enabled (up) or disabled (down).

Input VPI Indicates the incoming VPI value of the connection.

Input VCI Indicates the incoming VCI value of the connection.

Type Indicates the type of ATM connection (i.e., PVC or SPVC) that is associated with the CES connection.

To display the advanced settings of the current CES connections, enter the following:

```
localhost::configuration ces> show advanced
Searching for CEM Ports...

                        Service     Clock       Partial     Max         Integ.
 Service MapVPI MapVCI Type        Mode  Cas   Fill    BufSize   CDVT Period
 31      0      129    structured  synch basic 47          256   2000   2500
```

The fields in this display are explained in Section 2.6.1, except for the following:

Service Indicates the identification number (assigned by the switch) of the CES connection.

MapVPI Indicates the incoming VPI value of the connection.

MapVCI Indicates the incoming VCI value of the connection.

CDVT See **reasscdvt <cdvt>** in Section 2.6.1.

Integ. Period See **integ** in Section 2.6.1.

2.7 ILMI SNMP Proxy Configuration Commands

These commands let you configure the ILMI SNMP Proxy (ISP) table. Through this table, you can discover the topology of the network to which your switch is connected because your switch registers its address via ILMI (if ILMI is running on each switch) with its neighboring switches. You can add, delete, or display ISP table entries and you can send SNMP requests to the ISP table. Type **`ilmiproxy ?`** at the **`configuration`** level to display the available sub-commands.

```
localhost::configuration> ilmiproxy ?
  delete          go              new             show
```

2.7.1 Deleting an ISP Table Entry

This command lets you delete an entry from the ISP table. Enter the following parameters:

```
localhost::configuration ilmiproxy> delete <port> <vpi> <index>
```

port	Indicates the port number of the entry to be deleted from the ISP table.
vpi	Indicates the VPI of the entry to be deleted.
index	Indicates the unique index number of the entry that you want to delete.

For example, to delete an entry from the table, enter something similar to the following:

```
localhost::configuration ilmiproxy> del 1a2 0 19
```

2.7.2 Resending an ILMI SNMP Proxy Request

This command allows you to resend an ILMI SNMP proxy request. Enter the following parameters:

```
localhost::configuration ilmiproxy> go <port> <vpi> <index>
```

port Indicates the port number of the ISP table entry to use for SNMP requests.

vpi Indicates the VPI of the ISP table entry to use for SNMP requests.

index Indicates the unique index number of the SNMP request that you want to resend.

For example, to resend a request, enter something similar to the following:

```
localhost::configuration ilmiproxy> go 1a1 0 6
```

2.7.3 Creating an ISP Table Entry

This command enables you to create an ISP table entry and send the request. Enter the following parameters:

```
localhost::configuration ilmiproxy> new <port> <vpi> <index> (get | gnext) <oid>
<comm> (doOnce | doEveryIlmiRestart)
```

port Indicates the port number of the ISP table entry that you want to create.

vpi Indicates the VPI of the ISP table entry that you want to create.

index Indicates the unique index number of the ISP table entry that you want to create.

get|gnext `get` means the SNMP request you are creating is a get, which searches for the object that you are requesting. `gnext` means the SNMP request you are creating is a getnext, which searches for the next greatest entry in the MIB after the object that you specify.

oid Indicates the object identifier (OID) for the SNMP request that you want to get or getnext.

comm Indicates the SNMP community string to use.

doOnce Indicates that the SNMP request is to be performed only once.

doEveryIlmiRestart Indicates that the SNMP request is to be performed each time that ILMI restarts on the specified path.

NOTE

Your request will fail if ILMI is down on the path that you entered. First, use the command **`conf uni show`** so that you can quickly see on which ports ILMI is up.

For example, before creating an entry, first check on which ports ILMI is up by entering the following:

```
localhost::configuration uni> show
 Port  VPI Version  State ILMI  Side     Type   OperType RemoteAddress
 1D1     0 uni30(a) up    up    network  auto   FT-PNNI  169.144.64.42
 1D2     0 auto (a) down  down  network  auto   privUNI
 1D3     0 uni30(a) up    up    user     auto   FT-PNNI  169.144.64.85
 1D4     0 auto (a) down  down  network  auto   privUNI
 1D5     0 uni30(a) up    up    user     auto   FT-PNNI  169.144.64.232
 1D6     0 auto (a) down  down  network  auto   privUNI
 1CTL    0 uni30(a) up    down  network  auto   privUNI
```

Then type the parameters to create the entry as follows:

```
localhost::conf ilmiproxy> new 1d3 0 get .1.3.6.1.2.1.1.4.0 public doOnce
```

2.7.4 Displaying the ISP Table Entries

This command lets you display the current ISP table entries. Enter the following parameters:

```
localhost::configuration ilmiproxy> show
ISP Entry Port 1A1 Vpi 0 Index 3
------------------------------------------------------------------------
Req_Oid          .1.3.6.1.2.1.1.2.0
Rsp_Oid          .1.3.6.1.2.1.1.2.0
Operation        get
Community        private
When to do       doOnce
Value            OID:.1.3.6.1.4.1.326.2.2
Operation Status success
------------------------------------------------------------------------
ISP Entry Port 1A1 Vpi 0 Index 12
------------------------------------------------------------------------
Req_Oid          .1.3.6.1.4.1.326.2.1.1.1.1.16.0
Rsp_Oid          N/A
Operation        get
Community        private
When to do       doOnce
Value            N/A
Operation Status failure
------------------------------------------------------------------------
ISP Entry Port 1A1 Vpi 0 Index 15
------------------------------------------------------------------------
Req_Oid          .1.3.6.1.2.1.1.1.0
Rsp_Oid          .1.3.6.1.2.1.1.1.0
Operation        get
Community        public
When to do       doOnce
Value            FORE Systems ASX-1000
Operation Status success
------------------------------------------------------------------------
Press return for more, q to quit: q
```

The fields in this display are defined as follows:

Req_Oid Shows the object identifier (OID) for the SNMP request that you sent.

Rsp_Oid Shows the OID in the response to the SNMP request. It is valid only if the operation status is `success`.

Operation `get` means the SNMP request is a get, which searches for the OID that you requested. `gnext` means the SNMP request is a getnext, which searches for the next greatest entry in the MIB after the specified OID.

Community Shows the SNMP community string being used.

When to do `doOnce` means that the SNMP request is to be performed only once. `doEveryIlmirestart` means that the SNMP request is to be performed each time that ILMI comes up on the specified path.

Value Shows the value returned by the get or the getnext. This is valid only if the operation status is `success`.

Operation Status Shows the current status of this SNMP query. `Idle` means the request has not been made yet. `inProgress` means the request has been made, but has not been completed yet. `Success` means the request has been made and completed successfully. `Failure` means the request has been made, but was not successful. Failures can occur because either there was no response from the peer (the request timed out), or there was an error message from the peer (like a NOSUCHNAME error), or the ILMI/UNI/link on which to send this request is down.

You can also display an individual ISP table entry. Enter the following:

```
localhost::configuration ilmiproxy> show [<port> [<vpi> [<index>]]]
localhost::configuration ilmiproxy> show 1a1 0 15
ISP Entry Port 1A1 Vpi 0 Index 15
------------------------------------------------------------------------
Req_Oid          .1.3.6.1.2.1.1.1.0
Rsp_Oid          .1.3.6.1.2.1.1.1.0
Operation        get
Community        public
When to do       doOnce
Value            FORE Systems ASX-1000
Operation Status success
------------------------------------------------------------------------
```

If there are no current entries in the ISP table, then the following is displayed:

```
localhost::configuration ilmiproxy> show
ISP information not available
```

AMI Configuration Commands

2.8 IP Configuration Commands

These commands let you change the IP configuration. You can display the list of available subcommands by typing **ip ?** at the **configuration** level.

```
localhost::configuration> ip ?
  address          admin            broadcast        forwarding
  mask             route>           show             unconfigure
```

2.8.1 Configuring the IP Address

This command allows you to configure the IP address of each of the switch's IP interfaces. Enter the following parameters:

On a new switch, the `ie0`, `asx0`, `qaa0`, `qaa1`, `qaa2`, `qaa3` interfaces are NOT configured. An IP address must be configured for at least one of the interfaces to allow IP access to the switch, which, in turn, enables SNMP access. By setting the IP address of the `asx0` interface or one of the `qaa` interfaces, in-band (over ATM) access to the switch control processor (SCP) is enabled. By setting the IP address of the `ie0` interface, out-of-band access to the SCP is enabled.

NOTE

On a TNX-1100 or MSC-900, the IP addresses must be configured individually on each SCP.

```
localhost::configuration ip> address <interface> <address>
```

interface Indicates the name of the IP interface to be managed. Valid interfaces are: `ie0` (the Ethernet interface), `asx0` (the switch's SPANS interface), `qaa0`, `qaa1`, `qaa2`, `qaa3` (the Classical IP interfaces), `lo0` (the switch's localhost interface that allows AMI to run), and `el0`, `el1`, `el2`, and `el3` (the LAN Emulation interfaces).

address Indicates the IP address for this interface. The state of the interface must be `up` before setting the address. This can be changed using the **`configuration ip admin`** command.

2.8.2 Configuring the IP State

This command allows you to change the state of the IP interface to up or down. Enter the following parameters:

```
localhost::configuration ip> admin <interface> (up|down)
```

interface Indicates the name of the IP interface to be managed. Valid interfaces are: `ie0` and `asx0`.

up|down Entering `up` changes the state of the designated interface to up. Entering `down` changes the state of the designated interface to down.

NOTE

The switch's localhost interface, `lo0`, must always be `up` to allow AMI to run on the switch.

2.8.3 Configuring the IP Broadcast Address

This command allows you to modify the broadcast address for an IP interface. Enter the following parameters:

```
localhost::configuration ip> broadcast <interface> (0|1)
```

interface Indicates the name of the IP interface. Valid interfaces are: `ie0`, `asx0`, and any of the `el` interfaces.

0|1 Indicates the IP broadcast type for this interface. This is the host portion of the IP address that is used for routing. Entering `1` causes the host portion of the IP address to be set to all 1s. Entering `0` causes the host portion of the IP address to be set to all 0s.

2.8.4 Configuring IP Forwarding

This command allows you to turn IP forwarding on or off. If IP forwarding is turned off, the switch will not forward (i.e., route) IP packets from one IP interface to another IP interface. It is generally not necessary to turn IP forwarding off, except for security reasons. Enter the following parameters:

```
localhost::configuration ip> forwarding (on|off)
```

on|off Using `on` turns IP forwarding on. Using `off` turns IP forwarding off.

2.8.5 Configuring the IP Subnet Mask

This command allows you to modify the IP subnet mask. Enter the following parameters:

```
localhost::configuration ip> mask <interface> <mask>
```

interface Indicates the name of the IP interface. Valid interfaces are: `ie0`, `asx0`, `qaa0`, `qaa1`, `qaa2`, and `qaa3`.

mask Indicates the subnet mask for this IP interface. It should be entered in dotted decimal notation (e.g., 255.255.255.0).

2.8.6 Configuring IP Routes

This command allows you to add a static IP route to the local IP routing table, delete a static IP route from the local IP routing table, or list the current static IP routes in the local IP routing table. You can display the list of available subcommands by typing **`route ?`** at the **`ip`** level.

```
localhost::configuration ip> route ?
new              delete           show
```

2.8.6.1 Adding an IP Route

This command lets you create an IP route. Enter the following parameters:

```
localhost::configuration ip route> new (default|<destination-ipaddress>) <gate-
way> [<metric>] [(host | net)]
```

default	This parameter must be specified to create a default route.
destination -ipaddress	Indicates the destination IP network number.
gateway	Indicates the gateway address to the destination IP network number.
metric	Indicates the number of hops to the destination IP network. The default value of `1` is used if no value is entered by the user. If `1` is specified, the route is created with the RTF_GATEWAY flag set.
host|net	Using `host` indicates that this is a host-specific route with the destination being a specific node's IP address. Using `net` indicates that this is a network-specific route with the destination being a network IP address. The default value of `net` is used if no value is entered by the user or if a value is entered incorrectly (e.g., if a typo is made).

2.8.6.2 Deleting an IP Route

This command lets you delete an IP route. Enter the following parameters:

```
localhost::configuration ip route> delete (default|<destination-ipaddress>)
<gateway>
```

default	A default must be specified to delete a default route.
destination -ipaddress	Indicates the destination IP network number.
gateway	Indicates the gateway address to the destination IP network number.

2.8.6.3 Showing the IP Routes

This command lets you display the current IP routes. Enter the following parameters:

```
localhost:: configuration ip route> show
Destination      Gateway              Metric          Interface       Flags
default          169.144.48.1         1               le0             G
169.144.48.0     169.144.48.21        0               le0
169.144.60.0     169.144.60.21        0               asx0
169.144.64.0     169.144.64.21        0               qaa0
169.144.200.0    169.144.200.21       0               el0
169.144.204.0    169.144.204.21       0               el1
169.144.205.0    169.144.205.21       0               el2
169.144.206.0    169.144.206.21       0               el3
```

The fields in this display are defined as follows:

Destination Shows the destination IP network.

Gateway Shows the gateway address to the destination IP network number.

Metric Shows the number of hops to the destination IP network. The default is `1`.

Interface Shows the local IP interface used to get to the destination IP network.

Flags Shows `H` if the route is host-specific (created with the RTF_HOST flag set). Lists `G` if the route is network-specific (created with the RTF_GATEWAY flag set).

2.8.7 Displaying the IP Interface Configuration

This command allows you to display information about the configuration of the IP interfaces. Enter the following parameters:

```
localhost::configuration ip> show
interface  state        address          netmask          broadcast
lo0        up           127.0.0.1        255.0.0.0        N/A
ie0        up           172.19.4.239     255.255.252.0    172.19.7.255
asx0       up           172.19.8.239     255.255.255.0    172.19.8.255
qaa0       up           172.19.12.239    255.255.255.0    N/A
qaa1       down         172.19.16.239    255.255.255.0    N/A
qaa2       down
qaa3       down

IP Forwarding State: not-forwarding
```

The fields in this display are defined as follows:

interface Indicates the name of the IP interface.

state Lists the administrative state of the IP interface.

address Displays the IP address of the IP interface.

netmask Shows the netmask address of the IP interface.

broadcast Indicates the broadcast address of the IP interface.

You may also designate a single interface to be displayed by entering **show** and the specific interface name at the prompt as follows:

```
localhost::configuration ip> show ie0
interface  state        address          netmask          broadcast
ie0        up           172.19.4.239     255.255.252.0    172.19.7.255

IP Forwarding State: not-forwarding
```

The fields in this display are defined in the same manner as those listed above in the example for showing the configuration of all of the IP interfaces.

2.8.8 Unconfiguring an IP Interface

This command lets you unconfigure an IP interface. This process removes the IP address associated with the interface. Enter the following parameters:

```
localhost::configuration ip> unconfigure <interface>
```

interface Indicates the name of the IP interface to be unconfigured. Valid interfaces are: `ie0`, `asx0`, `qaa0`, `qaa1`, `qaa2`, and `qaa3`.

You will be asked to confirm this action. To confirm the action, type **`y`** at the prompt. To cancel the action, type **`n`** or press **`<Enter>`** at the prompt. For example:

```
localhost::configuration ip> unconfigure qaa1

Unconfiguring an interface requires the switch to be rebooted.
Continue with unconfigure [n]? y

Reboot the switch [y]? y
```

NOTE The switch must be rebooted for this command to take effect.

2.9 LAN Emulation Configuration Commands

These commands allow you to configure LAN Emulation (LANE) on a switch. You can display the list of available subcommands by typing **lane ?** at the **configuration** level.

```
localhost::configuration> lane ?
  bus>          lec>          lecs>          les>
```

2.9.1 Broadcast and Unknown Server (BUS) Configuration Commands

These commands allow you to configure a Broadcast and Unknown Server (BUS) for an ELAN. You can reach this level by entering **bus** at the **lane** level. Enter the following parameters and type **?** to list the various **bus** commands:

```
localhost::configuration lane> bus ?
  admin          delete          new          show
```

2.9.1.1 Configuring the BUS Administrative Status

This command lets you change the administrative status of a BUS to up (start a BUS service) or down (stop a BUS service). Enter the following parameters:

```
localhost::configuration lane bus> admin <BUS index> (up | down)
```

BUS index Indicates the unique, positive integer index of the BUS that is dynamically assigned by AMI when a BUS is created to identify this service from any other service in the same class. The index can be found under the Index field when you enter the **conf lane bus show** command.

up|down Entering up changes the administrative status of the designated BUS index to up. Entering down changes the administrative status of the designated BUS index to down. The default is up.

2.9.1.2 Deleting a BUS

This command allows you to delete a specified BUS. Enter the following parameters:

```
localhost::configuration lane bus> delete <BUS index>
```

BUS index Indicates the unique, positive integer index of the BUS that is to be deleted. This number is dynamically assigned by AMI when a BUS is created. The index can be found under the `Index` field when you enter the **`conf lane bus show`** command.

2.9.1.3 Creating a BUS

This command lets you create a BUS for an ELAN. Enter the following parameters:

```
localhost::configuration lane bus> new <BUS Selector byte (HEX)> <BUS name> \
                [-type (ethernet | token-ring)] \
                [-mtu (1516 | 4544 | 9234 | 18190)]
```

BUS Selector byte (HEX) Indicates the 20th byte of the ATM address of the switch that is to run a BUS service (entered in hexadecimal format). Use the **`conf atmarp getnsap`** command to display the entire ATM address.

BUS name Indicates the name for this BUS. It helps you to remember which ELAN this BUS services.

-type (ethernet| token-ring) **`ethernet`** means that the LAN type is Ethernet. **`token-ring`** means that the LAN type is Token Ring. The default is **`ethernet`**.

-mtu (1516|4544 |9234|18190) Indicates which maximum transmission unit (MTU) size you wish to use. The default is **`1516`** for Ethernet and **`4544`** for Token Ring.

NOTE The MTU size must match the MTU size of the other hosts on the ELAN.

2.9.1.4 Displaying BUS Information

This command lets you display the current BUS information in one of two ways. To display information about every BUS that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane bus> show
 Index  AdminStatus  OperStatus   Selector  Type          MTU  ELAN
     1  up           up               0x12  ethernet     1516  one
     2  up           up               0x32  token-ring   4544  three
```

The fields in this display are defined as follows:

Index Shows the unique, positive integer index that identifies this BUS. It is dynamically assigned by AMI when the BUS is created.

AdminStatus Reflects any changes that you have made to the status of the BUS. `Up` means you have started the BUS. `Down` means you have stopped the BUS.

OperStatus Reflects the actual current status of the BUS. `Up` means the BUS is currently active. `Down` means the BUS is currently inactive.

Selector Displays the selector byte portion (20th byte) of the ATM address of the host or switch that is the BUS in hexadecimal format.

Type Shows what type of ELAN this is. `ethernet` means that the LAN type is Ethernet. `token-ring` means that the LAN type is Token Ring.

MTU Shows the maximum transmission unit (MTU) size. Can be `1516`, `4544`, `9234`, or `18190`. The default for Ethernet is `1516.` The default for Token Ring is `4544.`

ELAN Lists the name of the ELAN that this BUS services.

NOTE

When you change the administrative status of a BUS from `down` to `up`, it takes a few seconds for the operational change to occur and to be reflected in the `OperStatus` field. Therefore, it is possible for the information above to show the `AdminStatus` as `up`, but the `OperStatus` as `down`. If you show the information again after two or three seconds, the change will have taken place and be reflected here.

To display information about a particular BUS that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane bus> show [<BUS index>]
```

For example, to display information about the BUS with an index number of 1, enter the following parameters:

```
localhost::configuration lane bus> show 1
 Index  AdminStatus  OperStatus   Selector  Type          MTU  ELAN
     1  up           up               0x12  ethernet     1516  one
```

The fields in this display are defined in the same manner as those listed above in the example showing every BUS configured on the switch.

2.9.2 LAN Emulation Client (LEC) Configuration Commands

These commands let you configure the LAN Emulation Client (LEC). You can display the list of available subcommands by typing **lec ?** at the **lane** level.

```
localhost::configuration lane> lec ?
  admin            arp>             delete           default>
  new              show
```

2.9.2.1 Configuring the LEC Administrative Status

This command lets you change the administrative status of a LEC to up (start a LEC) or down (stop a LEC). Enter the following parameters:

```
localhost::configuration lane lec> admin <LEC index> (up | down)
```

LEC index Indicates the unique, positive integer index of the LEC that is dynamically assigned by AMI when a LEC is created to identify this LEC from any others in the same ELAN. The index can be found under the `Index` field when you enter the **conf lane lec show** command.

up|down Entering **up** starts this LEC. Entering **down** stops this existing LEC. The default is **up**.

2.9.2.2 Configuring LANE ARP Commands

These commands let you configure the LANE ARP cache. You can reach this level by entering **arp** at the **lec** level. Enter the following parameters and type **?** to list the various ARP commands:

```
localhost::configuration lane lec> arp ?
  delete           show
```

2.9.2.2.1 Deleting LANE ARP Cache Information

This command allows you to remove an ARP entry from the LANE ARP cache or to delete the contents of the LANE ARP cache. Enter the following parameters:

```
localhost::configuration lane lec arp>  delete (all | <MAC address>)
```

all Indicates that all of the entries are to be flushed from the LANE ARP cache.

<MAC address> Indicates the specific entry that is to be flushed from the LANE ARP cache.

2.9.2.2.2 Displaying LANE ARP Cache Information

This command displays the current LANE ARP cache. The MAC address-to- ATM address mapping information for each LEC is stored here. Enter the following parameters:

```
localhost::configuration lane lec arp> show [advanced]
```

By entering **show** without the **advanced** option, the basic LANE ARP cache information is displayed as follows:

```
localhost::configuration lane lec arp> show
 MacAddress   AtmAddress                                        ELAN
 0020481a00d5 0x47.0005.80.ffe100.0000.f21a.00d5.0020481a00d5.0b eng-net
```

By entering **show** with the **advanced** option, more LANE ARP cache information, including the VPI/VCI combination and any flags associated with this entry, is displayed as follows:

```
localhost::configuration lane lec arp> show advanced
 MacAddress   AtmAddress                                        ELAN
 0020481a00d5 0x47.0005.80.ffe100.0000.f21a.00d5.0020481a00d5.0b eng-net
        vpi=0, vci=82, flags=valid
```

If the LANE ARP cache is empty, then the following message is displayed.

```
No LANE ARP entries are available.
```

2.9.2.3 Deleting a LEC

This command lets you delete a LEC from an ELAN. Enter the following parameters:

```
localhost::configuration lane lec> delete <LEC index>
```

LEC index Indicates the unique, integer index of the LEC that is to be deleted. This number is dynamically assigned by the switch when a LEC is created and can be found under the `Index` field when you enter the **`conf lane lec show`** command.

2.9.2.4 LEC Default Configuration Mode Commands

These commands allow you to set or to display the default LEC configuration mode. You can show the list of available subcommands by typing **`default ?`** at the **`lec`** level.

```
localhost::configuration lane lec> default ?
  mode              show
```

2.9.2.4.1 Setting the Default LEC Configuration Mode

This command lets you set the default mode for configuring all of the ELANs that may be created on this switch.

NOTE

If you chose **`manual`** mode, you must specify the LECS address of the machine that will be used as the LECS. If you choose **`automatic`** mode, then the “well-known” LECS address is used.

Enter the following parameters:

```
localhost::configuration lane lec default> mode (manual | automatic) [<LECS
address>]
        LECS address is required for manual mode.
```

manual|automatic Using **`manual`** means the LECS address specified here is used as the LECS address. Using **`automatic`** means that the “well-known” LECS address (**`47.0079.00.000000.0000.0000.0000.00A03E000001.00`**) as defined by the ATM Forum’s LAN Emulation standard is used as the LECS address. The default is **`automatic`**.

LECS address Indicates the ATM address of the LECS to be used instead of the “well-known” LECS.

2.9.2.4.2 Displaying the Default LEC Configuration Mode

This command lets you show whether the default LEC configuration mode is **`manual`** (using a LECS other than the one at the “well-known” address) or **`automatic`** (using the LECS at the “well-known” address). Enter the following parameters:

```
localhost::configuration lane lec default> show
LEC Default configuration mode: automatic
```

2.9.2.5 Creating an Ethernet LEC

This command lets you create an Ethernet LEC (join an ELAN). When a LEC is created, a corresponding `el` interface is created. The interface name (`el0`, `el1`, `el2`, etc.) is assigned based on the selector byte entered when the LEC is created. The list of current `el` interfaces can be displayed using the **`conf lane lec show`** command or the **`conf ip show`** command. Enter the following parameters:

NOTE This AMI command only allows you to create an instance of a LEC on a switch. To create an instance of a LEC on a host, you must use the VLAN Manager or use a *ForeRunner* adapter. Please refer to the respective user's manual for instructions.

NOTE You can only create an Ethernet LEC on a switch. To create a Token Ring LEC, you must use a *ForeRunner* PC adapter. Please refer to your respective PC adapter user's manual for instructions.

```
localhost::con lane lec> new <LEC Selector byte (HEX)> <ELAN name> [(automatic
| manual)]
manual mode options: [-lecs <LECS address>] or [-les <LES address>]
Use ELAN name ''default'' to join the default ELAN
```

LEC Selector byte (HEX) Indicates the 20th byte of the ATM address of the LEC (entered in hexadecimal format). Use the **`conf atmarp getnsap`** command to display the entire ATM address.

NOTE If you create a LEC and then change the NSAP prefix of the switch at a later time, the change is NOT automatically reflected in the LEC's address. You must delete the LEC and recreate it using the new NSAP prefix.

ELAN name Indicates the name of the ELAN that this LEC is joining. If a failover mechanism has been set up in the LECS configuration file, use the name of the failover LEC (e.g., `eng-net|0`). For more information, refer to Chapter 3 of the *TNX ATM Switch Network Configuration Manual*.

automatic|manual	Indicates the configuration mode that is used when this LEC joins the ELAN. Using `automatic` means that the LEC attempts to contact the LECS using the "well-known" address. Using `manual` and the `-lecs` option means that the LEC attempts to contact the LECS using the LECS address you specified here. Using `manual` and the `-les` option means that the LEC bypasses the LECS and directly contacts the LES address specified here. The default is `automatic`.
-lecs <LECS address>	Indicates the LECS address to use instead of the "well-known" LECS address.
-les <LES address>	Indicates the LES address to use for this ELAN.

2.9.2.6 Displaying LEC Information

This command lets you display the current LEC information in one of two ways. To display information about all of the LECs that are currently configured on the switch, enter the following parameters:

```
localhost::configuration lane lec> show
       Admin   Oper
 Index Status  Status  Sel   Mode        MACaddress    IfName    ELAN
     1 up      up       0x00  automatic   000000000000  FAILOVER  eng-net|0
       LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
       LES :0x47.0005.80.ffe100.0000.f21a.00d0.0020481a00d0.a0
     2 up      up       0x01  automatic   000000000000  FAILOVER  eng-net|1
       LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
       LES :0x47.0005.80.ffe100.0000.f21a.00d0.0020481a00d0.a1
     3 up      up       0x02  automatic   00204815096b  el0       eng-net|2
       LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
       LES :0x47.0005.80.ffe100.0000.f215.096b.00204815096b.a2
     4 up      up       0x03  automatic   000000000000  FAILOVER  sw-net|0
       LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
       LES :0x47.0005.80.ffe100.0000.f215.096b.00204815096b.a0
     5 up      joining  0x04  automatic   0a204815096b  el1       sw-net|1
       LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
       LES :0x47.0005.80.ffe100.0000.f215.096b.00204815096b.a1
     6 up      joining  0x05  automatic   000000000000  FAILOVER  sw-net|2
       LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
       LES :0x47.0005.80.ffe100.0000.f21a.00d0.0020481a00d0.a2
```

The fields in this display are defined as follows:

Index Shows the unique, integer index that identifies this LEC. It is dynamically assigned by the switch when the LEC is created.

AdminStatus Reflects any changes that you have made to the status of the LEC. `Up` means you have started the LEC. `Down` means you have stopped the LEC.

OperStatus Reflects the actual current status of the LEC. `Up` means the LEC is currently active. `Down` means the LEC is currently inactive. `Joining` means that the LEC is in the process of registering with the ELAN.

Sel Shows the selector byte portion (20th byte) of the ATM address of the LEC in hexadecimal format.

Mode Shows the configuration mode that is used when a LEC joins the ELAN. `Automatic` means that the "well-known" LECS address and the default LES are used. `Manual` means that the specified LECS or LES address is used. The default is `automatic`.

MACaddress Shows the Ethernet MAC address for this LEC.

IfName Shows the `el` interface name of this LEC. If it is part of a failover sequence, the `el` interface name (e.g., `el1`) is displayed for the active `el` interface and `FAILOVER` is displayed for the others.

ELAN Shows the name of the ELAN to which this LEC belongs.

NOTE When you change the administrative status from `down` to `up`, it takes a few seconds for the operational change to occur and to be reflected in the `OperStatus` field. Therefore, it is possible for the information above to show the `AdminStatus` as `up`, but the `OperStatus` as `down`. If you show the information again after two or three seconds, the change has taken place and is reflected here.

To display information about a particular LEC that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane lec> show [<LEC index>]
```

For example, to display information about the LEC with an index number of 3, enter the following parameters:

```
localhost::configuration lane lec> show 3
        Admin   Oper
 Index  Status  Status  Sel   Mode         MACaddress    IfName    ELAN
     3  up      joining  0x02  automatic    00204815096b  el0       eng-net|2
        LECS:0x47.0079.00.000000.0000.0000.0000.00a03e000001.00
        LES :0x47.0005.80.ffe100.0000.f215.096b.00204815096b.a2
```

The fields in this display are defined in the same manner as those listed above in the example showing all of the LECs configured on the switch.

2.9.3 LAN Emulation Configuration Server (LECS) Commands

These commands allow you to configure the LAN Emulation Configuration Server (LECS). You can display the list of available subcommands by typing **lecs ?** at the **lane** level.

```
localhost::configuration lane> lecs ?
  admin             delete            new               show
  get
```

2.9.3.1 Configuring the LECS Administrative Status

This command lets you change the administrative status of the LECS to up (start a LECS service) or down (stop a LECS service). Enter the following parameters:

```
localhost::configuration lane lecs> admin <LECS index> (up | down)
```

LECS index Indicates the unique, positive integer index of the LECS that is dynamically assigned by AMI when a LECS is created to identify this service from any other service in the same class. The index can be found under the `Index` field when you enter the **conf lane lecs show** command.

up|down Entering `up` changes the administrative status of the designated LECS index to up. Entering `down` changes the administrative status of the designated LECS index to down. The default is `up`.

2.9.3.2 Deleting a LECS

This command lets you delete (stop) a specified LECS service. Enter the following parameters:

```
localhost::configuration lane lecs> delete <LECS index>
```

LECS index Indicates the unique, positive integer index of the LECS that is to be deleted. This number is dynamically assigned by the switch when a LECS is created and can be found under the `Index` field when you enter the **conf lane lecs show** command.

2.9.3.3 Creating a LECS

This command lets you create (start) a LECS service. Enter the following parameters:

```
localhost::conf lane lecs> new <LECS Selector byte (HEX)> [-db <LECS database file>]
        [-default <LES atm address>] [<LECS-wka> | none]
```

LECS Selector byte (HEX) Indicates the 20th byte of the ATM address of the host or switch that is to run a LECS service (entered in hexadecimal format). Use the **`conf atmarp getnsap`** command to display the entire ATM address.

-db <LECS database file> Indicates the full path to the location and name of the LECS database file. The default file is `lecs.cfg`. For information about configuring this file, refer to the *TNX ATM Switch Network Configuration Manual*.

-default <LES atm address> Indicates a default LES address to use in case the LECS configuration file is inaccessible.

<LECS-wka>|none `None` means the well-known address is disabled so that the LECS can only be contacted by using the switch's actual address (with selector byte). `LECS-wka` indicates that the ATM address that you enter is going to be used as the well-known address instead of the one defined by the ATM Forum.

NOTE Although more than one LECS can be created on a switch, you must ensure that no two LECS are listening on the same address.

2.9.3.4 Displaying LECS Information

This command lets you display the current LECS information in one of two ways. To display information about the current LECS configuration on the switch, enter the following parameters:

```
localhost::configuration lane lecs> show
 Index  AdminStatus  OperStatus   Selector  WKA         Database
     1  up           up               0x01  atm-forum   /atm/etc/lecs.cfg
        Default LES :0x47.0005.80.ffe100.0000.f215.096b.00204815096b.a2
     2  up           up               0x02  none        /atm/etc/lecs.cfg
     3  up           up               0x03  other       /atm/etc/lecs.cfg
        wka: 0x47.0005.80.ffe100.0000.f215.11f1.0020481511f8.99
```

The fields in this display are defined as follows:

Index Shows the unique, integer index of the LECS that is dynamically assigned by the switch when the LECS is created.

AdminStatus Reflects any changes that you have made to the status of the LECS. `Up` means you have started the LECS. `Down` means you have stopped the LECS.

OperStatus Reflects the actual current status of the LECS. `Up` means the LECS is currently active. `Down` means the LECS is currently inactive.

Selector Displays the selector byte portion (20th byte) of the ATM address of the host or switch that is the LECS in hexadecimal format.

WKA Shows the state of the well-known address for this particular LECS. `atm-forum` means the LECS is using the default address as defined by the ATM Forum. `none` means the well-known address has been disabled. `other` means the well-known address has been redefined, in which case the new address appears on the following line.

Database Shows the full path to the location and name of the LECS database file. The default file is `lecs.cfg`.

Default LES Shows the default LES address to use in case the LECS configuration file is inaccessible. If a default LES address has not been specified, this field is not displayed.

NOTE

When you change the administrative status of a LECS `down` to `up`, it takes a few seconds for the operational change to occur and to be reflected in the `OperStatus` field. Therefore, it is possible for the information above to show the `AdminStatus` as `up`, but the `OperStatus` as `down`. If you show the information again after two or three seconds, the change will have taken place and will be reflected here.

To display information about a particular LECS that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane lecs> show [<LECS index>]
```

For example, to display information about the LECS with an index number of 1, enter the following parameters:

```
localhost::configuration lane lecs> show 1
 Index  AdminStatus  OperStatus   Selector  WKA         Database
     1  up           up               0x01  atm-forum   /atm/etc/lecs.cfg
        Default LES :0x47.0005.80.ffe100.0000.f215.096b.00204815096b.a2
```

The fields in this display are defined in the same manner as those listed above in the example for all of the LECS configured on the switch.

2.9.3.5 Getting the LECS Configuration File

This command lets you download the LECS configuration file. Enter the following parameters:

```
localhost::configuration lane lecs> get <host>:<remotefile> [<localfile>]
```

host Indicates the name of the host from which the LECS database file is to be retrieved.

remotefile Indicates the name of the LECS database file that is to be retrieved.

localfile Indicates the name of the file where the retrieved LECS database file is to be stored.

NOTE

The default local file is `lecs.cfg`.

The LECS configuration file is retrieved via tftp.

For information about configuring this file, refer to the *TNX ATM Switch Network Configuration Manual*.

2.9.4 LAN Emulation Server (LES) Configuration Commands

These commands allow you to configure the LAN Emulation Server (LES). You can display the list of available subcommands by typing **les ?** at the **lane** level.

```
localhost::configuration lane> les ?
  admin          delete         new            show
```

2.9.4.1 Configuring the LES Administrative Status

This command lets you change the administrative status of the LES to up (start a LES service) or down (stop a LES service). Enter the following parameters:

```
localhost::configuration lane les> admin <LES index> (up | down)
```

LES index Indicates the unique, positive integer index of the LES that is dynamically assigned by AMI when a LES is created to identify this service from any other service in the same class. The index can be found under the `Index` field when you enter the **conf lane les show** command.

up|down Entering `up` changes the administrative status of the designated LES index to up. Entering `down` changes the administrative status of the designated LES index to down. The default is `up`.

2.9.4.2 Deleting a LES

This command lets you delete a specified LES. Enter the following parameters:

```
localhost::configuration lane les> delete <LES index>
```

LES index Indicates the unique, positive integer index of the LES that is to be deleted. This number is dynamically assigned by the switch when a LES is created and can be found under the `Index` field when you enter the **conf lane les show** command.

2.9.4.3 Creating a LES

This command lets you create a new LES. Enter the following parameters:

```
localhost::conf lane les> new <LES Selector byte (HEX)> <BUS ATM address> <LES name> \
        [colocated_bus] \
        [-type (ethernet | token-ring)] \
        [-mtu (1516 | 4544 | 9234 | 18190)]
```

LES Selector byte (HEX) Indicates the 20th byte of the ATM address of the host or switch that is to run a LES service (entered in hexadecimal format). Use **conf atmarp getnsap** to display the entire ATM address.

BUS ATM address Indicates the ATM address of the BUS associated with this LES. If you are starting a colocated BUS, then you only need to enter the BUS selector byte instead of the full address. If the BUS is running on a different switch, you must enter the full address. Use **conf atmarp getnsap** to display the entire ATM address.

LES name Indicates the user-defined name associated with this LES to help you to remember to what ELAN this LES belongs.

colocated_bus If **colocated_bus** is entered when the LES is created, indicates that the LES and BUS services for a particular ELAN are running on the same switch. It is recommended that the **colocated_bus** option be used when creating the LES.

NOTE By using the **colocated_bus** option, you are creating a LES and BUS using a single AMI command. There is no need to create a BUS separately.

-type (ethernet| token-ring) **ethernet** means that the LAN type is Ethernet. **token-ring** means that the LAN type is Token Ring. The default is ethernet.

-mtu (1516|4544 |9234|18190) Indicates the length (in number of bytes) of the largest frame field (or MTU size). The default for Ethernet is **1516**. The default for Token Ring is **4544**.

NOTE The MTU size must match that of the other hosts on the ELAN.

2.9.4.4 Displaying LES Information

This command lets you display the current LES information in four different ways. To display information about every LES that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane les> show
 Index  AdminStatus  OperStatus   Selector  Type         MTU  ELAN
     1  up           up               0x11  ethernet     1516  one
        BUS:0x47.0005.80.ffe100.0000.f21a.29d4.0020481a29d4.12
     2  up           up               0x21  ethernet     1516  two
        BUS:0x47.0005.80.ffe100.0000.f21a.29d4.0020481a29d4.22 (Co-Located)
     3  up           up               0x31  token-ring   4544  three
        BUS:0x47.0005.80.ffe100.0000.f21a.29d4.0020481a29d4.32
```

The fields in this display are defined as follows:

Index Shows the unique, integer index of the LES that is dynamically assigned by the switch when the LES is created.

AdminStatus Reflects any changes that you have made to the status of the LES. `Up` means you have started the LES. `Down` means you have stopped the LES.

OperStatus Reflects the actual current status of the LES. `Up` means the LES is currently active. `Down` means the LES is currently inactive.

Selector Displays the selector byte portion (20th byte) of the ATM address of the host or switch that is the LES in hexadecimal format.

Type Shows what type of ELAN this is. `ethernet` means that the LAN type is Ethernet. `token-ring` means that the LAN type is Token Ring.

MTU Shows the maximum data frame size. Can be `1516`, `4544`, `9234`, or `18190`. The default for Ethernet is `1516.` The default for Token Ring is `4544.`

ELAN Shows the name of the ELAN that this LES services.

NOTE

When you change the administrative status of a LES from `up` to `down`, it takes a few seconds for the operational change to occur and to be reflected in the `OperStatus` field. Therefore, it is possible for the information above to show the `AdminStatus` as `up`, but the `OperStatus` as `down`. If you show the information again after two or three seconds, the change will have taken place and is reflected here.

To display information about a particular LES that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane les> show [<LES index>]
```

For example, to display information about the LES with an index number of 3, enter the following parameters:

```
localhost::configuration lane les> show 3
 Index  AdminStatus  OperStatus   Selector  Type          MTU  ELAN
     3  up           up               0x31  token-ring   4544  three
        BUS:0x47.0005.80.ffe100.0000.f21a.29d4.0020481a29d4.32
```

The fields in this display are defined in the same manner as those listed above in the example showing every LES configured on the switch.

To display advanced information about every LES that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane les> show advanced
ELAN Name: “elan-0”
  LES: 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.a0
  BUS: 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.b0
  LAN Type: Ethernet/IEEE 802.3     Maximum Data Frame Size: 1516
  Non-proxy Control Distribute VCC: 0.77
      Proxy Control Distribute VCC: -.-
LEC #1 at 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.00 (non-proxy)
  00-20-48-1a-01-92 -> 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.00
  Control Direct VCC: 0.70
LEC #5800 at 47.0005.80.ffe100.0000.f20f.006a.0020480f006a.00 (non-proxy)
  00-20-48-0f-00-6a -> 47.0005.80.ffe100.0000.f20f.006a.0020480f006a.00
  Control Direct VCC: 0.740
LEC #5801 at 47.0005.80.ffe100.0000.f20f.006a.0020480630b7.00 (non-proxy)
  22-20-48-06-30-b7 -> 47.0005.80.ffe100.0000.f20f.006a.0020480630b7.00
  Control Direct VCC: 0.744
Press return for more, q to quit:
ELAN Name: “elan-2”
  LES: 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.a1
  BUS: 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.b1
  LAN Type: Ethernet/IEEE 802.3     Maximum Data Frame Size: 1516
  Non-proxy Control Distribute VCC: 0.79
      Proxy Control Distribute VCC: -.-
LEC #1 at 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.01 (non-proxy)
  02-20-48-1a-01-92 -> 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.01
  Control Direct VCC: 0.72
```

The fields in this display are defined as follows:

ELAN Name Shows the names of any ELANs associated with this switch.

LES Displays the ATM address of the LES that services this particular ELAN.

BUS Shows the ATM address of the BUS that services this particular ELAN.

LAN Type Shows the type of emulated LAN. Can be either `Ethernet/IEEE 802.3` or `TokenRing/IEEE 802.5`.

Maximum Data Frame Size	Shows the length (in number of bytes) of the largest frame field. Can be 1516, 4544, 9234, or 18190.
Non-proxy Control Distribute VCC	Shows the point-to-multipoint connection that the LES maintains to all of the non-proxy LECs that it services.
Proxy Control Distribute VCC	Shows the point-to-multipoint connection that the LES maintains to all of the proxy LECs that it services. This entry is blank if no proxy LECs have joined this ELAN.
LEC	Shows the LEC ATM address, shows the MAC-to-ATM address mapping for each LEC in this ELAN, and shows whether or not this LEC is a proxy.
Control Direct VCC	Shows the point-to-point connection that the LES maintains to this particular LEC.

To display advanced information about a particular LES that is currently configured on the switch, enter the following parameters:

```
localhost::configuration lane les> show [<LES index>] [advanced]
```

For example, to display advanced information about the LES with an index number of 2, enter the following parameters:

```
localhost::configuration lane les> show 2 advanced
ELAN Name: “elan-2”
  LES: 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.a1
  BUS: 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.b1
  LAN Type: Ethernet/IEEE 802.3     Maximum Data Frame Size: 1516
  Non-proxy Control Distribute VCC: 0.79
      Proxy Control Distribute VCC: -.-
LEC #1 at 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.01 (non-proxy)
  02-20-48-1a-01-92 -> 47.0005.80.ffe100.0000.f21a.0192.0020481a0192.01
  Control Direct VCC: 0.72
LEC #5966 at 47.0005.80.ffe100.0000.f20f.006a.0020480f006a.01 (non-proxy)
  02-20-48-0f-00-6a -> 47.0005.80.ffe100.0000.f20f.006a.0020480f006a.01
  Control Direct VCC: 0.737
LEC #5967 at 47.0005.80.ffe100.0000.f20f.006a.0020480630b7.01 (non-proxy)
  26-20-48-06-30-b7 -> 47.0005.80.ffe100.0000.f20f.006a.0020480630b7.01
  Control Direct VCC: 0.736
```

The fields in this display are defined in the same manner as those listed above.

2.10 Network Module Configuration Commands

These commands let you configure the network modules. The list of available subcommands is displayed by typing **`module ?`** at the **`configuration`** level.

```
localhost::configuration> module ?
  reset          show          timing>          traffic>
```

2.10.1 Resetting a Network Module

This command is the software equivalent of removing and immediately re-inserting a network module while the switch is under power. This allows you to reset the connections on a given network module without having physical access to the switch. Enter the following parameters:

```
localhost::configuration module> reset <module>
```

module	Indicates which network module you want to reset.

NOTE

All SVCs associated with this network module are torn down upon a reset and attempt to reconnect as needed. All PVCs associated with this network module are torn down and set up again upon a reset. Depending on the number of PVCs involved, it may take a few seconds for all of the PVCs to be re-established after a reset.

For example, if you want to reset network module 3B, enter the following:

```
localhost::configuration module> reset 3b
```

The switch then cautions you that all connections will be torn down. To abort the reset, type **n** or press **<ENTER>**. To continue with the reset, type **y**.

```
Resetting the network module will destroy all
existing connections that are already configured.
Reset the network module [n]? y
```

2.10.2 Displaying Network Module Configuration Information

This command lets you display general information about network modules that are currently installed in a switch board. Enter the following parameters:

```
localhost::configuration module> show
Module Series  Speed Ports  Timing Rev  Uptime    ProductNumber
1A     C2      1.544     6  yes    1.0  0d:01:31  NMCE-6/DS1A
1B     C       2.048     6  yes    1.0  1d:07:21  NM-6/E1C
1C     C       100.0     6  no     1.0  1d:05:40  NM-6/100MMSTC
1E     B      2560.0     4  no     1.0  2d:07:42  NM-4/BPB
```

The fields in this display are defined as follows:

Module Shows each network module currently installed in the switch board. 1 means that it is the switch fabric in slot 1. The letter shows the position of the network module in the switch fabric. E is the intra-fabric port to the other switch fabrics in a TNX-1100 and the other multiplexer modules in an MSC-900.

Series Indicates the hardware series of the network module. C2 signifies a circuit emulation module (CEM).

Speed Shows the speed in Mbps of the ports.

Ports Shows the number of ports on the network module.

Timing `Yes` means this network module has distributed timing capabilities. `No` means that it does not have distributed timing capabilities.

Rev Shows the hardware revision level.

Uptime Displays the length of time that the network module has been in its current state.

Product Number Shows the FORE Systems' product number for this network module. `NM` means network module, `CE` means circuit emulation, `BPB` indicates the intra-fabric module.

NOTE Series B network modules can not be used in the same switch fabric as Series LC network modules.

AMI Configuration Commands

2.10.3 Configuring Distributed Timing on a Network Module

These commands enable you to configure or to display information about the timing source of the network modules.

NOTE These commands apply only to FORE Systems' Series LC network modules and to Series C network modules that have distributed timing support.

Enter the following parameters to show the commands for network module timing:

```
localhost::configuration module> timing ?
 show          internalclock          exportclock            importclock
```

2.10.3.1 Displaying the Network Module Timing Source

This command allows you to display information about the timing source of the network modules.

NOTE

This command applies only to FORE Systems' Series LC network modules and to Series C network modules that have distributed timing support.

Enter the following parameters:

```
localhost::configuration module timing> show
                  Import                                Export
Module  Internal  Primary   Secondary Current   Primary   Secondary Current
1C      export    N/A       N/A       N/A       crystal   crystal   primary
```

The fields in this display are defined as follows:

Module Shows each distributed timing network module that is currently installed in the switch. The 1 means that it is the first switch fabric. The C indicates the position of the network module in the switch fabric.

Internal Shows whether the export clock or the import clock is being used as the internal transmit clock for this network module.

Import Primary Defines the preferred import timing source for the specified network module. This can be designated as the export clock of a different network module on the same switch fabric or as the board clock from one of the switch fabrics on a TNX-1100 or one of the multiplexer modules on an MSC-900.

Import Secondary Defines the backup import timing source to be used for the specified network module in the event that the import primary source is unavailable. This can be designated as the export clock of a different network module on the same switch fabric or as the board clock from one of the switch fabrics on a TNX-1100 or one of the multiplexer modules on an MSC-900.

Import Current Lists the current import timing source for the specified network module. In the event that the primary source is unavailable, it reads `secondary`. If both the primary source and secondary source are unavailable, it displays itself as the source (e.g., 1C) meaning that it is importing its own export clock.

Export Primary Defines the preferred export timing source for the specified network module. This clock source may be either recovered from one of the ports on this network module or this clock source may be the crystal oscillator on this network module.

Export Secondary Defines the backup export timing source to be used for the specified network module in the event that the export primary source is unavailable. This clock source may be either recovered from one of the ports on this network module or this clock source may be the crystal oscillator on this network module.

Export Current Lists the current export timing source for the specified network module. Normally, it shows `primary`. In the event that the primary source is unavailable, it reads `secondary`. If the export primary and export secondary timing sources are both unavailable (i.e., both sources were defined as ports), the on-board crystal is used as the export timing source. The default setting is `crystal`.

2.10.3.2 Configuring the Internal Clock Timing of a Network Module

Each network module installed in a switch has its own internal clock as a timing source. This timing source can be either the export clock or it may be the import clock. This command allows you to configure the internal clock on a specified network module.

NOTE

These commands apply only to FORE Systems' Series LC network modules and to Series C network modules that have distributed timing support.

Enter the following parameters:

```
localhost::configuration module timing> internalclock <module> (export | import)
```

module Indicates the specific distributed timing network module to be configured.

export Indicates the export clock is being used by this network module as the internal clock. This clock source may be either recovered from one of the ports on this network module or this clock source may be the crystal oscillator on this network module.

import Indicates the import clock is being used by this network module as the internal clock. This clock source is being taken from the export clock of a different network module on the same switch fabric or from the board clock from one of the switch fabrics on a TNX-1100 or one of the multiplexer modules on an MSC-900.

2.10.3.3 Configuring the Export Clock Timing of a Network Module

This command allows you to configure the timing source for the export clock on a specified network module. Enter the following parameters:

NOTE

These commands apply only to FORE Systems' Series LC network modules and to Series C network modules that have distributed timing support.

```
localhost::configuration module timing> exportclock <module> (primary | second-
ary)
(<port#> |crystal | none)
```

module Indicates the specific distributed timing network module to be configured.

primary|secondary Using `primary` designates this as the preferred export timing source for this network module. Using `secondary` designates this as the backup export timing source to be used for this network module in the event that the primary source is unavailable.

port#|crystal|none Specifies the source of the export clock for this network module. Using `port#` means that the timing source is recovered externally from this specific port on a distributed timing network module. Using `crystal` means that the timing is derived internally from the crystal oscillator on this network module. `None` is only available on the TP25 network module. Using `none` allows the TP25 network module to disable transmitting sync pulses.

For example, to configure the fourth port on network module 1B as the secondary source of timing for the export clock, enter the following parameters:

```
localhost::configuration module timing> exportclock 1B secondary 4
```

NOTE

For the final parameter, `port#`, you only need to enter the port number (e.g., 4), not the module and port number (e.g., 1B4), since the second parameter is the module number.

2.10.3.4 Configuring the Import Clock Timing of a Network Module

This command allows you to configure the timing source for the import clock on a specified network module.

NOTE These commands apply only to FORE Systems' Series LC network modules and to Series C network modules that have distributed timing support.

Enter the following parameters:

```
localhost::configuration module timing> importclock <module> (primary | secondary) (A | B | C | D | 1 | 2 | 3 | 4)
```

module Indicates the specific distributed timing network module to be configured.

primary|secondary Using `primary` designates this as the preferred import timing source for this network module. Using `secondary` designates this as the backup import source to be used for this network module in the event that the primary source is unavailable.

A|B|C|D|1|2|3|4 Indicates the source from which the import timing will be taken for this network module. The imported clock may be used as the network module global clock, which in turn, may be used by all ports that link their transmit clock to the network module global clock. Can be from the export clock from another (A - bottom left, B - bottom right, C - top left, or D - top right) network module on this switch fabric, or the export clock from another (1 - first (leftmost slot), 2 - second slot, 3 - third slot, 4 fourth slot) switch fabric.

NOTE You cannot import the clock from the fabric you are currently using; i.e., if you are configuring board 2, you cannot use 2 as the value for `(A|B|C|D|1|2|3|4)`.

2.10.4 Configuring Traffic on a Network Module

These commands enable you to configure or to display information about the traffic on the network modules. You can display the list of available subcommands by typing **traffic ?** at the **module** level.

```
localhost::configuration module> traffic ?
  c>                lc>               le>
```

2.10.4.1 Configuring Traffic on a Series C Network Module

These commands let you configure or display information about the traffic on Series C network modules. You can display the list of available subcommands by typing **c ?** at the **traffic** level.

```
localhost::configuration module traffic> c ?
  epd               fifoblock         models            setmodel
  show
```

2.10.4.1.1 Setting Early Packet Discard on a Series C Network Module

This command lets you set a threshold value for AAL5 Early Packet Discard (EPD) on a specified network module. This is the static threshold (in terms of a specified number of cells) at which EPD is activated. AAL5 frames that arrive when the shared buffer is over this threshold are discarded in whole. Enter the following parameters:

```
localhost::configuration module traffic c> epd <module> <number of cells>
```

module Indicates the network module to be configured for Early Packet Discard.

number of cells Indicates the AAL5 packet drop threshold to be set, in number of cells. By default, this value is set to 90% of the shared buffer size.

2.10.4.2 Setting FIFO Blocking on a Series C Network Module

This command lets you set FIFO blocking on a specific network module. FIFO blocking enables buffering on the fabric when the network module buffers are full. Enter the following parameters:

```
localhost::conf module traffic c> fifoblock <module> (normal | enabled)
```

module Indicates which network module is to be configured.

normal|enabled `Normal` indicates that the network module passes traffic normally. `Enabled` means that FIFO blocking takes place on the network module when the buffers are full. The default state is `normal`.

2.10.4.3 Displaying Traffic Models for a Series C Network Module

This command allows you to display the different types of traffic memory models on a network module. Enter the following parameters:

```
localhost::configuration module traffic c> models
 Model   Memory Ucasts Mcasts  MOuts  Cells  Name
 1       32Kx48   4096    512   1024   2048  default
 2      128Kx48   6144    512   1024  12288  default
 3      128Kx48  11264   1024   2048  10240  more conns
 5      128Kx48   2048   2048  16384   8192  VP shaping
 6      128Kx48   3072    128   1024  13312  more cells
 7       32Kx48   2048    256   1024   2560  more cells
```

NOTE

Memory model 4 has been removed from *ForeThought*-SP1.0.

The fields in this display are defined as follows:

Model Shows the shared memory model for this configuration. This is the number to enter for the *<model>* parameter when using the **conf module traffic c setmodel** command.

Memory Shows the size, in bytes, of this shared memory configuration.

Ucasts Shows the maximum number of unicast connections supported for this model. Half of these connections are reserved for low-priority connections (ABR, UBR) and half are reserved for high-priority connections (VBR, CBR). For example, if a model supports 4K unicast connections, it really supports 2K VBR or CBR connections and 2K ABR or UBR connections.

Mcasts Shows the number of input multicast connections supported from the switch fabric to the network module for this shared memory model. Half of these connections are reserved for low-priority connections (ABR, UBR) and half are reserved for high-priority connections (VBR, CBR). A multicast connection can have multiple outputs on the same network module. The number of outputs does not figure into this constraint.

MOuts Shows the number of output multicast connections supported from the network module to the link for this shared memory model. Any multicast connection can have multiple outputs on the same network module or the same port. If one multicast connection has four outputs, it requires 1 mcast and 4 mouts. Adding an output to a multicast connection can fail if all of the outputs are in use. Adding the multicast connection might not fail.

Cells Shows the total amount of cell buffering that is supported for this shared memory model.

Name Shows the identifier for this shared memory model.

2.10.4.4 Setting Traffic Models on a Series C Network Module

This command lets you select one of the traffic memory models for a specific network module. Enter the following parameters:

```
localhost::configuration module traffic c> setmodel <module> <model>
```

module Indicates which network module is to be configured.

model Indicates the predefined memory model to be used for this network module. The models make different trade-offs between the number of cell buffers, and the number of unicast and multicast connections. Enter the number found in the `Model` field of the **`conf module traffic c models`** command for the shared memory configuration that you want to use.

NOTE The following Series C network modules can only use the following traffic memory models: NM-6/25UTPEC and NM-4/155UTP5EC can only use models 1 and 7; all other Series C network modules can only use models 2 - 6.

NOTE The switch software must be restarted for this command to take effect.

2.10.4.5 Displaying Traffic on a Series C Network Module

This command enables you to display traffic model information about the Series C network modules. Enter the following parameters:

```
localhost::configuration module traffic c> show
 Module  Memory  Model    EPD  FIFOblock
 2A     128Kx48  2       6653  enabled
 2B     128Kx48  2       8036  enabled
 2C     128Kx48  2       8036  enabled
 2D     128Kx48  2       8036  enabled
```

The fields in this display are defined as follows:

Module Shows the network module that has been configured.

Memory Shows the hardware configuration this shared memory model supports, in units of 48 bit words (x48).

Model Shows the shared memory model used for this network module. See the **`conf mod traffic c models`** command for more information.

EPD Shows the threshold, in cells, for AAL5 Early Packet Discard on this network module.

FIFOblock Displays `enabled` if FIFO blocking is enabled on this network module. Otherwise, displays `normal`.

You can also display traffic model information about an individual Series C network module. Enter the following parameters:

```
localhost::configuration module traffic c> show [<module>]
localhost::configuration module traffic c> show 2C
 Module  Memory  Model    EPD  FIFOblock
 2C     128Kx48  2       8036  enabled
```

The fields in this display are defined in the same manner as those listed in the example above.

If no Series C network modules are installed, the following is displayed:

```
localhost::configuration module traffic c> show
No Series-C shared memory module information is available
```

2.10.4.6 Configuring Traffic on a Series LC Network Module

These commands let you configure or display information about the traffic on Series LC network modules. You can display the list of available subcommands by typing **lc ?** at the **traffic** level.

```
localhost::configuration module traffic> lc ?
  epd              efci             models           setmodel
  show
```

2.10.4.6.1 Setting EPD on a Series LC Network Module

This command lets you set a threshold value for AAL5 Early Packet Discard (EPD) on a Series LC network module. This is the static threshold (in terms of a specified number of cells) at which EPD is activated. AAL5 packets that arrive when the shared buffer is over this threshold are discarded in whole. Enter the following parameters:

```
localhost::conf module traffic lc> epd <module> [UBR] <number of cells>
```

module Indicates the network module to be configured for AAL5 Early Packet Discard.

UBR If **UBR** is entered, indicates the AAL5 packet drop threshold is used for AAL5 UBR connections only. If **UBR** is not entered, indicates the AAL5 packet drop threshold is used for all other AAL5 connections.

number of cells Indicates the AAL5 packet drop threshold to be set, in number of cells. By default, this value is set to 90% of the shared buffer size.

2.10.4.6.2 Setting EFCI on a Series LC Network Module

This command lets you designate the cell buffer threshold over which Available Bit Rate (ABR) cells have their explicit forward congestion indicator (EFCI) code point set. When the EFCI code point is set, this signals congestion to downstream ABR flow control mechanisms. Once this threshold is surpassed, EFCI continues to be set until the queue empties below the `off` threshold. Enter the following parameters:

```
localhost::conf module traffic lc> efci <module> (on | off) <number of cells>
```

module	Indicates the port on which the EFCI threshold will be set.
on|off	`on` means the EFCI will be set when the threshold number is reached, signalling congestion. `off` means the EFCI will be cleared when the threshold number is reached, indicating no congestion.
number of cells	Indicates the number of cells over which the ABR cells will have the EFCI set. The default value is `64` cells for `on` and `1` cell for `off`.

NOTE

The value for the `off` threshold must always be less than the value for the `on` threshold.

2.10.4.6.3 Displaying Traffic Models for a Series LC Network Module

This command allows you to display the different types of traffic memory models on a Series LC network module. Enter the following parameters:

```
localhost::configuration module traffic lc> models
          Cell   Table
 Model  Memory  Memory Ucasts Mcasts  Cells Counters  Name
 1     256Kx64  32Kx32   6144    512  32768        0  more cells
 2     256Kx64  32Kx32   6144    512  16384        1  default
 3     256Kx64  32Kx32   6144    512   8192        2  two counters
 4     256Kx64  64Kx32   6144    512  32768        2  default
 5     512Kx64  64Kx32   6144   1024  57344        2  default
 6     256Kx64  32Kx32   4096   1024  24576        1  more mcast
 7     256Kx64  64Kx32   4096   1024  32768        2  more mcast
 8     512Kx64  64Kx32   4096   2048  57344        2  more mcast
```

The fields in this display are defined as follows:

Model Displays the shared memory model for this configuration. This is the number to enter for the *<model>* parameter when using the **conf module traffic lc setmodel** command.

Cell Memory Shows the hardware configuration this shared memory model supports, in units of 64-bit words (x64).

Table Memory Shows the hardware configuration this shared memory model supports, in units of 32-bit words (x32).

Ucasts Shows the maximum number of unicast connections supported by this shared memory configuration.

Mcasts Shows the number of input multicast connections supported from the switch fabric to the network module by this shared memory configuration.

Cells Shows the total amount of cell buffering that is supported by this shared memory configuration.

Counters Shows the number of per-connection counters that is supported by this shared memory configuration. `0` means there are no per-connection counters. `1` means there are per-connection counters for cells transmitted and for cells lost. `2` means there are per-connection counters for cells transmitted, for cells lost, for intentional cells lost, and for unintentional cells lost.

Name Displays the identifier for this shared memory configuration.

NOTE

The `Cell Memory` and `Table Memory` sizes determine which memory models are appropriate for any given network module.

2.10.4.6.4 Setting Traffic Models on a Series LC Network Module

This command lets you select one of the traffic memory models on a Series LC network module. Enter the following parameters:

```
localhost::configuration module traffic lc> setmodel <module> <model>
```

module Indicates which network module is to be configured.

model Indicates the predefined memory model to be used for this Series LC network module. The various models make different trade-offs between the number of cell buffers, and the number of unicast and multicast connections, and the number of per-connection counters. Enter the number found in the `Model` field of the **`conf module traffic lc models`** AMI command for the shared memory configuration that you want to use.

NOTE

For proper operation, all Series LC network modules in a switch must use memory models that support the same number of unicast connections. Therefore, all Series LC in a switch should either use models 1-5 OR models 6-8.

The following Series LC network modules can only use the following traffic memory models: OC-3 MM and UTP can only use models 1, 2, 3, and 6; OC-3 SM can only use models 4 and 7; and OC-12 MM and SM can only use models 5 and 8.

NOTE

The switch software must be restarted for this command to take effect.

2.10.4.6.5 Displaying Traffic on a Series LC Network Module

This command lets you display traffic model information on the Series LC network modules. Enter the following parameters:

```
localhost::configuration module traffic lc> show
           Cell   Table                   UBR   EFCI   EFCI
 Module  Memory  Memory  Model     EPD    EPD     On    Off
 1A     256Kx64  32Kx32  3         256    256    256      1
 1B     256Kx64  32Kx32  3         256    256    256      1
 1C     256Kx64  32Kx32  3         256    256    256      1
 1D     512Kx64  64Kx32  7       58050  58050     64      1
```

The fields in this display are defined as follows:

Module Shows the network module that has been configured.

Cell Memory Shows the hardware configuration this shared memory model supports, in units of 64-bit words (x64).

Table Memory Shows the hardware configuration this shared memory model supports, in units of 32-bit words (x32).

Model Shows the shared memory model used for this network module. See the **`conf mod traffic lc models`** command for more information.

EPD Shows the AAL5 packet drop threshold for CBR, VBR, and ABR traffic, in cells, on this network module.

UBR EPD Shows the AAL5 packet drop threshold for UBR traffic, in cells, on this network module.

EFCI On Shows the threshold value at which the EFCI will be set (turned on), signalling congestion, for ABR traffic.

EFCI Off Shows the threshold value at which the EFCI will be cleared (turned off), indicating no congestion for ABR traffic.

You can also display traffic model information about an individual Series LC network module. Enter the following parameters:

```
localhost::configuration module traffic lc> show [<module>]
localhost::configuration module traffic lc> show 1B
          Cell   Table                UBR   EFCI   EFCI
 Module  Memory  Memory  Model    EPD    EPD     On    Off
 1B     256Kx64  32Kx32  3        256    256    256      1
```

The fields in this display are defined in the same manner as those listed in the example above.

If no Series LC network modules are installed, the following is displayed:

```
localhost::configuration module traffic lc> show
No Series-LC shared memory module information is available
```

2.11 NSAP Configuration Commands

The submenus of these commands allow you to create, modify, delete, and display NSAP Designated Transit Lists; to create, delete, and display NSAP static routes; to create, delete, and display NSAP prefixes; to display ILMI registered NSAP addresses; to create, delete, and display NSAP-to-E.164 address mappings, and to configure entries in the NSAP address validation (av) table. You can display the list of available commands by typing **nsap ?** at the **configuration** level.

```
localhost::configuration> nsap ?
  dtl>              route>            prefix>           ilmi>
  e164>             av>
```

2.11.1 DTL Configuration Commands

These commands let you create, delete, and display Designated Transit Lists (DTLs). A DTL is a static source route for the *ForeThought* PNNI router which specifies the preferred call routing for the SVC portion of a directed SPVC. A DTL is a source route (index) and each entry (row) in the DTL represents a single hop in the source route. Each hop is represented by a *ForeThought* PNNI node and the logical output port at that node. The *ForeThought* PNNI node is given by the node's NSAP prefix and mask. The logical port is given by the link ID and the VPI. You can display the list of available subcommands by typing **dtl ?** at the **nsap** level.

```
localhost::configuration nsap> dtl ?
  delete            modify            new               show
```

2.11.1.1 Deleting a DTL

This command enables you to remove an existing DTL. Enter the following parameters:

```
localhost::configuration nsap dtl> delete <index> (<row>|all)
```

index Indicates the index number of a DTL from which you want to delete a single entry (row) or all entries (rows).

row Indicates the row number of the individual entry within a given DTL that you want to delete. An entry in the DTL is given a row number equal to its position in the source route. Thus, the entry corresponding to the first hop is row 1, the second hop is row 2, and so on.

all Indicates that you want to delete all of the entries within a given DTL.

For example, if you want to delete row 2 of index entry 9, enter the following:

```
localhost::configuration nsap dtl> delete 9 2
```

Similarly, if you want to delete every row in index entry 9, enter the following:

```
localhost::configuration nsap dtl> delete 9 all
```

2.11.1.2 Modifying a DTL

This command allows you to modify a DTL. Enter the following parameters:

```
localhost::configuration nsap dtl> modify <index> <row> (prefix|mask|port|vpi)
<new_value>
```

index The index number of the DTL that you want to modify.

row Indicates the row number of an entry within a given DTL that you want to modify. An entry in the DTL is given a row number equal to its position in the source route. Thus, the entry corresponding to the first hop is row 1, the second hop is row 2, and so on.

prefix Indicates that you want to change the prefix part of the node ID of this DTL entry. In *ForeThought* PNNI, the node IDs are prefixes that represent both the ID of the node and a summary of reachable addresses.

mask Indicates that you want to change the mask corresponding to the prefix. Gives the length of the above prefix in number of bits. Can vary from 0 to 104 (13 bytes).

port Indicates that you want to change the output port number for the node given by the above node ID. This is also the port to which the next node in the DTL (if there is one) is connected.

vpi Indicates that you want to change the output path in the above output port. This is the signalling path to the peer given by the next node in the DTL.

new_value Indicates the actual value that you wish to use for one of the above fields. Can be the new prefix, mask, port, or vpi number.

For example, to modify the port of index entry 9, row 2 to port D1, enter the following:

```
localhost::configuration nsap dtl> modify 9 2 port D1
```

Similarly, to modify the mask of index entry 12, row 1 to a mask of 104, enter the following:

```
localhost::configuration nsap dtl> modify 12 1 mask 104
```

2.11.1.3 Creating a DTL

This command allows you to create a DTL. Enter the following parameters:

```
localhost::conf nsap dtl> new <index> <row> <NSAP> <mask> <port> <vpi>
```

index Indicates the index number of the DTL that you want to add.

row Indicates the row number of an entry within a given DTL that you want to add. An entry in the DTL is given a row number equal to its position in the source route. Thus, the entry corresponding to the first hop is row 1, the second hop is row 2, and so on.

NSAP Indicates the NSAP prefix part of the node ID of this DTL entry. In *ForeThought* PNNI, the node IDs are prefixes that represent both the ID of the node and a summary of reachable addresses.

mask Indicates the mask corresponding to the prefix. This gives the length of the above prefix in number of bits. This can vary from 0 to 104 (13 bytes).

port Indicates the output port for the node given by the above node ID. This is also the port to which the next node in the DTL (if there is one) is connected.

vpi Indicates the output path in the above output port. This is the signalling path to the peer given by the next node in the DTL.

For example, if you want to create a DTL, enter something similar to the following:

```
localhost::conf nsap dtl> 10 1 0x47000580ffe1000000f21b19c3 104  C1 0
```

2.11.1.4 Displaying DTLs

This command lets you display the current DTLs. Enter the following:

```
localhost::configuration nsap dtl> show
Index    Row   NSAP prefix                            Mask  Port   VPI
   10      1   0x47.0005.80.ffe100.0000.f21b.19c3      104    C1     0
           2   0x47.0005.80.ffe100.0000.f21b.19a1      104    C2     0
```

Index Shows the index number of all current DTLs.

Row Shows the row number of each entry within each DTL. Each entry in the DTL has a row number equal to its position in the source route, so the entry corresponding to the first hop is row 1, the second hop is row 2, and so on.

NSAP prefix Shows the NSAP prefix part of the node ID of this DTL entry. In *ForeThought* PNNI, the node IDs are prefixes that represent both the ID of the node and a summary of reachable addresses.

Mask Shows the mask corresponding to the prefix, which gives the length of the above prefix in number of bits. It can vary from 0 to 104 (13 bytes).

Port Shows the output port for the node given by the above node ID. This is also the port to which the next node in the DTL (if there is one) is connected.

VPI Shows the output path in the above output port. This is the signalling path to the peer given by the next node in the DTL.

You can also display an individual DTL by entering the following parameters:

```
localhost::configuration nsap dtl> show [<index>]
localhost::configuration nsap dtl> show 10
Index    Row   NSAP prefix                            Mask  Port   VPI
   10      1   0x47.0005.80.ffe100.0000.f21b.19c3      104    C1     0
           2   0x47.0005.80.ffe100.0000.f21b.19a1      104    C2     0
```

If no DTLs exist, the following is displayed:

```
localhost::configuration nsap dtl> show
Index    Row   NSAP prefix                            Mask  Port   VPI
No DTLs selected.
```

2.11.2 NSAP Route Configuration Commands

These commands let you create, delete, and display NSAP static routes. You can display the list of available subcommands by typing **`route ?`** at the **`nsap`** level.

```
localhost::configuration nsap> route ?
  delete          new              show
```

2.11.2.1 Deleting an NSAP Route

This command enables you to remove an existing NSAP static route. Enter the following parameters:

```
localhost::configuration nsap route> delete <NSAP> <mask> <port> <vpi>
```

NSAP Indicates the complete 20-byte NSAP route address in hexadecimal format.

mask Indicates the bit mask indicating number of high-order bits to use for routing purposes. The default mask for the route to the host is 152 and the default mask for the route to the switch is 104.

port Specifies the port on which this NSAP route is to be deleted.

vpi Specifies the virtual path on which this NSAP static route is to be deleted.

2.11.2.2 Creating an NSAP Route

This command allows you to create an NSAP static route. Enter the following parameters:

```
localhost::configuration nsap route> new <NSAP> <mask> <port> <vpi> [-cost
<cost>]
[-cbr_cap <cbr_cap>] [-vbr_cap <vbr_cap>] [abr] [epd]
```

NSAP Indicates the complete 20-byte NSAP route address in hexadecimal format.

mask Indicates the bit mask indicating number of high-order bits to use for routing purposes. The default mask for a static route to a host is `152` and the default mask for a static route to another switch is `104`.

port Specifies the port through which this NSAP route can be reached.

vpi Specifies the UNI signalling path through which this NSAP route can be reached.

-cost <cost> Indicates the routing metric for this link. There is a cost for each link in a route. The sum of these link costs determines the overall cost of a route. To expedite traffic on a route, try to minimize the overall cost of a route. For a critical route, then, choose a small cost value. For a lesser important route, choose a higher cost value. The default value is `100`.

-cbr_cap <cbr_cap> Indicates the maximum CBR (Constant Bit Rate) capacity allowed for any single connection on this route. This number is limited by the actual CBR capacity available on the output link specified for this route.

-vbr_cap <vbr_cap> Indicates the maximum VBR (Variable Bit Rate) capacity allowed for any single connection on this route. This number is limited by the actual VBR capacity available on the output link specified for this route.

abr This is an optional parameter. Use the `abr` parameter only for links that support ABR traffic.

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epd This is an optional parameter. Use the `epd` parameter only for links that support Early Packet Discard.

The following is an example of how to create an NSAP static route:

```
localhost::configuration nsap route> new
0x47.0005.80.ffe100.0000.f215.11f2.002048100464.00 152 1c2 0 -cost 200 -cbr_cap
20000 -vbr_cap 30000 abr
```

2.11.2.3 Displaying NSAP Routes

This command lets you display the current NSAP static routes. Enter the following parameters:

```
localhost::configuration nsap route> show
NSAP-address                             Mask Port VPI Cost CBR   VBR   FLAGS
                                                            Mbs   Mbs
47000580ffe1000000f21511f200204810046400 152  1C2  0   200  20.0  30.0  A
47000580ffe1000000f21511f20020481ee00000 144  1C3  0   100  70.0  60.0  AE
47000580ffe1000000f21511f20020481ff00000 144  1C1  0   100  INF   INF   AE
47000580ffe1000000f21511f20020481ff12300 152  1C3  0   100  INF   INF
```

The fields in this display have the following meaning:

NSAP-address Shows all current NSAP static routes on the switch.

Mask Lists the bit mask indicating number of high-order bits to use for routing purposes. The default mask for a static route to a host is `152` and the default mask for a static route to another switch is `104`.

Port Lists the port number on which the NSAP route exists. The 1 indicates that it is the first switch fabric. The letter C indicates the position of the network module in the switch. The 1, 2, 3 indicate the specific port number on the network module.

VPI Shows the number of the virtual path on which the NSAP static route exists.

Cost Shows the routing metric for this link. There is a cost for each link in a route. The sum of these link costs determines the overall cost of a route. To expedite traffic on a route, try to minimize the overall cost of a route. A small cost value is assigned to a critical route, while a higher cost value is assigned to a lesser important route. The default value is `100`.

CBR Displays the maximum CBR capacity allowed for any single connection on this route. `INF` means that you did not specify a value for this parameter when the route was created, so the value defaults to the capacity available on the outgoing link.

VBR Displays the maximum VBR capacity allowed for any single connection on this route. `INF` means that you did not specify a value for this parameter when the route was created, so the value defaults to the capacity available on the outgoing link.

FLAGS `A` means this link supports ABR traffic. `E` means that this route supports Early Packet Discard (EPD). `AE` means this link supports both ABR traffic and EPD. No flags indicate that neither EPD nor ABR traffic are supported on this link.

If you have not configured any static routes, then the following message is displayed:

```
localhost::configuration nsap route> show
No NSAP static route information is available
```

2.11.3 NSAP Prefix Configuration Commands

These commands enable you to delete an NSAP prefix, create an NSAP prefix, and display NSAP prefix information. You can display the list of available subcommands by typing **`prefix ?`** at the **`nsap`** level.

```
localhost::configuration nsap> prefix ?
  delete           new              show
```

2.11.3.1 Deleting an NSAP Prefix

This command lets you remove an existing NSAP prefix. Enter the following parameters:

```
localhost::config nsap prefix> delete <port> <vpi> <prefix>
```

port Indicates the port number on which the NSAP prefix is to be deleted.

vpi Indicates the number of the virtual path on which the NSAP prefix is to be deleted.

prefix Indicates the NSAP prefix for this entry.

2.11.3.2 Creating an NSAP Prefix

This command lets you create an NSAP prefix. Enter the following parameters:

```
localhost::config nsap prefix> new <port> <vpi> <prefix>
```

port Indicates the port number on which the NSAP prefix is to be created.

vpi Indicates the number of the virtual path on which the NSAP prefix is to be created.

prefix Indicates the NSAP prefix for this entry.

NOTE Because multiple prefixes are not supported on the same port, delete the old prefix before creating a new one.

2.11.3.3 Displaying NSAP Prefixes

This command enables you to display the current list of NSAP prefixes. Enter the following parameters:

```
localhost::configuration nsap prefix> show
 Port      VPI NSAP-Prefix
 1A1         0 0x47.0005.80.ffe100.0000.f124.00de
 1A2         0 0x47.0005.80.ffe100.0000.f124.00de
 1A3         0 0x47.0005.80.ffe100.0000.f124.00de
 1A4         0 0x47.0005.80.ffe100.0000.f124.00de
 1B1         0 0x47.0005.80.ffe100.0000.f124.00de
 1B2         0 0x47.0005.80.ffe100.0000.f124.00de
 1B3         0 0x47.0005.80.ffe100.0000.f124.00de
 1B4         0 0x47.0005.80.ffe100.0000.f124.00de
 1B5         0 0x47.0005.80.ffe100.0000.f124.00de
 1B6         0 0x47.0005.80.ffe100.0000.f124.00de
 1CTL        0 0x47.0005.80.ffe100.0000.f124.00de
```

The fields in this display have the following meanings:

Port Indicates the port number of the network module that is currently installed in the switch. The 1 indicates that it is the first switch fabric. The letter A indicates that the network module is installed in the bottom left-hand slot in the switch. The letter B indicates that the network module is installed in the bottom right-hand slot in the switch. The 1, 2, 3, 4, 5, 6 indicate the specific port number on the network module. CTL indicates the logical control port.

VPI Indicates the number of the virtual path on which the NSAP prefix exists.

NSAP-Prefix Indicates the NSAP prefix for this port.

If you have not configured any NSAP prefixes, then the following message is displayed:

```
localhost::configuration nsap prefix> show
No user configured NSAP prefix information is available
```

2.11.4 NSAP ILMI Configuration Command

This command enables you to display the NSAP addresses of all of the ports on a switch fabric that have been registered via ILMI. ILMI address registration occurs between the switch and host. The switch sends the host its 13-byte NSAP prefix. If the host accepts the prefix, the host builds its own NSAP address by appending its 7-byte host specific part. The host returns the complete 20-byte NSAP address to the switch. If the switch accepts the address, the switch enters that information into its topology tables and all connections destined for that NSAP address are routed to that host. These registration messages are sent over the reserved channel VPI 0, VCI 16. You can display the available subcommand by typing **ilmi ?** at the **nsap** level.

```
localhost::configuration nsap> ilmi ?
  show
```

2.11.4.1 Displaying NSAP Addresses Registered through ILMI

This command lets you display the NSAP addresses of all of the ports on a switch fabric that have been registered via ILMI. Enter the following parameters:

```
localhost::configuration nsap ilmi> show
 Port  NsapAddress
  1D1   47000580ffe1000000f215116f00204810308600
```

Port Lists the port number for which an NSAP address has been registered via ILMI.

NsapAddress Shows the NSAP address that has been registered through ILMI for this port.

To display the NSAP addresses that have been registered via ILMI for a specific port, enter the following parameters:

```
localhost::configuration nsap ilmi> show [<port>]
localhost::configuration nsap ilmi> show 1B1
 Port  NsapAddress
 1B1   47000580ffe1000000f215116f00204810046400
```

If no addresses have been registered via ILMI, the following is displayed:

```
No NSAP address information is available
```

2.11.5 NSAP-to-E.164 Configuration Commands

These commands let you display NSAP-to-E.164 address mapping information, create an NSAP-to-E.164 address mapping, and delete an NSAP-to-E.164 address mapping. You can display the list of available subcommands by typing **e164 ?** at the **nsap** level.

```
localhost::configuration nsap> e164 ?
  show              new               delete
```

2.11.5.1 Displaying NSAP-to-E.164 Address Mapping Information

This command enables you to display the current NSAP-to-E.164 address mapping information. Enter the following parameters:

```
localhost::configuration nsap e164> show
 Port VPI NSAP-Address                               Mask Native-E164Address
 3B2  0   47000580ffe1000000f21a00d00020481a00d000 152  4126352756
```

Port Shows the port number on which the NSAP-to-E.164 address mapping exists.

VPI Shows the port number on which the NSAP-to-E.164 address mapping is to be created.

NSAP-Address Shows the NSAP address for this mapping.

Mask Shows the number of leading significant bits for this NSAP address.

Native-E164Address Indicates the E.164 address, which can be up to 15 ASCII digits (0-9) long.

If no NSAP-to-E.164 mapping information has been configured, you receive the following message:

```
localhost::configuration nsap> e164 show
No NSAP <-> E.164 Mapping information is available.
```

2.11.5.2 Adding an NSAP-to-E.164 Address Mapping

This command lets you map an NSAP address to an E.164 address format. Enter the following parameters:

```
localhost::configuration nsap e164> new <port> <vpi> <NSAP> <mask> <E.164>
```

port Indicates the port number on which the NSAP-to-E.164 address mapping is to be created.

vpi Indicates the number of the virtual path on which the NSAP-to-E.164 address mapping is to be created.

NSAP Indicates the NSAP address for this entry.

mask Indicates the number of leading significant bits for this NSAP address.

E.164 Indicates the E.164 address, which can be up to 15 ASCII characters long.

The following is an example of how to add an NSAP-to-E.164 mapping to the mapping table:

```
localhost::conf nsap e164> new 3b2 0
0x47.0005.80.ffe100.0000.f21a.00d0.0020481a00d0.0b 152 4126352756
```

2.11.5.3 Deleting an NSAP-to-E.164 Address Mapping

This command lets you remove an existing NSAP-to-E.164 address mapping. Enter the following parameters:

```
localhost::configuration nsap e164> delete <port> <vpi> <NSAP> <mask>
```

port Indicates the port number on which the NSAP-to-E.164 address mapping is to be deleted.

vpi Indicates the number of the virtual path on which the NSAP-to-E.164 address mapping is to be deleted.

NSAP Indicates the NSAP address for this entry.

mask Indicates the number of leading significant bits for the NSAP-to-E.164 address mapping that is to be deleted.

The following is an example of how to delete an NSAP-to-E.164 mapping from the mapping table:

```
localhost::conf nsap e164> del 3B2 0 47000580ffe1000000f21a00d00020481a00d000
152
```

2.11.6 NSAP Address Validation Configuration Commands

These commands enable you to configure public address validation (av) parameters. The av parameters are disabled by default. For these commands to take effect, the `-av enabled` option must be used when using **`conf uni new`** to create the UNI for which these parameters will apply. When enabled, the calling party number (CPN) in any setup message is screened against the list of valid addresses provisioned for that interface. The list of valid addresses is stored in a table. A call fails address validation if there is no match in the table, or if there is a match but the instruction has been set to reject that address. The size of the address validation table is limited to the amount of memory available on the switch. The memory is also shared between routing, signalling, and PVCs. You can display the list of available commands by typing **`av ?`** at the **`nsap`** level.

NOTE

These commands should be used only if your network includes one or more FORE switches that are being used as "edge" switches on the public side of a public network.

```
localhost::configuration nsap> av ?
  delete           new              show             timespan
  threshold
```

2.11.6.1 Deleting an Entry from the Address Validation Table

This command lets you remove an entry from the address validation (av) table. Enter the following parameters:

```
localhost::configuration nsap av> delete <port> <vpi> <nsap> <mask>
```

port	Indicates the port number on which the entry is to be deleted.
vpi	Indicates the virtual path number of this signalling path.
nsap	Indicates the NSAP address for this entry.
mask	Indicates the number of leading significant bits for the entry that is to be deleted.

The following is an example of how to delete an entry from the av table:

```
localhost::conf nsap av> del 3b4 0
0x47.0079.00.000000.0000.0000.0000.00a03e000001.00 152
```

2.11.6.2 Creating a Entry in the Address Validation Table

This command lets you create an entry in the address validation (av) table. These entries are validated against the calling party addresses in the UNI setup messages such that the entry that matches the largest number of significant (non-masked) bits is selected. Enter the following parameters:

NOTE For this command to take effect, the `-av enabled` option must be used when using **`conf uni new`** to create the UNI.

```
localhost::conf nsap av> new <port> <vpi> <nsap> <mask> <accept|reject>
```

port Indicates the port number on which the entry is to be added.

vpi Indicates the virtual path number of this signalling path.

nsap Indicates the NSAP address to be filtered for this entry.

mask Indicates the number of leading significant bits applied to the calling party number (CPN) address in order to compare against the above NSAP address.

accept|reject Indicates what to do with CPNs that match this entry.

The following is an example of how to add an entry to the address validation mapping table:

```
localhost::conf nsap av> new 3b4 0
0x47.0079.00.000000.0000.0000.0000.00a03e000001.00 152 accept
```

2.11.6.3 Displaying Address Validation Table Information

This command lets you display all of the address validation (av) table entries. Enter the following parameters:

```
localhost::configuration nsap av> show
 Port VPI  NSAP-Address                             Mask Action
 3B4  0    47007900000000000000000000a03e00000100 152  accept
```

The fields in this display are defined as follows:

port Shows the port number for the entry.

vpi Shows the virtual path number for the entry.

nsap Shows the NSAP address being filtered for this entry.

mask Shows the number of leading significant bits applied to the calling party number (CPN) address in order to compare against the above NSAP address.

accept|reject Shows the action that is taken with CPNs that match this entry.

If address validation has not been configured, you receive the following message:

```
localhost::configuration nsap av> show
No NSAP Screening Entries are configured.
```

2.11.6.4 Setting and Displaying the Rejected Call Timespan

An option exists on the UNI to provide a default calling party number (CPN) if the user side does not provide one in the setup request. If a CPN is not given in the signalling message, and if the UNI has not been configured with a default CPN, and if address validation has been enabled for this UNI, then the call is rejected. This command is used in conjunction with the **`conf nsap av threshold`** command. You can set the amount of time during which the number of call rejections specified in the **`conf nsap av threshold`** command can occur before a trap is sent. Enter the following parameters:

```
localhost::configuration nsap av> timespan ?
usage: timespan [<seconds>]
```

seconds	Indicates amount of time during which CPN rejections may occur before a CPN REJECT trap is generated. The default value is `300` seconds.

For example, to change the threshold value to 180 seconds, enter the following:

```
localhost::configuration nsap av> timespan 180
```

If you enter **`timespan`** at the **`av`** level with no other parameters, the current timespan information is displayed as follows:

```
localhost::configuration nsap av> timespan
Address validation trap timespan: 180 seconds.
```

2.11.6.5 Setting and Displaying the Rejected Call Threshold

An option exists on the UNI to provide a default calling party number (CPN) if the user side does not provide one in the setup request. If a CPN is not given in the signalling message, and if the UNI has not been configured with a default CPN, and if address validation has been enabled for the UNI that received the to be rejected setup message, then the call is rejected. This command is used in conjunction with the **conf nsap av timespan** command. You can set the number of call rejections that can occur during the period specified in the **conf nsap av timespan** command before a trap is sent. Enter the following parameters:

```
localhost::configuration nsap av> threshold ?
usage: threshold [<count>]
```

count Indicates the maximum number of CPN rejections that may occur within the timespan configured in **conf nsap av timespan** before a CPN REJECT trap is generated. The default value is 300 rejected calls.

To change the threshold value, for example, to 200 rejected calls, enter the following:

```
localhost::configuration nsap av> threshold 200
```

If you enter **threshold** at the **av** level with no other parameters, the current threshold is displayed as follows:

```
localhost::configuration nsap av> threshold
Address validation trap threshold: 200 rejected calls.
```

2.12 Port Configuration Commands

These commands let you manage the configuration of the various ports. Type **`port ?`** at the **`configuration`** level to display the available subcommands.

```
localhost::configuration> port ?
  aal5pktdiscard   aisrdi           cac              cdvt
  cesds1>          cese1>           ds1>             ds3>
  e1>              e3>              gcrapolicing     j2>
  led>             policing         pppolicing       show
  sonet>           taxi>            tp25>            traffic>
  ubrtagging       vbrbuffob        vbrob
```

2.12.1 AAL5 Packet Discard Command

This command lets you configure EPD / PPD on a per-port / per-class basis for all CBR, VBR, and / or UBR SVCs and / or PVCs. Enter the following parameters:

NOTE

Even though packet discard is disabled on a certain port, class, or connection, partial packet policing may still occur on that same port, class, or connection. This is because partial packet policing occurs on the input side of the switch and partial packet discard occurs on the output side of the switch in the network module queues.

```
localhost::conf port> aal5packetdiscard <port>
(cbr|vbr|ubr)(allOn|allOff|svcOn|svcOff)
```

port Indicates the port number on which packet discard is being configured.

cbr|vbr|ubr Indicates the class of service for which you are configuring packet discard.

allOn `allOn` means all connections (SVCs and PVCs) of the specified class of service leaving on this port are subjected to packet discard.

allOff `allOff` means no (SVCs and PVCs) connections of the specified class of service leaving on this port are subjected to packet discard.

svcOn `svcOn` means all SVCs of the specified class of service leaving on this port are subjected to packet discard. PVCs are policed based on their UPC contract. This is the default.

svcOff `svcOff` means no SVCs of the specified class of service leaving on this port are subjected to packet discard. PVCs are policed based on their UPC contract.

For example, to enable packet discard on all CBR SVCs and PVCs on port 2B4, enter the following parameters:

```
localhost::conf port> aal5packetdiscard 2b4 cbr allOn
```

2.12.2 AISRDI Port Configuration Commands

When a physical layer fault (loss of carrier, loss of frame, etc.) is detected on a port that has AIS/RDI (Alarm Indication Signal)/(Remote Defect Indication) enabled, OAM cells are generated for all through paths, originating paths, PVCs, and PNNI SPVCs that originate on that port. If a virtual path AIS condition is indicated (by receipt of F4 AIS cells on a terminating path), OAM cells are generated for only that path and for channels (PVCs and PNNI SPVCs) that originate on that path. SVCs and SPANS SPVCs do not generate AIS cells. RDI cells are generated upstream from a terminating path whenever an OAM condition exists on the receiving side of that port. An AIS is sent in the downstream direction (away from the failure). Receiving an AIS cell indicates that a physical layer failure condition is present upstream from the receiver. An RDI cell is sent toward the failure when a physical fault or AIS condition is detected on the virtual path and channel. Receiving an RDI cell means that a fault exists in the transit pathway of the virtual connection described by the RDI cell. This command lets you enable or disable ATM layer AIS/RDI OAM cell generation on a specific port. Enter the following:

NOTE Currently, AIS/RDI OAM cell generation is supported only for point-to-point connections.

```
localhost::configuration port> aisrdi <port> (enable | disable)
```

enable Indicates that OAM cells are generated when AISs and RDIs are detected.

disable Indicates that AISs and RDIs are ignored when they are detected. No OAM cells are generated.

AMI Configuration Commands

2.12.3 CAC Configuration

Port-level Connection Admission Control (CAC) allows you to set output bandwidth overbooking and output buffer overbooking for VBR traffic on a particular port.

To configure CAC on a particular port, enter the following parameters:

```
localhost::configuration port> cac <port> (enable | disable)
```

The fields in this dialog are defined as follows:

port Indicates the port on which CAC is to be configured.

enable | disable Indicates whether CAC is to be enabled (`enable`) or disabled (`disable`) on the port.

2.12.4 CDVT Port Configuration Commands

This command lets you modify the input Cell Delay Variation Tolerance (CDVT) on a per-port basis. Enter the following parameters:

```
localhost::configuration port> cdvt <port> <us>
```

port Indicates the port number on which the CDVT is to be changed.

us Specifies the new value for the CDVT setting in microseconds.

2.12.5 CESDS1 Port Configuration Commands

These commands allow you to configure the ports on a DS1 CES network module. The following **cesds1** commands are valid only when a DS1 CES network module is installed in the switch fabric. You can display the list of subcommands by typing **cesds1 ?** at the **port** level.

```
localhost::configuration port> cesds1 ?
  admin            framing          length           linestatus
  loopback         mode             show
```

2.12.5.1 Enabling/Disabling CES on a Port

The **admin** command lets you enable or disable CES on a DS1 CES port. Enter the following:

```
localhost::configuration port cesds1> admin <port> (up | down)
```

The parameters for this command have the following meaning:

port Indicates the port on which CES is to be enabled or disabled.

up | down Indicates whether CES is to be enabled or disabled on the selected port. up indicates that CES will be enabled. down indicates that CES will be disabled.

2.12.5.2 Configuring DS1 CES Port Framing

The **framing** command lets you change the framing mode on a DS1 CES port. Enter the following:

```
localhost::configuration port cesds1> framing <port> (ESF|SF)
```

port Indicates the DS1 CES port number for which the framing mode is being set.

ESF|SF Designates the type of framing on the port. ESF indicates that ESF (Extended Super Frame) framing will be used. SF indicates that SF (Super Frame) framing will be used.

2.12.5.3 Configuring DS1 CES Port Line Length

The **length** command lets you change the line length of a DS1 CES port to correspond to the physical cable attached to that port. This lets the DS1 CES port anticipate the strength of the received signal on the cable. Enter the following:

```
localhost::conf port cesds1> length <port> (<130 | 130-260 | 260-390 | >390)
```

The parameters in this command have the following meanings:

port Indicates the port number on which the line length is to be changed.

<130 Indicates that the physical cable is shorter than 130 feet long.

130-260 Indicates that the physical cable is from 130 to 260 feet long.

260-390 Indicates that the physical cable is from 260 to 390 feet long.

>390 Indicates that the physical cable is greater than 390 feet long.

2.12.5.4 Displaying DS1 CES Port Line Status

The **linestatus** command lets you display the current line status of each DS1 CES port. Enter the following:

```
localhost::configuration port cesds1> linestatus
           Rx  Tx  Rx  Tx
Port Alarm LOF LOF AIS AIS LOF LOS Loopback
2A1  no    no  no  no  no  no  yes off
2A2  no    no  no  no  no  no  yes off
2A3  no    no  no  no  no  no  yes off
2A4  no    no  no  no  no  no  yes off
2A5  no    no  no  no  no  no  yes off
2A6  no    no  no  no  no  no  yes off
```

The fields in this display have the following meanings:

port Indicates the DS1 CES port.

alarm Indicates whether or not the port is experiencing an alarm condition.

Rx LOF Indicates whether or not the receiving port is experiencing a Loss of Frame (LOF).

Tx LOF Indicates whether or not the transmit port is experiencing a Loss of Frame (LOF).

Rx AIS Indicates whether or not the receiving port is experiencing an Alarm Indication Signal (AIS).

Tx AIS Indicates whether or not the transmit port is experiencing an Alarm Indication Signal (AIS).

LOF Indicates whether or not the DS1 CES connection is experiencing a Loss of Frame (LOF).

LOS Indicates whether or not the DS1 CES connection is experiencing a Loss of Signal (LOS).

Loopback Indicates whether or not the port is in loopback mode.

2.12.5.5 Configuring DS1 CES Port Loopback

The **loopback** command lets you designate the type of loopback on a DS1 CES port. Enter the following:

```
localhost::configuration port cesds1> loopback <port> (line | none)
```

The parameters in this command have the following meanings:

port Indicates the DS1 CES port on which the loopback mode is to be changed.

line Setting `line` loopback connects the transmitter to the receiver. The data stream received from the Rx line is retransmitted out to the Tx line. Cells that are switched to this port are not sent over the line.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.5.6 Configuring the DS1 CES Port Line Coding

The mode command lets you configure the line coding for a particular DS1 CES port. Enter the following:

```
localhost::configuration port cesds1> mode <port> (B8ZS|AMI)
```

The parameters in this command have the following meanings:

port Indicates the port on which the line coding is to be changed.

B8ZS | AMI Indicates the type of coding to be used. B8ZS indicates that Binary 8-Zero Substitution will be used. AMI indicates that Alternate Mark Inversion will be used (see the *Glossary*).

2.12.5.7 Displaying the DS1 CES Port Configuration

The **show** command lets you display the current configuration of each DS1 CES port. Enter the following parameters:

```
localhost::configuration port cesds1> show
Port      Framing Carrier Line Loopback Port     Line    Line
          Mode    State   Code State    Timing   Length  Status
2A1  down ESF     no      B8ZS none     internal <130    64
2A2  down ESF     no      B8ZS none     internal <130    64
2A3  down ESF     no      B8ZS none     internal <130    64
2A4  down ESF     no      B8ZS none     internal <130    64
2A5  down ESF     no      B8ZS none     internal <130    64
2A6  down ESF     no      B8ZS none     internal <130    64
```

The fields in this display are defined as follows:

Port Indicates the DS1 CES port number and the state of the port (up or down).

Framing Mode Indicates the type of framing used on the line.

Carrier State Indicates whether or not a carrier has been detected on the port. A carrier is detected when a signal is applied to the receive side of the port, but it does not guarantee the signal is the proper frequency.

Line Code Indicates the type of line coding being utilized on the port.

Loopback State Indicates the loopback mode on the port.

Port Timing Indicates the source of the timing on this port. The values are one of: <BNP> indicating the board/network module/port from which the timing is being extracted, `srts` indicating that srts is being used on this port, `fabric` <X> where X is 1, 2, 3, or 4 indicating that timing is being sourced from another switch fabric or multiplexer module (not applicable to the TNX-210), `network` indicating that the clock is being derived from the line itself, or `crystal` indicating that the crystal on the network module itself is being used.

LineLength Indicates the length of the physical cable attached to this port.

Line Status Indicates the line status of the DS1 CES port.

2.12.6 CESE1 Port Configuration Commands

Port configuration on the E1 CES network module is performed via the **`cese1`** subcommands. These commands allow you to modify various aspects of the configuration of the ports on an E1 CES network module. The following **`cese1`** commands are available only when an E1 CES network module is installed in the switch fabric. You can display the list of available subcommands by typing **`cese1 ?`** at the **`port`** level.

```
localhost::configuration port> cese1 ?
  admin          framing        linestatus     loopback
  show
```

2.12.6.1 Enabling/Disabling CES on a Port

The **`admin`** command lets you enable or disable Circuit Emulation Services (CES) on a particular E1 CES port. Enter the following:

```
localhost::configuration port cese1> admin <port> (up | down)
```

The parameters for this command have the following meaning:

port Indicates the E1 CES port on which CES is to be enabled or disabled.

up | down Indicates whether CES is to be enabled or disabled on the selected port. `up` indicates that CES will be enabled. `down` indicates that CES will be disabled.

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2.12.6.2 Configuring E1 CES Port Framing

The **`framing`** command lets you change the framing mode on a E1 CES port. Enter the following:

```
localhost::configuration port cese1> framing <port> (E1|CRC4|MF|CRCMF)
```

port Indicates the E1 CES port number for which the framing mode is being set.

E1 | CRC4 | MF | CRCMF Designates the type of framing on the port. `E1` indicates that basic E1 framing is used. `CRC4` indicates that E1 framing with CRC-4 checksums is used. `MF` indicates that multiframe E1 framing is used. `CRCMF` indicates that multiframe E1 framing with CRC-4 checksums is used.

2.12.6.3 Displaying E1 CES Port Line Status

The **`linestatus`** command lets you display the current line status of each E1 CES port. Enter the following:

```
localhost::configuration port cese1> linestatus
          Rx  Tx  Rx  Tx                      TS16 FarEndTx  NearEndTx NearEnd
Port Alarm LOF LOF AIS AIS LOF LOS Loopback AIS  TS16LOMF  TS16LOMF  TestCode
3C1  no    no  no  no  no  no  no  off      no   no        no        No code
3C2  no    no  no  no  no  no  no  off      no   no        no        No code
3C3  no    no  no  no  no  no  no  off      no   no        no        No code
3C4  no    no  no  no  no  no  no  off      no   no        no        No code
3C5  no    no  no  no  no  no  no  off      no   no        no        No code
3C6  no    no  no  no  no  no  no  off      no   no        no        No code
```

The fields in this display have the following meanings:

port Indicates the E1 CES port.

alarm Indicates whether or not the port is experiencing an alarm condition.

Rx LOF Indicates whether or not the port is receiving a Loss of Frame (LOF) signal from the far end.

Tx LOF Indicates whether or not the port is transmitting a Loss of Frame (LOF) signal.

Rx AIS Indicates whether or not the port is receiving an Alarm Indication Signal (AIS).

Tx AIS Indicates whether or not the port is transmitting an Alarm Indication Signal (AIS).

LOF Indicates whether or not the port is experiencing Loss of Frame (LOF).

LOS Indicates whether or not the port is experiencing Loss of Signal (LOS).

Loopback Indicates whether or not the port is in loopback mode.

TS16 AIS Indicates whether AIS is being received in timeslot 16.

FarendTx TS16LOMF Indicates whether Loss Of Multi Frame (LOMF) is being indicated at the far end in Timeslot 16.

NearEndTx TS16LOMF Indicates that the port is experiencing a Loss Of Multiframe (LOMF) condition in timeslot 16.

NearEnd TestCode Indicates that the port is currently transmitting a test pattern.

2.12.6.4 Configuring E1 CES Port Loopback

The **loopback** command lets you designate the type of loopback on an E1 CES port. Enter the following:

```
localhost::configuration port cese1> loopback <port> (line | none)
```

The parameters in this command have the following meanings:

port Indicates the E1 CES port on which the loopback mode is to be changed.

line Setting line loopback connects the transmitter to the receiver. The data stream received from the Rx line is retransmitted out to the Tx line. Cells that are switched to this port are not sent over the line.

none Selecting none designates that no loopback will take place. This is the default setting.

2.12.6.5 Displaying the E1 CES Port Configuration

The **show** command lets you display the current configuration of each E1 CES port. Enter the following parameters:

```
localhost::configuration port cese1> show
Port      Framing Carrier Line Loopback Port     Line Signalling Line
          Mode    State   Coding State  Timing   Imp. Mode       Status
3C1  up   CRC     yes     HDB3 none     internal 120  none        1
3C2  up   CRC     yes     HDB3 none     internal 120  none        1
3C3  down CRC     yes     HDB3 none     internal 120  none        1
3C4  down CRC     yes     HDB3 none     internal 120  none        1
3C5  down CRC     yes     HDB3 none     internal 120  none        1
3C6  down CRC     yes     HDB3 none     internal 120  none        1
```

The fields in this display are defined as follows:

Port Indicates the E1 CES port number and the state of the port (`up` or `down`).

Framing Mode Indicates the type of framing used on the line.

Carrier State Indicates whether or not a carrier has been detected on the port. A carrier is detected when a signal is applied to the receive side of the port, but it does not guarantee the signal is the proper frequency.

Line Coding Indicates the type of line coding used on the port.

Loopback State Indicates the loopback mode on the port.

Port Timing Indicates the source of the timing on this port. The values are one of: <BNP> indicating the board/network module/port from which the timing is being extracted, `srts` indicating that srts is being used on this port, `fabric` <X> where X is 1, 2, 3, or 4 indicating that timing is being sourced from another switch fabric or multiplexer module (not applicable to the TNX-210), `network` indicating that the clock is being derived from the line itself, or `crystal` indicating that the crystal on the network module itself is being used.

Line Imp. Indicates the value of the line impedance (in ohms, either `75` or `120`).

Signalling Mode Indicates the type of signalling used on the line.

Line Status Indicates the line status of the E1 CES port.

2.12.7 DS1 Port Configuration Commands

These commands allow you to modify various aspects of the configuration of the ports on a DS1 network module. The following DS1 commands are available only when a DS1 network module is installed in the switch fabric. You can display the list of available subcommands by typing **ds1 ?** at the **port** level.

```
localhost:: configuration port> ds1 ?
  emptycells       length           loopback         mode
  scrambling       show             timing
```

2.12.7.1 Configuring DS1 Port Empty Cells

Empty cells are cells that are sent as "filler" or place holders when there is no real data to send. By sending these cells, network modules that are synchronous in nature can keep an even flow of traffic moving so that distributed timing can work properly. This command lets you change the type of cells sent as empty cells on a DS1 network module port. Enter the following parameters:

```
localhost::configuration port ds1> emptycells <port> (idle | unassigned)
```

port Indicates the port number on which the type of empty cells is to be changed.

idle|unassigned Indicates the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is unassigned. In general, it is not necessary to change this variable from the default setting.

2.12.7.2 Configuring DS1 Port Line Length

This command lets you change the line length of a DS1 port to correspond to the physical cable attached to that port. This lets the DS1 network module receive the signal on the cable. Enter the following parameters:

```
localhost::configuration port ds1> length <port> (Lt110 | 110-220 | 220-330 |
330-440 | 440-550 | 550-660 |Gt655)
```

port Indicates the port number on which the line length is to be changed.

Lt110 Use if the physical cable is shorter than 110 ft.

110-220 Use if the physical cable is between 110 and 220 ft.

220-330 Use if the physical cable is between 220 and 330 ft.

330-440 Use if the physical cable is between 330 and 440 ft.

440-550 Use if the physical cable is between 440 and 550 ft.

550-660 Use if the physical cable is between 550 and 660 ft.

Gt655 Use if the physical cable is greater than 655 ft.

NOTE The DS1 network module is designed to meet all applicable requirements up to 655 feet of cable. Operation with cables greater than 655 feet in length is not guaranteed.

2.12.7.3 Configuring DS1 Port Loopback

This command lets you designate the type of loopback on a port on a DS-1 network module. Enter the following parameters:

```
localhost::configuration port ds1> loopback <port> (line | payload | diag | none)
```

port Indicates the port number on which the loopback mode is to be changed.

line `Line` loopback connects the transmitter to the receiver. The data stream received from the line is retransmitted out to the line. Cells that are switched to this port are not sent over the line.

payload `Payload` loopback means the DS1 stream received from the network has the DS1 overhead bits re-inserted and is retransmitted to the network.

diag `Diagnostic` loopback connects the receiver to the transmitter. The stream transmitted by the SCP to a port is looped back to the SCP. The stream is still transmitted over the cable, but the incoming stream is ignored.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.7.4 Configuring DS1 Port Mode

This command allows you to change the mode of operation on a port on a DS1 network module. Enter the following parameters:

```
localhost::configuration port ds1> mode <port> (plcp | hcs)
```

port Indicates the port number on which the mode of operation is to be changed.

plcp|hcs `plcp` means the port uses PLCP (Physical Layer Convergence Protocol) framing for cell delineation. `hcs` means the port uses HCS (Header Check Sequence) based framing for cell delineation. The default is `hcs`.

2.12.7.5 Configuring DS1 Port Scrambling

This command allows you to change the scrambling mode on a port on the DS-1 network module. Enter the following parameters:

```
localhost::configuration port ds1> scrambling <port> (on | off)
```

port Indicates the port number on which the scrambling mode is to be changed.

on|off Using `on` means that cell payload scrambling is enabled on this port. Using `off` means that cell payload scrambling is disabled on this port. Only the payload of the ATM cells is scrambled.

NOTE The scrambling mode should be set to the same status on both the transmitting side and the receiving side.

2.12.7.6 Showing the DS1 Port Configuration

This command allows you to display current information about all of the ports on a DS1 network module. Enter the following parameters:

```
localhost::configuration port ds1> show
Port Carrier Status Mode Framing Loopback Timing   Scrambling Length  EmptyCells
4C1  no      0x1a0  hcs  ESF     none     internal off        Lt110   unassigned
4C2  no      0x1a0  hcs  ESF     none     internal off        Lt110   unassigned
4C3  no      0x1a0  hcs  ESF     none     internal off        Lt110   unassigned
4C4  no      0x1a0  hcs  ESF     none     internal off        Lt110   unassigned
4C5  no      0x1a0  hcs  ESF     none     internal off        Lt110   unassigned
4C6  no      0x1a0  hcs  ESF     none     internal off        Lt110   unassigned
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module that is currently installed in the switch fabric.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee the signal is the proper frequency.

Status Indicates the DS1 line status of the port.

Mode `Plcp` means the port uses PLCP (Physical Layer Convergence Protocol) framing for cell delineation. `Hcs` means the port uses HCS (Header Check Sequence) based framing for cell delineation.

Framing Indicates the type of framing used for the port. The type of circuit affects the number of bits per second that the circuit can reasonably carry, as well as the interpretation of the usage and error statistics. You cannot change this parameter.

Loopback Indicates the loopback mode on the port. Can be either `none`, `line`, `payload`, or `diagnostic`.

Timing `Network` means the timing for this port is derived externally from the incoming clock on this port. `Internal` means the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

Scrambling `On` means payload scrambling is enabled on this port. `Off` means it is disabled on this port.

LineLength Indicates the length of the physical cable that is attached to this port.

EmptyCells Shows the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

2.12.7.7 Configuring the DS1 Port Timing

This command allows you to change the timing source on a port on a DS-1 network module. Enter the following parameters:

```
localhost::configuration port ds1> timing <port> (network | internal)
```

port Indicates the port number from which the timing is being derived.

network|internal Designates the source of the transmit clock. `Network` means the timing for this port is derived externally from the incoming clock on this port. `Internal` means the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.8 DS3 Port Configuration Commands

These commands let you modify various aspects of the configuration of the ports on a DS3 network module. The following DS3 commands are available only when a DS3 network module is installed in the switch fabric. You can display the list of available subcommands by typing **`ds3 ?`** at the **`port`** level.

```
emptycells      framing         loopback        mode
scrambling      show            timing          length
```

2.12.8.1 Configuring DS3 Port Empty Cells

Empty cells are cells that are sent as "filler" or place holders when there is no real data to send. By sending these cells, network modules that are synchronous in nature can keep an even flow of traffic moving so that distributed timing can work properly. This command lets you change the type of cells sent as empty cells on a DS3 network module port. Enter the following parameters:

```
localhost::configuration port ds3> emptycells <port> (idle | unassigned)
```

port Indicates the port number on which the type of empty cells is to be changed.

idle|unassigned Indicates the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

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2.12.8.2 Configuring the DS3 Port Framing

This command allows you to designate the mode to be used on a port on a DS-3 network module. Enter the following parameters:

```
localhost::configuration port ds3> framing <port> (cchannel | cbit)
```

port Indicates the port number on which the framing is to be changed.

cchannel|cbit Indicates the type of framing for the port. `cchannel` (clearchannel) means that standard M23 framing is used on this port. The default is `cbit` (cbitparity).

2.12.8.3 Configuring the DS3 Port Loopback

This command allows you to designate the type of loopback on a port on a DS-3 network module. Enter the following parameters:

```
localhost::conf port ds3> loopback <port> (cell | payload | diag | line | none)
```

port Indicates the port number on which the loopback mode is to be changed.

cell Choosing `cell` loopback means that the DS3 stream received from the network is unframed into ATM cells. The cells are reframed and transmitted back to the network.

payload Selecting `payload` loopback mean the DS3 stream received from the network has the DS3 overhead bits re-inserted and is retransmitted to the network.

diag Choosing `diagnostic` loopback connects the receiver to the transmitter. The DS3 stream transmitted by the switch to a port is looped back to the switch. The DS3 stream is still transmitted to the network, but the incoming DS3 stream is ignored.

line Selecting `line` loopback connects the transmitter to the receiver. The data stream received from the line is retransmitted out to the line. Cells that are switched to this port are not sent over the line.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.8.4 Configuring the DS3 Port Mode

This command allows you to change the type of framing on a port on a DS3 network module. Enter the following parameters:

```
localhost::configuration port ds3> mode <port> (plcp | hcs)
```

port Indicates the port number on which the type of framing is to be changed.

plcp|hcs `plcp` means the port uses PLCP (Physical Layer Convergence Protocol) framing for cell delineation. `hcs` means the port uses HCS (Header Check Sequence) based framing for cell delineation. The default is `hcs`.

2.12.8.5 Configuring the DS3 Port Scrambling

This command allows you to change the scrambling mode on a port on the DS-3 network module. Enter the following parameters:

```
localhost::configuration port ds3> scrambling <port> (on | off)
```

port Indicates the port number on which the scrambling mode is to be changed.

on|off Using `on` means that cell payload scrambling is enabled on this port. Using `off` means that cell payload scrambling is disabled on this port. Only the payload of the ATM cells is scrambled.

NOTE The scrambling mode should be set to the same status on both the transmitting side and the receiving side.

2.12.8.6 Showing the DS3 Port Configuration

This command allows you to display current information about all of the ports on the DS3 network module. Enter the following parameters:

```
localhost::configuration port ds3> show
Port Carrier Status Mode Framing  Loopback Timing   Scrambling EmptyCells Length
1A1  yes     0x1    plcp cbit     none     internal off        unassigned Gt225
1A2  yes     0x1    plcp cbit     none     internal off        unassigned Gt225
```

Port Indicates the port number of the network module that is currently installed in the switch.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee the signal is the proper frequency.

Status Indicates the DS3 line status of the port.

Mode `Plcp` means the port uses PLCP (Physical Layer Convergence Protocol) framing for cell delineation. `Hcs` means the port uses HCS (Header Check Sequence) based framing for cell delineation.

Framing Indicates the type of framing used for the port. Can be `cchannel` or `cbit`. The default is `cbit`.

Loopback Indicates the loopback mode of the port. Can either `cell`, `payload`, `diagnostic`, or `none`.

Timing `Network` means that the timing for this port is derived externally from the incoming clock on this port. `Internal` means that the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

Scrambling `On` means payload scrambling is enabled on the port. `Off` means payload scrambling is disabled on the port.

EmptyCells Shows the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change from the default.

2.12.8.7 Configuring the DS3 Port Timing

This command allows you to change the timing source on a port on a DS3 network module. Enter the following parameters:

```
localhost::configuration port ds3> timing <port> (network | internal)
```

port Indicates the port number from which the timing is being derived.

network|internal Designates the source of the transmit clock. `Network` means the timing for this port is derived externally from the incoming clock on this port. `Internal` means the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.8.8 Configuring DS3 Port Line Length

This command lets you change the line length of a DS3 port to correspond to the physical cable attached to that port. Enter the following parameters:

```
localhost::configuration port ds3> length <port> (Lt225 | Gt225)
```

port Indicates the port number on which the line length is to be changed.

Lt225 Use if the physical cable is shorter than 225 ft.

Gt225 Use if the physical cable is greater than 225 ft. This is the default.

2.12.9 E1 Port Configuration Commands

These commands allow you to modify the configuration of the ports on an E1 network module. These commands are available only when an E1 network module is installed in the switch fabric. To display the list of available subcommands, type **`e1 ?`** at the **`port`** level.

```
localhost::configuration port> e1 ?
  emptycells       length           loopback         mode
  show             timing
```

2.12.9.1 Configuring E1 Port Empty Cells

Empty cells are cells that are sent as “filler” or place holders when there is no real data to send. By sending these cells, network modules that are synchronous in nature can keep an even flow of traffic moving so that distributed timing can work properly. This command lets you change the type of cells sent as empty cells on an E1 network module port. Enter the following parameters:

```
localhost::configuration port e1> emptycells <port> (idle | unassigned)
```

port Indicates the port number on which the type of empty cells is to be changed.

idle|unassigned Indicates the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

2.12.9.2 Configuring E1 Port Line Length

This command lets you change the line length of an E1 port to correspond to the physical cable attached to that port. This allows the E1 network module to receive the signal on the cable. Enter the following parameters:

```
localhost::configuration port e1> length <port> (Lt110 | 110-220 | 220-330 | 330-
440 | 440-550 | 550-660 |G703-75 | G703-120)
```

port	Indicates the port number on which the line length is to be changed.
Lt110	Use if the physical cable is shorter than 110 ft.
110-220	Use if the physical cable is between 110 and 220 ft.
220-330	Use if the physical cable is between 220 and 330 ft.
330-440	Use if the physical cable is between 330 and 440 ft.
440-550	Use if the physical cable is between 440 and 550 ft.
550-660	Use if the physical cable is between 550 and 660 ft.
G703-75	Use if the physical cable is a G703 standard 75 ohm coaxial line.
G703-120	Use if the physical cable is a G703 standard 120 ohm symmetrical line.

2.12.9.3 Configuring E1 Port Loopback

This command lets you designate the type of loopback on a port on an E-1 network module. Enter the following parameters:

```
localhost::configuration port e1> loopback <port> (line | payload | diag | none)
```

port Indicates the port number on which the loopback mode is to be changed.

line `Line` loopback connects the transmitter to the receiver. The data stream received from the line is retransmitted out to the line. Cells that are switched to this port are not sent over the line.

payload `Payload` loopback means the E1 stream received from the network has the E1 overhead bits re-inserted and is retransmitted to the network.

diag `Diagnostic` loopback connects the receiver to the transmitter. The E1 stream transmitted by the SCP to a port is looped back to the SCP. The stream is still transmitted over the cable, but the incoming stream is ignored.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.9.4 Configuring E1 Port Mode

This command allows you to change the method used for cell delineation on an E1 network module port. Enter the following parameters:

```
localhost::configuration port e1> mode <port> (plcp | hcs)
```

port Indicates the port number on which the type of framing is to be changed.

plcp|hcs Using `plcp` means that the port uses PLCP (Physical Layer Convergence Protocol) framing (G.751) for cell delineation. Using `hcs` means that the port uses HCS (Header Check Sequence) based framing (G.832) for cell delineation. The default is `hcs`.

2.12.9.5 Showing the E1 Port Configuration

This command allows you to display current information about all of the ports on an E1 network module. Enter the following parameters:

```
localhost::configuration port e1> show
Port Carrier Status  Mode  LineType Loopback Timing    LineLength EmptyCells
1B1  no      0x262   hcs   CRC      none     internal  Lt110      idle
1B2  no      0x262   hcs   CRC      none     internal  Lt110      idle
```

The fields in this display have the following meaning:

Port Indicates the port number of the network module that is currently installed in the switch fabric. The 1 means it is the first switch fabric. The letter B means the E1 network module is installed in the bottom right-hand slot in the switch fabric. The 1, 2 indicate the specific port number on the network module.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee that the signal is the proper frequency.

Status Shows the E1 line status of the port.

Mode `Plcp` means that the port uses PLCP framing for cell delineation. `Hcs` means that the port uses HCS cell delineation.

LineType Indicates the variety of E1 line implementing this circuit. The type of circuit affects the number of bits per second that the circuit can reasonably carry, as well as the interpretation of the usage and error statistics. You cannot change this parameter.

Loopback Indicates the loopback mode on the port. Can be either `none`, `line`, `payload`, or `diagnostic`.

Timing `Network` means that the timing for this port is derived externally from the incoming clock on this port. `Internal` means that the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

LineLength Indicates the length of the physical cable that is attached to this port.

EmptyCells Shows the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

2.12.9.6 Configuring E1 Port Timing

This command allows you to change the timing source on a port on an E-1 network module. Enter the following parameters:

```
localhost::configuration port e1> timing <port> (network | internal)
```

port Indicates the port number from which the timing is being derived.

network|internal Designates the source of the transmit clock. `Network` means the timing for this port is derived externally from the incoming clock on this port. `Internal` means the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.10 E3 Port Configuration Commands

These commands allow you to modify various aspects of the configuration of the ports on an E3 network module. These commands are available only when an E3 network module is installed in the switch fabric. You can display the list of available subcommands by typing **e3 ?** at the **port** level.

```
localhost::configuration port> e3 ?
  emptycells        loopback          mode              scrambling
  show              timing
```

2.12.10.1 Configuring E3 Port Empty Cells

Empty cells are cells that are sent as “filler” or place holders when there is no real data to send. By sending these cells, network modules that are synchronous in nature can keep an even flow of traffic moving so that distributed timing can work properly. This command lets you change the type of cells sent as empty cells on an E3 network module port. Enter the following parameters:

```
localhost::configuration port e3> emptycells <port> (idle | unassigned)
```

port Indicates the port number on which the type of empty cells is to be changed.

idle|unassigned Indicates the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

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2.12.10.2 Configuring the E3 Port Loopback

This subcommand allows you to designate the type of loopback on a port on an E-3 network module. Enter the following parameters:

```
localhost::conf port e3> loopback <port> (cell | payload | diag | line | none)
```

port Indicates the port number on which the loopback mode is to be changed.

cell `Cell` loopback means the E3 stream received from the network is unframed into ATM cells. The cells are then reframed and transmitted back to the network.

payload Selecting `payload` loopback means the E3 stream received from the network has the E3 overhead bits re-inserted and is retransmitted to the network.

diag Choosing `diagnostic` loopback connects the receiver to the transmitter. The E3 stream transmitted by the switch to a port is looped back to the switch. The E3 stream is still transmitted to the network, but the incoming E3 stream is ignored.

line Choosing `line` loopback connects the transmitter to the receiver. The data stream received from the line is retransmitted out to the line. Cells that are switched to this port are not sent over the line.

none Selecting `none` designates that no loopback will take place on the port. This is the default setting.

2.12.10.3 Configuring E3 Port Mode

This command allows you to change the method used for cell delineation on an E3 network module port. Enter the following parameters:

```
localhost::configuration port e3> mode <port> (plcp | hcs)
```

port Indicates the port number on which the type of framing is to be changed.

plcp|hcs `plcp` means the port uses PLCP (Physical Layer Convergence Protocol) framing (G.751) for cell delineation. `hcs` means the port uses HCS (Header Check Sequence) framing (G.832) for cell delineation. The default is `hcs`.

2.12.10.4 Configuring E3 Port Scrambling

This subcommand allows you to change the scrambling mode on a port on an E-3 network module. Enter the following parameters:

```
localhost::configuration port e3> scrambling <port> (on | off)
```

port Indicates the port number on which the scrambling mode is to be changed.

on|off Using `on` indicates that cell payload scrambling is enabled on this port. Using `off` means that cell payload scrambling is disabled on this port. The default setting is `off`.

NOTE

The scrambling mode should be set to the same status on both the transmitting side and the receiving side.

2.12.10.5 Showing the E3 Port Configuration

This command allows you to display current information about an E-3 network module. Enter the following parameters:

```
localhost::configuration port e3> show
Port Carrier Status Mode Loopback Timing    Scrambling EmptyCells
1D1  no      0x58   hcs  none     internal  off        unassigned
1D2  no      0x58   hcs  none     internal  off        unassigned
1D3  no      0x58   hcs  none     internal  off        unassigned
1D4  no      0x58   hcs  none     internal  off        unassigned
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module that is currently installed in the switch. The 1 means that it is the first switch fabric. The letter D means that the E3 network module is installed in the top right-hand slot in the switch. The 1, 2, 3, 4 specify the port number on the network module.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee that the signal is the proper frequency.

Status Indicates the E3 line status of the port.

Mode Indicates the mode of operation for this port. `Plcp` means that the port uses PLCP framing for cell delineation. `Hcs` means that the port uses HCS cell delineation.

Loopback Indicates the loopback mode on this port. Can be one of the following: `cell`, `payload`, `diagnostic`, `line`, or `none`.

Timing `Network` means the timing for this port is derived externally from the incoming clock on this port. `Internal` means the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

Scrambling `On` means that payload scrambling is enabled on this port. `Off` means that payload scrambling is disabled on this port.

EmptyCells Shows the type of cells this port sends for filler when this port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

2.12.10.6 Configuring the E3 Port Timing

This command allows you to change the timing source on a port on an E-3 network module. Enter the following parameters:

```
localhost::configuration port e3> timing <port> (network | internal)
```

port Indicates the port number from which the timing is being derived.

network|internal Designates the source of the transmit clock. `Network` means the timing for this port is derived externally from the incoming clock on this port. `Internal` means the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.11 GRCA Policing Command

Generic Cell Rate Algorithm (GCRA) policing ensures that traffic is regulated at the ATM layer on the input side of the network. This command allows you to configure GCRA policing on a per-port / per-class basis for all CBR and / or VBR PVCs and / or SVCs. Enter the following parameters:

```
localhost::conf port> gcrapolicing <port> (cbr|vbr) (allOn|allOff|svcOn|svcOff)
```

port Indicates the port number on which GCRA policing is being configured.

cbr|vbr Indicates the class of service for which you are configuring GCRA policing.

allOn `allOn` means all connections (SVCs and PVCs) of the specified class of service arriving on this port are subjected to GCRA policing.

allOff `allOff` means no connections (SVCs and PVCs) of the specified class of service arriving on this port are subjected to GCRA policing.

svcOn `svcOn` means all SVCs of the specified class of service arriving on this port are subjected to GCRA policing. PVCs are policed based on their UPC contract. This is the default.

svcOff `svcOff` means no SVCs of the specified class of service arriving on this port are subjected to GCRA policing. PVCs are policed based on their UPC contract.

For example, if you want all CBR SVCs and PVCs to be policed on port 2B4, enter the following parameters:

```
localhost::conf port> gcrapolicing 2b4 cbr allOn
```

2.12.12 J2 Port Configuration Commands

These commands let you modify various aspects of the configuration of a J-2 network module. The following J2 commands are available only when a J-2 network module is installed in the switch fabric. You can display the list of available subcommands by typing **j2 ?** at the **port** level.

```
localhost::configuration port> j2 ?
line            loopback        show            timing
```

2.12.12.1 Configuring J2 Port Line Length

This command enables you to change the line length of a J2 network module port. Enter the following parameters:

```
localhost::configuration port j2> line <port> (short | long)
```

port Indicates the port number on which the line length is being changed.

short|long Indicates the length of the physical cable attached to this port. If the line attached to the receive port has greater than 4 db of attenuation, then the line must be configured as `long`. If otherwise, then it must be configured as `short`. In general, if the cable is less than 20 feet, then configure the line as short.

2.12.12.2 Configuring J2 Port Loopback

This command allows you to configure the loopback mode on a J2 port. Enter the following parameters:

```
localhost::configuration port j2> loopback <port> (line | diag | none)
```

port Indicates the port number on which the loopback mode is to be changed.

line Selecting `line` loopback connects the transmitter to the receiver. The data stream received from the line is retransmitted out to the line. Cells that are switched to this port are not sent over the line.

diag Choosing `diagnostic` loopback connects the receiver to the transmitter. The J2 stream transmitted by the switch to a port is looped back to the switch. The stream is still transmitted over the cable, but the incoming stream is ignored.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.12.3 Showing J2 Port Configuration

This command allows you to display information about the configuration of the ports on a J2 network module. Enter the following parameters:

```
localhost::configuration port j2> show
Port LineLength   Loopback     Timing
1B1  short        none         network
1B2  short        none         network
1B3  short        none         network
1B4  short        none         network
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module.

LineLength Indicates the length of the physical cable that is attached to this port. Can be `short` or `long`.

Loopback Indicates the loopback mode of this port. Can be one of the following: `none`, `line`, or `diagnostic`.

Timing `Network` means that the timing for this port is derived externally from the incoming clock on this port. `Internal` means that the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.12.4 Configuring J2 Port Timing

This command allows you to change the timing source on a port on a J2 network module. Enter the following parameters:

```
localhost::configuration port j2> timing <port> (network | internal)
```

port Indicates the port number from which the timing is being derived.

network|internal Designates the source of the transmit clock. `Network` means that the timing for this port is derived externally from the incoming clock on this port. `Internal` means that the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.13 LED Port Configuration Commands

These commands let you configure the a model for the front panel LEDs on a Series C or a Series LC SONET network module. You can display the list of available subcommands by typing **`led ?`** at the **`port`** level.

```
localhost::configuration port> led ?
  model            show
```

2.12.13.1 LED Model Configuration

This command lets you select an LED model to use for setting the LED colors on a per-port basis on a SONET Series C or Series LC network module. Typically, the LAN LEDs blink when transmitting or receiving data on a port. Typically, the WAN LEDs illuminate solid green, unless an error condition exists on a port. Enter the following parameters:

```
localhost::configuration port led> model <port> (lan1 | wan1 | lan2 | wan2)
```

port Indicates the port on which you want to set an LED model.

lan1|wan1 For these models, RED means a fault in the receive direction, YELLOW means a fault in the transmit direction (Line Remote Defect Indication), AUTO/GREEN means no fault. Only the receive LED color is changed. These models show only three states and do not reflect the status of the Path Alarm Indications and Path Remote Defect Indications. `lan1` is the default value for all network modules.

lan2|wan2 For these models, RED means a line fault, YELLOW means a path fault, and AUTO/GREEN means no fault. The transmit LED shows faults in the transmit direction and the receive LED shows faults in the receive direction. These models provide a unique LED color pattern for all six fault states that can be detected by SONET signalling.

NOTE

For the lan2 and wan2 models, faults in the receive direction may make it impossible to detect certain faults in the transmit direction.

2.12.13.2 Displaying the LED Model Configuration

This command lets you display the LED models used for each port of a SONET Series C or a Series LC network module. Enter the following parameters:

```
localhost::configuration port led> show
Port  Type              rxLED  txLED  Model
4B1   J2                red    auto   N/A
4B2   J2                red    auto   N/A
4B3   J2                red    auto   N/A
4B4   J2                red    auto   N/A
4C1   OC3               auto   auto   lan1
4C2   OC3               red    auto   lan1
4C3   OC3               red    auto   lan1
4C4   OC3               red    auto   lan1
4E1   ASX-BP            N/A    N/A    N/A
4E2   ASX-BP            N/A    N/A    N/A
4E3   ASX-BP            N/A    N/A    N/A
4CTL  ASX-CTL           N/A    N/A    N/A
```

The fields in this display are defined as follows:

Port Shows the port number of the network modules that are currently installed in the switch fabric.

Type Shows what type of network module it is.

rxLED Shows the color of the receive LED for this port. Can be `off`, `green`, `red`, `yellow`, or `auto`. `auto` means that the LED is under hardware control. Typically, hardware control means that the LED is normally dark with green blinks to indicate data traffic.

txLED Shows the color of the transmit LED for this port. Can be `off`, `green`, `red`, `yellow`, or `auto`. `auto` means that the LED is under hardware control. Typically, hardware control means that the LED is normally dark with green blinks to indicate data traffic.

Model Shows which of the LED models (`lan1`, `wan1`, `lan2`, or `wan2`) has been assigned to this port.

You can also display the LED models for a single port. Enter the following:

```
localhost::configuration port led> show 4c3
Port  Type           rxLED  txLED  Model
4C3   OC3            red    auto   lan1
```

2.12.14 Port Policing Configuration Command

This command lets you decide whether or not incoming traffic is GCRA policed on a given port. Enter the following parameters:

```
localhost::configuration port> policing <port> (enabled | disabled)
```

port Indicates the specific port number on which GCRA traffic policing is to be enabled or disabled.

enabled|disabled Entering `enabled` means that GCRA traffic policing will take place on all incoming traffic on this port (depending on what has been configured using **`conf port gcrapolicing`** and using the **`noGCRA`** option in the **`conf upc new`** command). Entering `disabled` means that traffic policing will not take place on incoming traffic on this port (depending on what has been configured using **`conf port gcrapolicing`** and using the **`noGCRA`** option in the **`conf upc new`** command). The default is `enabled`.

NOTE

To enable or disable GCRA policing on incoming traffic on a per-port or on a per-class basis, it is recommended that you use the **`conf port gcrapolicing`** command instead of this command. To enable or disable GCRA policing on incoming traffic on a per-PVC basis for CBR and VBR connections, use the **`noGCRA`** option in the **`conf upc new`** command.

If you change the policing settings using this command, the switch issues a warning as shown in the following example:

```
localhost::configuration port> policing 1b1 disable
This change will cause the GCRA policing state of all
connections on port 1b1, to be updated to allOff.
Are you sure you want to make this change? [n]?
```

2.12.15 Partial Packet Policing Command

When partial packet policing is enabled on a connection, the GCRA policer looks for AAL5 packet boundaries by checking for cells with an EOM indicator in their cell header. If the policer decides that a cell in the middle of the AAL5 packet is non-conforming, then all remaining cells in that AAL5 packet (up to, but not including the EOM cell) are considered non-conforming. This command lets you configure partial packet policing on a per-port/per-class basis for all CBR and/or VBR PVCs and/or SVCs. Enter the following parameters:

NOTE GCRA policing must be used on any connection on which partial packet policing is being implemented.

NOTE This command applies only to AAL5 connections.

NOTE The HDCOMP ASIC must be version 1 or greater to support AAL5 partial packet policing. To display the ASIC version, use the **conf board show advanced** command.

```
localhost::conf port> pppolicing <port> (cbr|vbr) (allOn|allOff|svcOn|svcOff)
```

port Indicates the port number on which partial packet policing is being configured.

cbr|vbr Indicates the class of service for which you are configuring partial packet policing.

allOn `allOn` means all connections (SVCs and PVCs) of the specified class of service on this port are subjected to partial packet policing.

allOff `allOff` means no connections (SVCs and PVCs) of the specified class of service on this port are subjected to partial packet policing.

svcOn `svcOn` means all SVCs of the specified class of service on this port are subjected to partial packet policing. PVCs are policed based on their UPC contract. This is the default.

svcOff `svcOff` means no SVCs of the specified class of service on this port are subjected to partial packet policing. PVCs are policed based on their UPC contract.

For example, to enable partial packet policing on all VBR SVCs on port 2B4, enter the following parameters:

```
localhost::conf port> pppolicing 2b4 vbr svcOn
```

2.12.16 Showing the Port Configuration

This command lets you display port information about all of the ports on an individual switch fabric or about just a specified port. To show general information about all of the ports, enter the following parameters:

```
localhost::configuration port> show
Port Carrier   Mbps   CDVT  Policing VBROB BuffOB  AIS/RDI   Model
2A1  no       155.0    250  enabled    100    100  disabled  OC3
2A2  no       155.0    250  enabled    100    100  disabled  OC3
2A3  no       155.0    250  enabled    100    100  disabled  OC3
2A4  no       155.0    250  enabled    100    100  disabled  OC3
2B1  no       100.0   1000  enabled    100    100  disabled  TAXI-100
2B2  no       100.0   1000  enabled    100    100  disabled  TAXI-100
2B3  no       100.0   1000  enabled    100    100  disabled  TAXI-100
2B4  no       100.0   1000  enabled    100    100  disabled  TAXI-100
2B5  no       100.0   1000  enabled    100    100  disabled  TAXI-100
2B6  no       100.0   1000  enabled    100    100  disabled  TAXI-100
2C1  no       155.0    250  enabled    100    100  disabled  OC3
2C2  no       155.0    250  enabled    100    100  disabled  OC3
2C3  no       155.0    250  enabled    100    100  disabled  OC3
2C4  no       155.0    250  enabled    100    100  disabled  OC3
2E1  no      2560.0    100  disabled   100    100  disabled  ASX-BP
2E3  no      2560.0    100  disabled   100    100  disabled  ASX-BP
2E4  no      2560.0    100  disabled   100    100  disabled  ASX-BP
2CTL yes       80.0   5000  enabled    100    100  disabled  ASX-CTL
```

The fields in this display are defined as follows:

Port Indicates the port number of the network modules that are currently installed in the switch fabric. CTL indicates the control port, which is a logical (not physical) location where cells that are directed to the SCP itself are sent.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, yes is displayed. If a carrier has not been detected, no is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee the signal is the proper frequency.

Mbps Displays the capacity of this port's link in Mbps.

CDVT Shows the default value for the cell delay variation tolerance setting in microseconds.

Policing Displays whether traffic policing is enabled or disabled for this port.

VBROB Shows the bandwidth overbooking level configured on this port, specified as a percentage. Valid values are integers from `1` to `500`. The default is `100`, which means that no overbooking has been defined. Values less than 100 cause underbooking. Values greater than 100 denote overbooking.

BuffOB Indicates the buffer overbooking level configured on this port, specified as a percentage. Enter an integer value greater than or equal to `1`. The default is `100`, which means that no overbooking has been defined. Values less than 100 cause underbooking. Values greater than 100 denote overbooking.

AIS/RDI `Enabled` means that OAM cells are generated when AISs and RDIs are detected. `Disabled` means that OAM cells are not generated when AISs and RDIs are detected.

Model Lists the type of network module. For the control port, lists ASX.

To list port information for just a specified port, (for example, port 2C1), enter the following parameters:

```
localhost::configuration port> show 2C1
Port Carrier   Mbps   CDVT  Policing VBROB BuffOB  AIS/RDI   Model
2C1  no       155.0    250  enabled    100    100  disabled  OC3
```

The fields in this display are defined in the same manner as those listed previously in the example for all of the ports on an individual switch fabric.

This command also lets you display port traffic management information about all of the ports on an individual switch fabric or about just a specified port. To show traffic management information about all of the ports, enter the following parameters:

```
localhost::configuration port> show [<port>] [tm]
localhost::configuration port> show tm
      GCRA Policing  AAL5 PP Pol.   AAL5 Packet Discard   Tag All
Port  CBR    VBR     CBR    VBR     CBR    VBR    UBR     UBR
2A1   svcOn  svcOn   allOff allOff  svcOn  svcOn  svcOn   svcOff
2A2   svcOn  svcOn   allOff allOff  svcOn  svcOn  svcOn   svcOff
2A3   svcOn  svcOn   allOff allOff  svcOn  svcOn  svcOn   svcOff
2A4   svcOn  svcOn   allOff allOff  svcOn  svcOn  svcOn   svcOff
2A5   svcOn  svcOn   allOff allOff  svcOn  svcOn  svcOn   svcOff
2A6   svcOn  svcOn   allOff allOff  svcOn  svcOn  svcOn   svcOff
2E1   N/A    N/A     N/A    N/A     N/A    N/A    N/A     N/A
2E3   N/A    N/A     N/A    N/A     N/A    N/A    N/A     N/A
2E4   N/A    N/A     N/A    N/A     N/A    N/A    N/A     N/A
2CTL  svcOn  svcOn   allOff allOff  N/A    N/A    N/A     svcOff
```

Port Indicates the port number of the network modules that are currently installed in the switch fabric. `CTL` indicates the control port, which is a logical (not physical) location where cells that are directed to the SCP itself are sent.

GCRA Policing CBR `allOn` means all CBR connections arriving on this port are subjected to GCRA policing. `allOff` means no CBR connections arriving on this port are subjected to GCRA policing. `svcOn` means all CBR SVCs arriving on this port are subjected to GCRA policing. `svcOff` means no CBR SVCs arriving on this port are subjected to GCRA policing. CBR PVCs are policed based on the state of their UPC contract.

GCRA Policing VBR `allOn` means all VBR connections arriving on this port are subjected to GCRA policing. `allOff` means no VBR connections arriving on this port are subjected to GCRA policing. `svcOn` means all VBR SVCs arriving on this port are subjected to GCRA policing. `svcOff` means no VBR SVCs arriving on this port are subjected to GCRA policing. VBR PVCs are policed based on the state of their UPC contract.

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AAL5 PP Pol. CBR	`allOn` means all AAL5 CBR connections are subjected to partial packet policing. `allOff` means no AAL5 CBR connections are subjected to partial packet policing. `svcOn` means all AAL5 CBR SVCs are subjected to partial packet policing. For AAL5 CBR PVCs, partial packet policing is performed based on the UPC contract of the connection. `svcOff` means no AAL5 CBR SVCs are subjected to partial packet policing. For AAL5 CBR PVCs, partial packet policing is enabled based on the UPC contract of the connection.
AAL5 PP Pol. VBR	`allOn` means all AAL5 VBR connections are subjected to partial packet policing. `allOff` means no AAL5 VBR connections are subjected to partial packet policing. `svcOn` means all AAL5 VBR SVCs are subjected to partial packet policing. For AAL5 VBR PVCs, partial packet policing is performed based on the UPC contract of the connection. `svcOff` means no AAL5 VBR SVCs are subjected to partial packet policing. For AAL5 VBR PVCs, partial packet policing is enabled based on the UPC contract of the connection.
AAL5 Packet Discard CBR	`allOn` means all AAL5 CBR connections are subjected to packet discard. `allOff` means no AAL5 CBR connections are subjected to packet discard. `svcOn` means all AAL5 CBR SVCs are subjected to packet discard. For CBR PVCs, AAL5 packet discard is enabled based on the UPC contract of the connection. `svcOff` means no AAL5 CBR SVCs are subjected to packet discard. For CBR PVCs, AAL5 packet discard is enabled based on the UPC contract of the connection.
AAL5 Packet Discard VBR	`allOn` means all AAL5 VBR connections are subjected to packet discard. `allOff` means no AAL5 VBR connections are subjected to packet discard. `svcOn` means all AAL5 VBR SVCs are subjected to packet discard. For VBR PVCs, AAL5 packet discard is enabled based on the UPC contract of the connection. `svcOff` means no AAL5 VBR SVCs are subjected to packet discard. For VBR PVCs, AAL5 packet discard is enabled based on the UPC contract of the connection.

AAL5 Packet Discard UBR `allOn` means all AAL5 UBR connections are subjected to packet discard. `allOff` means no AAL5 UBR connections are subjected to packet discard. `svcOn` means all AAL5 UBR SVCs are subjected to packet discard. For UBR PVCs, AAL5 packet discard is enabled based on the UPC contract of the connection. `svcOff` means no AAL5 UBR SVCs are subjected to packet discard. For UBR PVCs, AAL5 packet discard is enabled based on the UPC contract of the connection.

Tag All UBR `allOn` means all UBR connections are tagged as non-compliant (set to CLP=1). `allOff` means no UBR connections are tagged. `svcOn` means all UBR SVCs are tagged. UBR PVCs are tagged based on their UPC contract. `svcOff` means no UBR SVCs are tagged. UBR PVCs are tagged based on their UPC contract.

2.12.17 SONET Port Configuration Commands

These commands allow you to modify various aspects of the configuration of all of the ports on a SONET network module. The following SONET commands are available only when a SONET network module is installed in the switch fabric. You can display the list of available subcommands by typing **sonet ?** at the **port** level.

NOTE All 155 Mbps and 622 Mbps network modules use this same set of commands, regardless of whether they are singlemode, multimode, OC-3, OC-12, or UTP network modules.

```
localhost::configuration port> sonet ?
  emptycells        loopback          mode              scrambling
  show              timing
```

2.12.17.1 Configuring SONET Port Empty Cells

Empty cells are cells that are sent as "filler" or place holders when there is no real data to send. By sending these cells, network modules that are synchronous in nature can keep an even flow of traffic moving so that distributed timing can work properly. This command lets you change the type of cells sent as empty cells on a SONET network module port. Enter the following parameters:

```
localhost::configuration port sonet> emptycells <port> (idle | unassigned)
```

port Indicates the port number on which the type of empty cells is to be changed.

idle|unassigned Indicates the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

2.12.17.2 Configuring SONET Port Loopback

This command enables you to configure the type of loopback mode on a SONET port. Enter the following parameters:

```
localhost::configuration port sonet> loopback <port> (line | diag | path | none)
```

port Indicates the port number on which the loopback mode is to be changed.

line Selecting `line` loopback connects the transmitter to the receiver. The data stream received from the fiber is retransmitted out to the fiber. In line loopback, the port acts as if it were an optical repeater. Cells that are switched to this port are not sent over the fiber. This option is valid for all SONET network modules.

diag Choosing `diagnostic` loopback connects the receiver to the transmitter. The SONET stream transmitted by the fiber to a port is looped back to the fiber. The stream is still transmitted over the fiber, but the incoming stream is ignored. This option is valid for all SONET network modules, except for Series C OC-12 network modules.

path Choosing `path` means that the loopback point is between the TPOP and RPOP blocks and the transmit parallel stream is connected to the receive stream. This option is valid ONLY for Series C OC-12 network modules.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.17.3 Configuring SONET Port Mode

This command lets you designate the mode to be used on a SONET network module port. Enter the following parameters:

```
localhost::configuration port sonet> mode <port> (sonet|sdh)
```

port Indicates the port number on which the mode is to be changed.

sonet|sdh Indicates the mode of operation for this port. Can be `sonet` or `sdh`.

2.12.17.4 Configuring the SONET Port Scrambling

This command allows you to change the scrambling mode on a port on a SONET network module. Enter the following parameters:

```
localhost::configuration port sonet> scrambling <port> (on | off)
```

port Indicates the port number on which the scrambling mode is to be changed.

on|off Using `on` means that cell payload scrambling is enabled on this port. Using `off` means that cell payload scrambling is disabled on this port. Only the payload of the ATM cells is scrambled.

NOTE

The scrambling mode should be set to the same status on both the transmitting side and the receiving side.

2.12.17.5 Showing the SONET Port Configuration

This command lets you display information about the configuration of all of the ports on a SONET network module. Enter the following parameters:

```
localhost::configuration port sonet> show
Port Width  Line Mode  Loopback Timing   Scrambling EmptyCells
1C1  sts3c  MM   sonet none     internal on         unassigned
1C2  sts3c  MM   sonet none     internal on         unassigned
1C3  sts3c  MM   sonet none     internal on         unassigned
1C4  sts3c  MM   sonet none     internal on         unassigned
1D1  sts12c MM   sonet none     N/A      on         unassigned
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module that is currently installed in the switch fabric.

Width Indicates the type of the SONET path. `sts3c` is 155.52 Mbps and `sts12c` is 622.08 Mbps. The SDH transmission rate STM-1 is equivalent to SONET rate STS-3 and STM-4 is equivalent to STS-12. You cannot change this parameter.

Line Displays the line type for this interface. The line type for optical SONET signals may be `SMSR` (155 Mbps single-mode short reach), `SMIR` (622 Mbps single-mode intermediate reach), `other` (155 Mbps single-mode long reach), or `MM` (155 Mbps or 622 Mbps multi-mode) fiber. For electrical interfaces, the line type is `UTP` (155 Mbps Unshielded Twisted Pair).

Mode Indicates the mode of operation for this port. Can be `sonet` or `sdh`.

Loopback Indicates the loopback mode on this port. Can be one of the following: `line`, `diagnostic`, `path` or `none`.

Timing `Network` means that the timing for this port is derived externally from the incoming clock on this port. `Internal` means that the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series LC network module or a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

NOTE The timing option displays N/A on all OC-12 network modules because they always use internal timing.

Scrambling `On` indicates that payload scrambling is enabled on this port. `Off` means that payload scrambling is disabled on this port.

EmptyCells Indicates the type of cells this port sends for filler when the port is not sending data. `Idle` cells set the CLP bit = 1 and `unassigned` cells set the CLP bit = 0. Please refer to page 57 of the ATM Forum 3.0 Specification for more information. Idle = invalid cell pattern and unassigned = unassigned. The default is `unassigned`. In general, it is not necessary to change this variable from the default setting.

You can also display information about an individual port. Enter the following parameters:

```
localhost::configuration port sonet> show 4c1
Port Width  Line Mode  Loopback Timing   Scrambling EmptyCells
4C1  sts3c  MM   sonet none     internal on         unassigned
```

The fields in this display are defined in the same manner as those listed previously in the example for all of the ports.

This command also lets you display information about the section, line, path, and ATM status of all of the ports on the SONET network modules. Enter the following parameters:

```
localhost::configuration port sonet> show status
Port Carrier Section Line Path Atm
4C1  yes     0x1     0x1  0x1  0x1
4C2  no      0x6     0x2  0xc  0x2
4C3  no      0x6     0x2  0xc  0x2
4C4  no      0x6     0x2  0xc  0x2
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module that is currently installed in the switch fabric.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee the signal is the proper frequency.

Section Shows the Section Status of this interface. The variable is a bit map represented as a sum, so it can represent multiple defects simultaneously. The various bit positions are as follows:

1 - sonetSectionNoDefect

2 - sonetSectionLOS - Loss Of Signal was detected. LOS is declared when 20 +/- 3us of all zero patterns is detected.

4 - sonetSectionLOF - Loss Of Frame was detected. LOF is declared when an out-of-frame condition persists for 3ms.

Line Shows the Line Status of this interface. It is a bit map represented as a sum, so it can represent multiple defects simultaneously. The various bit positions are:

1 - sonetLineNoDefect

2 - sonetLineAIS - Line Alarm Indication Signal was detected. Line AIS is asserted when a 111 binary pattern is detected in bits 6, 7, 8 of the K2 byte for five consecutive frames.

4 - sonetLineRDI Line Remote Defect Indication was detected. RDI is asserted when a 110 binary pattern is detected in bits 6, 7, 8 of the K2 byte for five consecutive frames.

Path Shows the Path Status of this interface. The variable is a bit map represented as a sum, so it can represent multiple defects simultaneously. The various bit positions are as follows:

1 - sonetPathNoDefect

2 - sonetPathLOP - Path Loss Of Pointer was detected. Path LOP is declared when a “normal pointer value” is not found for eight consecutive frames.

4 - sonetPathAIS - Path Alarm Indication Signal was detected. Path AIS is asserted when an all ones pattern is detected in the pointer bytes (H1 and H2) for three consecutive frames.

8 - sonetPathRDI - Path RDI alarm has been detected. RDI alarm is declared when bit 5 of the path status byte is high for ten consecutive frames.

16 - sonetPathUnequiped - Path is not provisioned (idle). PathSignalLabel = hex 00.

32 - sonetPathSignalLabelMismatch - A received Path Signal Label mismatch. A received Signal Label is considered mismatched if it does not equal either the standard value for an ATM payload (hex13) or the value for an “equipped non-specific”payload (1 hex).

Atm Shows the ATM Status of the interface. The variable is a bit map represented as a sum, so it can represent multiple defects simultaneously. The various bit positions areas follows:

1 - sonetAtmNoDefect

2 - sonetAtmLCD - Loss of Cell Delineation was detected. LCD is declared when a “normal pointer value” is not found for eight consecutive frames.

You can also display information about the status of an individual port on a SONET network module. Enter the following parameters:

```
localhost::configuration port sonet> show [<port>] [status]
localhost::configuration port sonet> show 4c1 status
Port Carrier Section Line Path Atm
4C1  yes     0x1     0x1  0x1  0x1
```

The fields in this display are defined in the same manner as those listed previously in the example for all of the ports.

2.12.17.6 Configuring SONET Port Timing

This command allows you to change the timing source on a port on a SONET network module.

NOTE

This option is not available on an OC-12 network module because it always uses internal timing. To configure distributed timing on an OC-12 network module, use the **`configuration module timing`** commands.

Enter the following parameters:

```
localhost::configuration port sonet> timing <port> (network | internal)
```

port Indicates the port number from which the timing is being derived.

network|internal Designates the source of the transmit clock. `Network` means that the timing for this port is derived externally from the incoming clock on this port. `Internal` means that the timing is derived from either the on-board crystal oscillator, or is derived from a specific port number that you have defined on a Series LC network module or a Series C network module with distributed timing capabilities. If set to a specific port number, the transmit clock is derived from that port, if available. If the port source becomes unavailable, the on-board crystal takes over as the transmit clock source.

2.12.18 TAXI Port Configuration Commands

These commands let you modify the configuration of the ports on a TAXI network module. The following commands are available only when a TAXI network module is installed in the switch fabric. You can display the list of available subcommands by typing **`taxi ?`** at the **`port`** level.

```
localhost::configuration port> taxi ?
loopback         show
```

2.12.18.1 Configuring TAXI Port Loopback

This command allows you to designate the type of loopback on a port on a TAXI network module. Enter the following parameters:

```
localhost::configuration port taxi> loopback <port> (diag | none)
```

port Indicates the port number on which the loopback mode is to be changed.

diag Choosing `diagnostic` loopback connects the receiver to the transmitter. The TAXI stream transmitted by the fiber to a port is looped back to the fiber. The stream is still transmitted over the fiber, but the incoming stream is ignored.

none Selecting `none` designates that no loopback will take place. This is the default setting.

2.12.18.2 Showing the TAXI Port Configuration

This command enables you to display current information about all of the ports on a TAXI network module. Enter the following parameters:

```
localhost::configuration port taxi> show
Port        Carrier     State       Loopback
2A1         yes         up          none
2A2         no          down        none
2A3         no          down        none
2A4         no          down        none
2A5         no          down        none
2A6         no          down        none
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module that is currently installed in the switch fabric.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee the signal is the proper frequency.

State Displays the current state of the port.

Loopback Indicates the loopback mode of this port. Can be either `none` or `diagnostic`.

2.12.19 TP25 Port Configuration Commands

These commands allow you to modify various aspects of the configuration of the ports on a TP25 network module. The following **tp25** commands are available only when a TP25 network module is installed in the switch fabric. You can display the list of available subcommands by typing **tp25 ?** at the **port** level.

```
localhost::configuration port> tp25 ?
loopback       show
```

AMI Configuration Commands

2.12.19.1 Configuring the TP25 Port Loopback

This subcommand allows you to designate the type of loopback on a port on a TP25 network module. Enter the following parameters:

```
localhost::configuration port tp25> loopback <port> (line | none)
```

port Indicates the port number on which the loopback mode is to be changed.

line Choosing `line` loopback, also known as remote loopback, causes received data to be transferred to the upstream system as well as to be looped back to the transmitter.

none Selecting `none` designates that no loopback will take place on the port. This is the default setting.

2.12.19.2 Showing the TP25 Port Configuration

This command allows you to display current information about a TP25 network module. Enter the following parameters:

```
localhost::configuration port tp25> show
Port Carrier Media Loopback RxTiming
1A1  no      UTP   none     Yes
1A2  no      UTP   none     Yes
1A3  no      UTP   none     Yes
1A4  no      UTP   none     Yes
1A5  no      UTP   none     Yes
1A6  no      UTP   none     Yes
1B1  yes     UTP   none     Yes
1B2  yes     UTP   none     Yes
1B3  no      UTP   none     Yes
1B4  yes     UTP   none     Yes
1B5  no      UTP   none     Yes
1B6  yes     UTP   none     Yes
```

The fields in this display are defined as follows:

Port Indicates the port number of the network module that is currently installed in the switch.

Carrier Shows whether or not a carrier has been detected on the port. If a carrier has been detected, `yes` is displayed. If a carrier has not been detected, `no` is displayed. A carrier is detected when a signal is applied to the receive side of the port. It does not guarantee that the signal is the proper frequency.

Media Displays what kind of physical medium is connected to the TP25 interface. `UTP` means that it is Unshielded Twisted Pair.

Loopback Indicates the loopback mode on this port. Can be either `line` or `none`.

RxTiming Indicates whether or not the port is receiving an 8kHz timing sync marker. These markers can be used to derive an 8kHz signal that can be transmitted from all ports on the network module and back to the switch fabric (on switches that support timing features). `No` means the port is not receiving sync pulses. `Yes` means the port is receiving sync pulses.

2.12.20 Port Traffic Configuration Commands

These commands enable you to configure various traffic management features on an individual port on a Series C, Series LC, or Series LE network module on the switch. You can display the list of available subcommands by typing **`traffic ?`** at the **`port`** level.

```
localhost::configuration port> traffic ?
  c>                lc>                le>
```

2.12.20.1 Configuring Port Traffic on Series C Network Modules

These commands enable you to configure various traffic management features on an individual port on a Series C network module on the switch. You can display the list of available subcommands by typing **`c ?`** at the **`traffic`** level.

```
localhost::configuration port traffic> c ?
  cdv               clp1              efci              qsize
  show
```

2.12.20.1.1 Configuring Cell Delay Variation on a Series C Network Module

On a Series C network module, there are two output queues that are 256 cells deep, by default, one for Constant Bit Rate (CBR) and one for Variable Bit Rate (VBR). The Cell Delay Variation (CDV) for CBR is calculated as the CBR cell queue depth (256 cells by default) multiplied by 1 cell time. The CDV for VBR is calculated as the VBR cell queue depth (256 cells by default) multiplied by 1 cell time plus the CBR CDV. The CDV also varies depending on the physical interface on which the link is running (e.g., a 155 Mbps connection versus a 45 Mbps connection). This command lets you set the maximum CDV on a worst case basis that cells for a specified output port and priority (CBR or VBR) should incur. This number is used to determine the size of the buffers reserved for CBR and VBR traffic. Enter the following parameters:

```
localhost::conf port traffic c> cdv <port> (CBR | VBR) <CDV in microseconds>
```

port Indicates the port on which the CDV will be set.

CBR|VBR Indicates if the CDV is for output CBR traffic or for output VBR traffic.

CDV Specified in microseconds, indicates the cell delay variation, that an output cell experiences under the worst conditions.

NOTE The switch control software must be restarted for this command to take effect.

2.12.20.1.2 Setting the CLP Threshold on a Series C Network Module

This command allows you to designate the CLP=1 threshold at which cells that have been tagged as non-conforming are dropped for a given traffic type on a specified port on a Series C network module. Enter the following parameters:

```
localhost::conf port traffic c> clp1 <port> (CBR | VBR | ABR) <number of cells>
```

port Indicates the port on which the CLP threshold is being set.

CBR|VBR|ABR Indicates for which type of traffic (CBR, VBR, or ABR) the CLP threshold is being set.

number of cells Indicates the number of cells in the buffer at which the specified traffic type drops CLP=1 cells. The default is 256 cells.

2.12.20.1.3 Configuring EFCI on a Series C Network Module

This command allows you to designate the cell buffer threshold over which Available Bit Rate (ABR) cells have their explicit forward congestion indicator (EFCI) code point set on a Series C network module. When the EFCI code point is set, this signals congestion to downstream switch fabrics and to future ABR flow control mechanisms. Once this threshold is surpassed, EFCI continues to be set until the queue empties. Enter the following parameters:

```
localhost::configuration port traffic c> efci <port> (on | off) <threshold>
```

port Indicates the port on which the EFCI threshold will be set.

on|off `On` means the EFCI is set when the threshold number is reached, signalling congestion. `Off` means the EFCI is cleared when the threshold number is reached, indicating no congestion.

threshold Indicates the number of cells over which the ABR cells will have EFCI set. The default value is 64 cells.

2.12.20.1.4 Configuring Port Queue Size on a Series C Network Module

This command enables you to designate the minimum queue size for a given type of traffic on a specified port on a Series C network module. Enter the following parameters:

```
localhost::conf port traffic c> qsize <port> (CBR | VBR | ABR) <number of cells>
```

port Indicates the port on which the minimum queue size will be set.

CBR|VBR|ABR Indicates for which type of traffic (CBR, VBR, or ABR) to set the minimum queue size.

number of cells Indicates the queue size to be assigned to the traffic designated in the previous parameter. The default is 256 cells.

NOTE The switch control software must be restarted for this command to take effect.

2.12.20.1.5 Displaying Port Traffic on a Series C Network Module

This command lets you display port and priority traffic information for all of the ports on all of the Series C network modules. Enter the following:

```
localhost::configuration port traffic c> show
                 CLP   EFCI   EFCI
 Port  Prio  Thrsh     On    Off   QSize     CDV
 1A1   ABR     256     64      1     256     N/A
 1A1   VBR     256    N/A    N/A     256    1400
 1A1   CBR     256    N/A    N/A     256     700
 1A2   ABR     256     64      1     256     N/A
 1A2   VBR     256    N/A    N/A     256    1400
 1A2   CBR     256    N/A    N/A     256     700
 1A3   ABR     256     64      1     256     N/A
 1A3   VBR     256    N/A    N/A     256    1400
 1A3   CBR     256    N/A    N/A     256     700
 1A4   ABR     256     64      1     256     N/A
 1A4   VBR     256    N/A    N/A     256    1400
 1A4   CBR     256    N/A    N/A     256     700
```

The fields in the port configuration display are defined as follows:

Port Shows the port that has been configured. The 1 means it is the first switch fabric, the letter shows the position of the network module in the switch fabric, and the 1, 2, 3, or 4 indicates the specific port number.

Prio Indicates the traffic type for this port.

CLP Thrsh Shows the value at which cells that have been tagged as non-conforming (CLP=1) are dropped for this port and priority. The default is 256 cells.

EFCI On Shows the value at which the EFCI is set (turned on) when the threshold number is reached, signalling congestion, for this port and priority.

EFCI Off Shows the value at which the EFCI is cleared (turned off) when the threshold number is reached, indicating no congestion, for port and priority.

Qsize Displays the reserved queue size for port and priority. The default setting is 256 cells.

CDV Shows the maximum cell delay variation for this port and priority, specified in microseconds.

This command also lets you show port and priority traffic information for an individual port on a Series C network module. Enter the following parameters:

```
localhost::configuration port traffic> show [<port>]

localhost::configuration port traffic> show 1A3
                   CLP   EFCI   EFCI
 Port   Prio   Thrsh     On    Off   QSize     CDV
 1A3    ABR      256     64      1     256     N/A
 1A3    VBR      256    N/A    N/A     256    1400
 1A3    CBR      256    N/A    N/A     256     700
```

The fields in these displays are defined in the same manner as those listed above in the example for displaying traffic information about all of the ports on the Series C network modules.

2.12.20.2 Configuring Port Traffic on Series LC Network Modules

These commands enable you to configure various traffic management features on an individual port on a Series LC network module on the switch. You can display the list of available subcommands by typing **lc ?** at the **traffic** level.

```
localhost::configuration port traffic> lc ?
  clp1             qsize            show
```

2.12.20.2.1 Setting the CLP Threshold on a Series LC Network Module

This command lets you designate the CLP=1 threshold at which cells that have been tagged as non-conforming are dropped for a given traffic type on a specified port on a Series LC network module. Enter the following parameters:

```
localhost::conf port traf lc> clp1 <port> (CBR | VBR | ABR | UBR) <number of
cells>
```

port	Indicates the port on which the CLP threshold is being set.
CBR|VBR|ABR|UBR	Indicates for which type of traffic (CBR, VBR, ABR, or UBR) the CLP threshold is being set.
number of cells	Indicates the number of cells in the buffer at which the specified traffic type drops CLP=1 cells. The default is 256 cells.

2.12.20.2.2 Configuring Port Queue Size on a Series LC Network Module

This command enables you to designate the minimum queue size for a given type of traffic on a specified port on a Series LC network module. Enter the following parameters:

```
localhost::conf port traf lc> qsize <port> (CBR | VBR | ABR| UBR) <number of
cells>
```

port	Indicates the port on which the minimum queue size will be set.
CBR|VBR|ABR|UBR	Indicates for which type of traffic (CBR, VBR, ABR, or UBR) to set the minimum queue size.
number of cells	Indicates the queue size to be assigned to the traffic designated in the previous parameter. The default is 256 cells.

NOTE The switch control software must be restarted for this command to take effect.

2.12.20.2.3 Displaying Port Traffic on a Series LC Network Module

This command lets you display port and priority traffic information for all of the ports on all of the Series LC network modules. Enter the following:

```
localhost::configuration port traffic lc> show
                   CLP
 Port   Prio   Thrsh   QSize
 1D1    ABR      256     256
 1D1    VBR      256     256
 1D1    CBR      256     256
 1D1    UBR      256     256
 1D2    ABR      256     256
 1D2    VBR      256     256
 1D2    CBR      256     256
 1D2    UBR      256     256
 1D3    ABR      256     256
 1D3    VBR      256     256
 1D3    CBR      256     256
 1D3    UBR      256     256
 1D4    ABR      256     256
 1D4    VBR      256     256
 1D4    CBR      256     256
 1D4    UBR      256     256
```

The fields in the port configuration display are defined as follows:

Port Shows the port that has been configured.

Prio Indicates the traffic type for this port.

CLP Thrsh Shows the value at which cells that have been tagged as non-conforming (CLP=1) are dropped for this port and priority.

Qsize Shows the reserved queue size, in cells, for the port and priority specified. The default is 256 cells.

This command also lets you show port and priority traffic information for an individual port. Enter the following parameters:

```
localhost::configuration port traffic lc> show [<port>]
localhost::configuration port traffic lc> show 1d1
               CLP
 Port  Prio  Thrsh  QSize
 1D1   ABR     256    256
 1D1   VBR     256    256
 1D1   CBR     256    256
 1D1   UBR     256    256
```

The fields in these displays are defined in the same manner as those listed above. If there are no Series LC network modules in the fabric, then the following is displayed:

```
localhost::configuration port traffic lc> show
No Series-LC port traffic configuration information available
```

2.12.21 UBR Tagging Command

When UBR tagging is enabled on a connection, all cells on the connection are tagged by the policer so that they can be discarded using the CLP=1 threshold when congestion is experienced. This prevents UBR traffic on a given port from using an unfair amount of buffer resources on a network module. This command lets you tag cells on a per-port and per-connection basis for all UBR connections. Enter the following parameters:

```
localhost::configuration port> ubrtagging <port> (allOn|allOff|svcOn|svcOff)
```

port Indicates the port number on which UBR tagging is being configured.

allOn `allOn` means all UBR connections (SVCs and PVCs) arriving on this port are subjected to UBR tagging.

allOff `allOff` means no UBR connections (SVCs and PVCs) arriving on this port are subjected to UBR tagging.

svcOn `svcOn` means all UBR SVCs arriving on this port are subjected to UBR tagging. PVCs are tagged based on their UPC contract. This is the default.

svcOff `svcOff` means no UBR SVCs arriving on this port are subjected to UBR tagging. PVCs are tagged based on their UPC contract.

For example, to enable tagging on all UBR SVCs and PVCs on port 2B4, enter the following parameters:

```
localhost::conf port> ubrtagging 2b4 allOn
```

2.12.22 VBRBuffOB Port Configuration Commands

This command is an advanced option that allows you to set an output buffer overbooking level for VBR traffic on a particular port. Enter the following parameters:

```
localhost::configuration port> vbrbuffob <port> <percent>
```

port Indicates the port number on which the buffer overbooking level for VBR traffic is to be changed.

percent Indicates the buffer overbooking level assigned to this path, specified as a percentage. Enter an integer value greater than or equal to `1`. The default is `100`, which means that no overbooking has been defined. Values less than `100` cause underbooking. Values greater than `100` denote overbooking.

2.12.23 VBROB Port Configuration Commands

This command is an advanced option that allows you to set an output bandwidth overbooking level for VBR traffic on a particular port. Enter the following parameters:

```
localhost::configuration port> vbrob <port> <percent>
```

port Indicates the port number on which the bandwidth overbooking level for VBR traffic is to be changed.

percent Indicates the bandwidth overbooking level assigned to this port, specified as a percentage. Enter an integer value from `1` to `99,999`. The default is `100`, which indicates that no overbooking will occur. Values less than `100` cause underbooking. Values greater than `100` denote overbooking.

2.13 Serial Port Configuration Commands

These commands let you manage an RS-232 serial port. You can display the list of available subcommands by typing **rs232 ?** at the **configuration** level.

```
localhost::configuration> rs232 ?
  show            speed
```

2.13.1 Displaying Serial Port Information

This command allows you to show information about the configuration of the RS-232 serial port on the SCP. You may type **show** at the **rs232 configuration** level to list the settings for the serial port. Enter the following parameters:

```
localhost::configuration rs232> show [(A|B)]
```

A|B Indicates the port letter of the serial port that is to be displayed. Port B not available.

```
localhost::configuration rs232> show
Port     Type        Speed   Flow     Bits   Stops      Parity
A        rs232        9600   none        8   one        none
```

The fields in this display are defined as follows:

Port Shows the physical port designation.

Type Indicates the signalling standard used.

Speed Displays the receive / transmit rate in bits per second.

Flow Indicates the type of flow control implemented on the given port.

Bits Shows the number of bit times in a single character.

Stops Lists the number of stop bits in a character frame.

Parity Displays the parity setting for the ports. Can be odd, even, mark, space, or none.

2.13.2 Configuring the Serial Port Speed

The **speed** command is not available on the TNX-210, TNX-1100, or the MSC-900.

2.14 SNMP Configuration Commands

These commands enable you to manage the SNMP communities and traps. You can display the list of available subcommands by typing **`snmp ?`** at the **`configuration`** level.

```
localhost::configuration> snmp ?
  community        trap>
```

2.14.1 Configuring the SNMP Community Access

This command lets you modify the SNMP community access to AMI. Enter the following parameters:

```
localhost::configuration snmp> community (read|write) <community>
```

read|write	Indicates the access level for this community. If set to `read`, the AMI session opens with read-only access. If set to `write`, the AMI session opens with read-write access.
community	Indicates the community string associated with `read` or with `write`. The default community string associated with `read` is `public`. The default community string associated with `write` is `private`.

2.14.2 Configuring SNMP Traps

These commands help you to manage SNMP traps. You can display the list of available sub-commands by typing **`trap ?`** at the **`snmp`** level.

```
localhost::configuration snmp> trap ?
delete         new            show
```

2.14.2.1 Deleting an SNMP Trap Entry

This command allows you to delete an existing SNMP trap destination. Before deleting a trap that may need to be recreated later, show the list of current SNMP traps and either copy and save the screen or write down the trap destinations. You will also need to show the list of current SNMP traps in order to find the number of the trap to be deleted. Enter the following parameters to delete a trap entry:

```
localhost::configuration snmp trap> delete <trap>
```

trap Indicates the number of the trap destination in the list of current SNMP traps that is to be removed.

For example, to delete trap 198.29.31.130, first list the traps to find its number and copy the address in case you want to recreate it later:

```
localhost::configuration snmp trap> show
Trap    Destination
1       192.88.243.18
2       198.29.16.14
3       198.29.16.18
4       198.29.23.39
5       198.29.31.130
```

Then enter the following parameters:

```
localhost::configuration snmp trap> delete 5
```

You can display the list again to verify that the trap has been deleted:

```
localhost::configuration snmp trap> show
Trap    Destination
1       192.88.243.18
2       198.29.16.14
3       198.29.16.18
4       198.29.23.39
```

2.14.2.2 Creating an SNMP Trap Entry

This command allows you to specify a host to which a switch can send SNMP traps. The SNMP traps supported by this switch are detailed in the FORE-Switch-MIB. Enter the IP address of the SNMP trap destination to be added. Repeat this for as many SNMP trap destinations as needed. Traps are active as soon as they are set. Enter the following parameters:

```
localhost::configuration snmp trap> new <ipaddress>
```

ipaddress Indicates the IP address of the trap destination to be created.

2.14.2.3 Displaying the SNMP Trap Entries

This command enables you to list all of the current SNMP traps. The SNMP traps supported by this switch are detailed in the FORE-Switch-MIB. Enter the following parameters:

```
localhost::configuration snmp trap> show
Trap    Destination
1       192.88.243.18
2       198.29.16.14
3       198.29.16.18
4       198.29.23.39
5       198.29.31.130
```

If no SNMP traps have been configured, the following message is displayed:

```
No trap information is available
```

2.15 SPANS Configuration Commands

These commands allow you to manage SPANS (Simple Protocol for ATM Network Signalling), FORE Systems' pre-standard signalling protocol. You can display the list of available subcommands by typing **spans ?** at the **configuration** level.

```
localhost::configuration> spans ?
delete          new             show
```

2.15.1 Deleting a SPANS Signalling Path

This command lets you delete an existing SPANS signalling path. Enter the following parameters:

```
localhost::configuration spans> delete <port> <vpi>
```

port Indicates the port number on which the SPANS signalling path is to be deleted.

vpi This is the number of the SPANS path to be removed.

2.15.2 Creating a SPANS Signalling Path

This command allows you to create a SPANS signalling path.

NOTE

Before a SPANS signalling path can be created on a given VPI, an originating and a terminating path must exist for that same VPI.

Enter the following parameters:

```
localhost::configuration spans> new <port> <vpi> [-cdvt <cdvt>] [(tag | drop)]
advanced options:
    [-sig <vci>] [-cls <vci>] [-aal (4 | 5)]
    [-sigbw <Kbps>] [-clsupc <index>]
    [-minvci <vci>] [-maxvci <vci>]
    [-opentimeout <msec>] [-closetimeout <msec>]
    [-outsigservice <vbr | ubr>]
```

port Indicates the port number on which the SPANS signalling path is to be created.

vpi Indicates the number of the SPANS path that is to be created.

-cdvt <cdvt> Indicates the Cell Delay Variation Tolerance (CDVT) associated with the peak cell rates in microseconds.

(tag|drop) Using `tag` means that non-compliant cells are tagged. Using `drop` means that non-compliant cells are dropped.

The advanced options are as follows:

-sig <vci> Indicates the VCI to use for SPANS signalling messages. The default is `15`.

-cls <vci> Indicates the VCI to use for connectionless messages. The default is `14`.

-aal (4|5) Indicates the AAL type to use for this SPANS signalling path. The default is `4`.

-sigbw <Kbps> Indicates the amount of bandwidth to be reserved on the VCI for SPANS signalling messages.

-clsupc <index>	Indicates the integer index that refers to a specific traffic contract that is used to police the connectionless VCI. If no index is specified, then no traffic policing will take place on this VCI. It is assigned a UPC index of 0, and all traffic on this VCI is treated as UBR traffic. This is the default.
-minvci <vci>	Indicates the bottom number for the range of VCIs to be reserved for SPANS SVCs on this path. The default is 32. You can change this range if you want to limit the number of SVCs on this path, limit the number of SPANS SVCs with respect to UNI SVCs, or divide the VCI range into a region reserved for SPANS SVCs and a region reserved for UNI SVCs.
-maxvci <vci>	Indicates the top number for the range of VCIs to be reserved for SPANS SVCs on this path. The default is the maximum number of VCIs that the path supports. You can change this range if you want to limit the number of SVCs on this path, limit the number of SPANS SVCs with respect to UNI SVCs, or divide the VCI range into a region reserved for SPANS SVCs and a region reserved for UNI SVCs.
[-opentimeout <msec>]	Indicates the timeout, in msec, for SPANS open requests. This option should be used on links that have a high propagation delay, such as satellite links. The default is 300 msec.
[-closetimeout <msec>]	Indicates the timeout, in msec, for SPANS close requests. This option should be used on links that have a high propagation delay, such as satellite links. The default is 500 msec.
[-outsigservice (vbr|ubr)]	Configures the SPANS signalling channel to be put into either the UBR or VBR queue on the output side at the time the SPANS channel is created. The default is VBR. By putting the SPANS signalling channel in the VBR queue, the SPANS signalling messages receive higher priority on the output side. This keeps UBR traffic from congesting the signalling traffic.

The following is an example of how to configure SPANS to use only VCIs 32-100 on port 1A1, VPI 0:

```
configuration spans> new 1a1 0 -minvci 32 -maxvci 100
```

2.15.3 Showing the SPANS Signalling Path Configuration

This command lets you list an individual switch fabric's current SPANS signalling path information. Enter the following parameters:

```
localhost::configuration spans> show
 Port   VPI  State Type   CDVT  Action RemoteAddress
 1C1      0  down  uni     250  tag
 1C2      0  down  uni     250  tag
 1C3      0  down  uni     250  tag
 1C4      0  up    uni     250  tag    169.144.60.108
 1D1      0  down  uni     250  tag
 1D2      0  down  uni     250  tag
 1D3      0  down  uni     250  tag
 1D4      0  down  uni     250  tag
 1CTL     0  up    uni       0  tag    10.10.10.48
```

The fields in this display have the following meanings:

Port Lists the port number of the SPANS signalling path.

VPI Shows the path number of the SPANS signalling path.

State Shows the current state of the SPANS path.

Type Designates the type of connection on this SPANS path. If the type listed is `uni`, this is a SPANS user-to-network interface connection to a SPANS host. If the type listed is `nni`, then this is a SPANS network-to-network interface connection to another switch.

CDVT Shows the Cell Delay Variation Tolerance (CDVT), in microseconds.

Action `Tag` means that non-compliant cells are tagged. `Drop` means that non-compliant cells are discarded.

RemoteAddress Shows the IP address of the remote endstation, if it is available.

To show advanced SPANS signalling path information about all of the ports, enter the following parameters:

```
localhost::configuration spans> show advanced
 Port   VPI SigVCI CLSVCI AAL MinVCI MaxVCI SigBW CLSUPC OpenT/O CloseT/O OutServ
 1B1      0     15     14   4     32    511     0      0     300      500     vbr
 1B2      0     15     14   4     32    511     0      0     300      500     vbr
 1B3      0     15     14   4     32    511     0      0     300      500     vbr
 1B4      0     15     14   4     32    511     0      0     300      500     vbr
 1B5      0     15     14   4     32    511     0      0     300      500     vbr
 1B6      0     15     14   4     32    511     0      0     300      500     vbr
 1C1      0     15     14   4     32    511     0      0     300      500     vbr
 1C2      0     15     14   4     32    511     0      0     300      500     vbr
 1C3      0     15     14   4     32    511     0      0     300      500     vbr
 1C4      0     15     14   4     32    511     0      0     300      500     vbr
 1E2      0     15     14   4     32   7168     0      0     300      500     vbr
 1E3      0     15     14   4     32   7168     0      0     300      500     vbr
 1E4      0     15     14   4     32   7168     0      0     300      500     vbr
 1CTL     0     15     14   4     32   1023     0      0     300      500     vbr
```

The fields in this display have the following meanings:

Port Shows the port number of the SPANS signalling path.

VPI Shows the path number of the SPANS signalling path.

SigVCI Shows the virtual channel number used for SPANS messages on the SPANS path. The default is VCI 15.

CLSVCI Shows the VCI used for connectionless messages.

AAL Shows the AAL type used for SPANS messages.

MinVCI Shows the bottom number for the range of VCIs to be reserved for SPANS SVCs on this path.

MaxVCI Shows the top number for the range of VCIs to be reserved for SPANS SVCs on this path.

SigBW Shows the amount of bandwidth reserved on the VCI for SPANS signalling messages.

CLSUPC Shows the integer index that refers to a specific UPC contract used to police the connectionless VCI.

OpenT/O Shows the timeout, in msec, for SPANS open requests.

CloseT/O Shows the timeout, in msec, for SPANS close requests.

OutServ Shows in which service queue the output SPANS VCC resides. Can be VBR or UBR. The default is VBR.

To list SPANS information for a specific port, (for example, port 1C1), enter the following parameters:

```
localhost::configuration spans> show 1C1
 Port  VPI  State Type   CDVT  Action RemoteAddress
 1C1     0  down  uni     250  tag
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying SPANS information on all of the ports on an individual switch fabric.

To list SPANS information for a specific port and path, (for example, port 1C1 and VPI 0), enter the following parameters:

```
localhost::configuration spans> show 1c1 0
 Port  VPI  State Type   CDVT  Action RemoteAddress
 1C1     0  down  uni     250  tag
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying SPANS information on all of the ports on an individual switch fabric.

To list advanced SPANS information for a specific port and path, (for example, port 1b3 and VPI 0), enter the following parameters:

```
localhost::configuration spans> show 1b3 0 advanced
 Port  VPI SigVCI CLSVCI AAL MinVCI MaxVCI SigBW CLSUPC OpenT/O CloseT/O OutServ
 1B3     0     15     14   4     32    511     0      0     300      500     vbr
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying advanced SPANS information on all of the ports on an individual switch fabric.

2.16 SPVC Configuration Commands

These commands allow you to configure SPVCs (Smart Permanent Virtual Circuits). An SPVC is a connection that goes across multiple switch fabrics. An SPVC looks like a PVC at the local and remote endpoints with an SVC in the middle. SPVCs are more robust than PVCs. If a link carrying a PVC goes down, then the PVC goes down. If a link carrying a SPVC goes down and there is an alternate route, then the end switch fabrics of the SPVC automatically reroute the SPVC around the failed link.

You can display the list of available subcommands by typing **spvc ?** at the **configuration** level.

```
localhost::configuration> spvc ?
  spans>            pnni>
```

2.16.1 SPANS SPVC Configuration Commands

These commands allow you to configure SPANS SPVCs. To create a SPANS SPVC, you must configure the two ends concurrently on the two switch fabrics. Therefore, you have an AMI session open on both the local switch fabric and the destination switch fabric. You can display the list of available subcommands by typing **spans ?** at the **spvc** level.

```
localhost::configuration spvc> spans ?
  delete            new               show
```

2.16.1.1 Deleting a SPANS SPVC

This command allows you to delete an existing SPANS SPVC. There are two different ways to delete an SPVC. Enter the following parameters:

```
localhost::conf spvc spans> delete <Local SPVC ID> [(source | destination | bidirectional)]
```

or

```
localhost::conf spvc> delete <port> <vpi> <vci> \ <dest-session> <dest-port> <dest-vpi> <dest-vci>\ [(source | destination | bidirectional)]
```

Local SPVC ID — Indicates the unique number that the SCP assigned to this SPANS SPVC when it was created.

source|destination|bidirectional — Source means the SPVC to be deleted is a unidirectional SPVC going from the local switch fabric to the remote switch fabric. Destination means the SPVC to be deleted is a unidirectional SPVC going from the remote switch fabric to the local switch fabric. Bidirectional means the pair of unidirectional SPVCs will be deleted. The default is bidirectional.

port — Indicates the port number on the local switch fabric on which this SPANS SPVC is to be deleted.

vpi — Indicates the virtual path number on the local switch fabric.

vci — Indicates the virtual channel number on the local switch fabric.

dest-session — Indicates the name of the remote switch session for this SPVC.

dest-port — Indicates the port number on the remote switch fabric on which this SPANS SPVC is to be deleted.

dest-vpi — Indicates the virtual path number on the remote switch fabric.

dest-vci — Indicates the virtual channel number on the remote switch fabric.

source|destination|bidirectional — Source means the SPVC to be deleted is a unidirectional SPVC going from the local switch fabric to the remote switch fabric. Destination means the SPVC to be deleted is a unidirectional SPVC going from the remote switch fabric to the local switch fabric. Bidirectional means the pair of unidirectional SPVCs will be deleted. The default is bidirectional.

2.16.1.2 Creating a SPANS SPVC

This command allows you to create a new SPANS SPVC. Enter the following parameters:

```
localhost::con spvc spans> new <port> <vpi> <vci> <dest-session> <dest-port>
<dest-vpi> <dest-vci> \ [-peak <Kb/sec>] [(source | destination | bidirectional)]
```

port Indicates the port number on the local switch fabric on which this SPANS SPVC is to be created.

vpi Indicates the virtual path number on the local switch fabric.

vci Indicates the virtual channel number on the local switch fabric.

dest-session Indicates the name of the remote switch session.

dest-port Indicates the port number on the remote switch fabric on which this SPANS SPVC is to be created.

dest-vpi Indicates the virtual path number on the remote switch fabric.

dest-vci Indicates the virtual channel number on the remote switch fabric.

-peak <Kb/sec> Indicates the amount of peak bandwidth allocated for this SPANS SPVC, specified in kilobits per second. The default value is `0`.

source|destination|bidirectional Source means a unidirectional SPANS SPVC going from the local switch fabric to the remote switch fabric will be created. Destination means a unidirectional SPANS SPVC going from the remote switch fabric to the local switch fabric will be created. Bidirectional means the pair of unidirectional SPANS SPVCs will be created. The default direction, if you do not specify one, is bidirectional.

NOTE To create a bidirectional SPANS SPVC, you must either specify bidirectional, or you must set up two unidirectional SPANS SPVCs with one going in each direction.

To create a SPANS SPVC, you need to configure the two ends concurrently on the two switch fabrics. Therefore, you first need to open an AMI session to the destination switch fabric by either using the SCP's IP address or its name, along with the SNMP read-write community string. The following example depicts how to create a bidirectional SPVC from the local switch fabric (localhost) to a remote switch fabric (198.29.22.46). The user is logged into localhost.

```
localhost::> open 198.29.22.46 private

Opening a session for "198.29.22.46", please wait...
Connected to "198.29.22.46" (asx200bx).
198.29.22.46::> localhost

localhost::> configuration spvc spans new ?

usage: new <port> <vpi> <vci> <dest-session> <dest-port> <dest-vpi>
<dest-vci> \[-peak <Kb/sec>] [(source | destination | bidirectional)]

localhost::configuration spvc spans> new 1c1 0 49 198.29.22.46 1b1 0 50
```

2.16.1.3 Displaying SPANS SPVC Information

This command allows you to display all of the SPANS SPVCs on an individual switch fabric. Enter the following parameters:

```
localhost::configuration spvc spans> show
Local                                        Remote
ID    Port VPI VCI      BW Direction      ID    Port VPI VCI Switch
35664 1C1    0  51    0.0 bidirectional  10427 1B1    0  52 198.29.22.46
65364 1C1    0  49    0.0 bidirectional  42591 1B1    0  50 198.29.22.46
```

The fields in this display are defined as follows:

Local ID Indicates the unique number that the local switch fabric's SCP assigned to this SPANS SPVC when the it created.

Local Port Indicates the port number on the local switch fabric.

Local VPI Indicates the virtual path number on the local switch fabric.

Local VCI Indicates the virtual channel number on the local switch fabric.

Local BW Indicates the amount of peak bandwidth allocated for this SPANS SPVC, specified in kilobits per second.

Remote ID Indicates the unique number that the remote switch fabric's SCP assigned to this SPANS SPVC when it was created.

Remote Port Indicates the port number on the remote switch fabric.

Remote VPI Indicates the virtual path number on the remote switch fabric.

Remote VCI Indicates the virtual channel number on the remote switch fabric.

Switch Indicates the IP address or name of the remote switch fabric's SCP.

The following is displayed if no SPANS SPVCS have been configured:

```
localhost::configuration spvc spans>  show
No SPVC information is available
```

2.16.2 PNNI SPVC Configuration Commands

These commands allow you to configure PNNI SPVCs. Unlike the SPANS SPVCs, PNNI SPVCs are inherently bidirectional, which means that a single signalling call establishes the circuits in both directions. Although PNNI SPVCs are bidirectional, the endpoint that initiates the call setup is known as the source and the other endpoint is known as the destination. You can display the list of available subcommands by typing **pnni ?** at the **spvc** level.

```
localhost::configuration spvc> pnni ?
  delete           new              parameters>      show
```

2.16.2.1 Deleting a PNNI SPVC

This command allows you to delete an existing PNNI SPVC from the source end. Enter the following parameters:

```
localhost::configuration spvc pnni> delete <SPVC ID>
```

SPVC ID Indicates the unique, identifying number assigned to this PNNI SPVC when it was created.

The following is an example of how to delete a PNNI SPVC:

```
localhost::configuration spvc pnni> delete 3428
```

If you enter an SPVC ID that does not exist, the following error message is returned:

```
localhost::configuration spvc pnni> delete 16451

?ERROR: SNMP: the specified value is invalid
```

2.16.2.2 Creating a PNNI SPVC

This command lets you create a PNNI SPVC. Enter the following parameters:

NOTE You do not need to open a session to the destination switch to create a PNNI SPVC because all PNNI SPVCs are bidirectional.

```
localhost::conf spvc pnni> new <port> <vpi> <vci> <destnsap | destprefix:dest-
port> \
[-destvpi <vpi> -destvci <vci>] [-spvcid <index>]\
[-fupc <index>] [-bupc <index>]
advanced options:
[-reroute (enable|disable)] [-dtl <index>]\
[-name <name>] [-bearerClass (X|A|C)] \
[-trafficType (NI|CBR|VBR)] [-timing (NI|TR|TNR)] [-clip (no|yes)]
NOTE: <destprefix:destport> option can be used only if the destination switch is
a FORE switch.
```

port Indicates the port number on the source (local) switch fabric on which this PNNI SPVC is to be created.

vpi Indicates the virtual path number on the source (local) switch fabric for this PNNI SPVC.

vci Indicates the virtual channel number on the source (local) switch fabric for this PNNI SPVC.

destnsap Indicates the ATM NSAP address of the destination end (remote switch) for this SPVC.

destprefix:destport Indicates the ATM NSAP prefix and the port number of this terminating SPVC at the destination end. This option is valid only if the destination switch is a FORE switch.

-destvpi <vpi> Indicates the virtual path number on the destination switch fabric for this PNNI SPVC. When using this option, both the `destvpi` and `destvci` must be specified.

-destvci <vci> Indicates the virtual channel number on the destination switch fabric for this PNNI SPVC. When using this option, both the `destvpi` and `destvci` must be specified.

-spvcid <index> Indicates the index number assigned to this SPVC to identify it uniquely. For PNNI SPVCs, the index number may be assigned either by AMI or by the user. Valid values are integers between `1` and `65535`.

-fupc <index> Indicates the forward (going from the local switch fabric to the remote switch fabric) UPC contract index assigned to this SPVC. To find the index you want, use the **`conf upc show`** command. If no index is specified, an index of `0` (UBR best effort) is used.

-bupc <index> Indicates the backward (going from the remote switch fabric to the local switch fabric) UPC contract index assigned to this SPVC. To find the index you want, use the **`conf upc show`** command. If no index is specified, an index of `0` (UBR best effort) is used.

The advanced options are as follows:

[-reroute enable|disable] `Enable` indicates that this SPVC will be examined to see if it is using a sub-optimal route. If it is, it will be rerouted according to the parameters in **`conf spvc pnni parameters reroute`**. `Disable` indicates that this SPVC will not be examined to see if it is using a sub-optimal route. The default state for PNNI SPVCs is `disabled`. If you want to change this value for this PNNI SPVC after you create it, you must delete it and then recreate it.

[-dtl <index>] Indicates the Designated Transit List (DTL) index assigned to this SPVC. The DTL specifies the preferred call routing for the SVC portion of the SPVC. To find the index you want, use the **`conf nsap dtl show`** command.

NOTE

If you configure an SPVC to use a specific DTL that you have created, the SVC portion of the SPVC always uses that path so long as it is available, even if there is another path that has a lesser administrative weight.

-name <name> Indicates an optional name for the user to assign to this PNNI SPVC to help uniquely identify it.

-bearerClass <X|A|C> Indicates the requested broadband bearer class for this SPVC. X is for all types of ATM media. A is for non-ATM CBR media. C is for non-ATM VBR, UBR, and ABR media. The default is X.

-trafficType <NI|CBR|VBR> The requested broadband bearer traffic type for this SPVC. Can be No Indication (NI), Constant Bit Rate (CBR), or Variable Bit Rate (VBR). The default is NI. This parameter can be used only if the bearerClass is X.

-timing <NI|TR|TNR> Indicates the requested broadband bearer timing requirements for this SPVC. Can be No Indication (NI), (end-to-end) Timing Required (TR), or (end-to-end) Timing Not Required (TNR). The default is NI. This parameter can be used only if the bearerClass is X. CBR traffic must use TR.

-clip <no|yes> During speech transmission, clipping is the loss of a brief interval at the beginning of a speech spurt. Using no indicates this SPVC is not susceptible to clipping. Using yes indicates this SPVC is susceptible to clipping. The default is no.

NOTE The forward and backward UPC contracts that you specify must be compatible with the bearerClass, trafficType, and timing parameters for the SPVC (e.g., all parameters are for VBR traffic or CBR traffic).

The following is an example of how to create a simple PNNI SPVC:

```
localhost::configuration spvc pnni> new 1a1 0 100
47.0005.80.ffe100.0000.f21b.19cd:1b1
```

NOTE If you configure a PNNI SPVC on a CEM connection, you must set the following appropriate values for the options under **conf spvc pnni new**. For [**-bearerClass** (**X**|**A**|**C**)], choose **X**. For [**-trafficType** (**NI**|**CBR**|**VBR**)], choose **CBR**. For [**-timing** (**NI**|**TR**|**TNR**)], choose **TR**. For [**-clip** (**no**|**yes**)], choose **no**.

2.16.2.3 Configuring PNNI SPVC Parameters

Pacing parameters regulate the call setup cycle for SPVCs that are “down” (established, but currently not active). The pacing cycle is as follows:

1. Attempt the *<number>* of SPVC call setups for down SPVCs.
2. Pause for *<interval>* seconds.
3. Go to step 1.

Rerouting parameters regulate whether or not to evaluate the efficiency of the routes used by the “up” (established and currently active) PNNI SPVCs. If enabled, the rerouting cycle is as follows:

1. Check the current call routing cost for the *<number>* of up PNNI SPVCs. (The call routing cost is the sum of all the link costs over the call route. The **conf uni new** command lets you configure the link cost. The current cost for a particular SPVC can be obtained by using the **conf spvc pnni show advanced** command.)
2. Check to see if better (new call routing cost is less by *<threshold>* percentage) routes are available. If so, disconnect and reroute (attempting to reconnect using the pacing cycle) those that can be improved and go to step 3. If not, go to step 3.
3. Pause for *<interval>* seconds.
4. Go to step 1.

Type **parameters ?** at the **pnni** level to display the available subcommands.

```
localhost::configuration spvc pnni> parameters ?
  pacing>          reroute>
```

2.16.2.3.1 Configuring Pacing for PNNI SPVCs

If a switch has a large number of SPVCs configured in the CDB, it tries to open the SPVCs all at once when it reboots. Therefore, it is advantageous to pace the number of SPVCs that are opened at once, so that each is serviced properly. This command allows you to set the SPVC controller to open only the configured number of SPVCs and to schedule itself for callback after the specified time interval if there are more SPVCs to be opened, both at start up and at the retry callback. You can display the list of available subcommands by typing **pacing ?** at the **parameters** level.

```
localhost::configuration spvc pnni parameters> pacing ?
  interval         number           show
```

2.16.2.3.1.1 Setting the PNNI SPVC Pacing Interval

This command allows you to change the interval between call setup attempts for SPVCs that are down. Enter the following parameters:

```
localhost::configuration spvc pnni parameters pacing> interval <seconds>
```

seconds Indicates the interval in seconds between call setup attempts. Values can be from `1` to `300` seconds. The default is `2` seconds.

2.16.2.3.1.2 Setting the Number of PNNI SPVC Calls

This command lets you configure the number of calls to attempt after each interval for SPVCs that are down. Enter the following parameters:

```
localhost::configuration spvc pnni parameters pacing> number <count>
```

count Indicates the number of call setups to attempt. Values can be from `1` to `1000`. The default is `20` calls.

2.16.2.3.1.3 Displaying the PNNI SPVC Pacing Parameters

This command lets you display the parameters that have been set for attempting call setups between down PNNI SPVCs. Enter the following parameters:

```
localhost::configuration spvc pnni parameters pacing> show

Pacing will setup 20 calls per cycle with 2 seconds between cycles.
```

2.16.2.3.2 Configuring Rerouting for PNNI SPVCs

Sometimes SPVCs are forced to use a less than optimal route because of temporary link failures or because of an inconsistent routing database. This command lets you configure the SPVC controller to check for SPVCs that are using less than optimal routes and reroute them if a better route becomes available. A path is considered “better” than another path if its administrative weight is lower by a specified percentage. You can display the list of available subcommands by typing **`reroute ?`** at the **`parameters`** level.

```
localhost::configuration spvc pnni parameters> reroute ?
  interval          number            show              threshold
```

2.16.2.3.2.1 Setting the Interval for Rerouting PNNI SPVCs

This command lets you indicate the number of seconds between callbacks to the SPVC controller to reroute PNNI SPVCs. Enter the following parameters:

```
localhost::configuration spvc pnni parameters reroute> interval <seconds>
```

seconds Indicates the time interval, in seconds, between successive callbacks to the SPVC controller to check for and reroute existing SPVC connections if a better path becomes available. The default is `10` seconds. The range of valid values is `1` to `3600`, inclusive.

2.16.2.3.2.2 Setting the Number of Reroutes for PNNI SPVCs

At each interval between reroutes, you can check a certain number of the active SPVCs to see if they are using optimal routes. This command lets you determine the number of SPVCs that are analyzed at each interval.

```
localhost::configuration spvc pnni parameters reroute> number <count>
```

count Indicates how many up SPVCs, per interval, will be analyzed to determine whether or not those SPVCs need to be rerouted. The default is `20` SPVCs. The range of valid values is `1` to `1000`, inclusive.

2.16.2.3.2.3 Displaying PNNI SPVC Reroute Information

This command lets you display information about PNNI SPVC rerouting. Enter the following parameters:

```
localhost::configuration spvc pnni parameters reroute> show

Rerouting analyzes 20 calls per cycle with 10 seconds between cycles.
The new call routing cost must show a 50 percent improvement over
the current call routing cost before the call is rerouted.
```

2.16.2.3.2.4 Setting the Improvement Threshold for Rerouting

This command lets you configure the routing cost improvement percentage against which the SPVCs are analyzed to see if there is a better route available. Enter the following parameters:

```
localhost::configuration spvc pnni parameters reroute> threshold <percent>
```

percent Indicates the minimum percentage improvement in the cost that the new SPVC path must have over the current SPVC path before a reroute is performed. The default value is `50` percent. The range of valid values is `1` to `99`, inclusive.

2.16.2.4 Displaying PNNI SPVC Information

This command allows you to display all of the PNNI SPVCs that originate and terminate on an individual switch fabric. By entering **show ?**, you can list the various ways of displaying PNNI SPVC information as follows:

```
localhost::configuration spvc pnni> show ?
usage: show [<spvcid>] [(orig | term)] [(advanced)]
```

show By entering **show** with no arguments, basic information is displayed for all originating and terminating PNNI SPVCs associated with this switch.

spvcid By entering **show** with a specific *<spvcid>*, lists basic information for only that PNNI SPVC.

orig By entering **show** with **orig**, basic information is displayed for all originating PNNI SPVCs associated with this switch.

term By entering **show** with **term**, basic information is displayed for all terminating PNNI SPVCs associated with this switch.

advanced By entering **advanced** with **show** or with **show** and another option, basic and advanced information is displayed for the PNNI SPVCs specified in the option.

For example, to display basic information about all PNNI SPVCs on this switch, enter the following parameters:

```
localhost::configuration spvc pnni> show
Originating PNNI SPVCs:
       Source             Destination
 INDEX PORT VPI  VCI  UPC PORT VPI  VCI  UPC VPVC-SEL STATE
 16451 1A1  0    100  0   1B1  any  any  0   noPref   down
       Destination: 0x47.0005.80.ffe100.0000.f21b.19cd.0020480d0008.00
 24341 1A1  0    101  0   1B1  0    32   0   noPref   up
       Destination: 0x47.0005.80.ffe100.0000.f21b.19c3.0020480d0008.00
Terminating PNNI SPVCs:
       Source         Destination
 INDEX PORT VPI  VCI  PORT VPI  VCI  STATE
 11    1B1  0    100  1A3  0    32   up
       Source: 0x47.0005.80.ffe100.0000.f21b.19c3.0020480d0008.00
```

The fields in this display are defined as follows:

Source INDEX Displays the index number assigned to this PNNI SPVC by AMI to identify it uniquely from other PNNI SPVCs that have this switch fabric as their source.

Source PORT Shows the port number on the local switch fabric for this PNNI SPVC.

Source VPI Shows the virtual path number on the local switch fabric for this PNNI SPVC. any means that the user did not specify the VPI to be used at the destination.

Source VCI Shows the virtual channel number on the local switch fabric for this PNNI SPVC. any means that the user did not specify the VCI to be used at the destination.

Source UPC Displays the forward (going from the local switch fabric to the remote switch fabric) UPC contract index associated with this PNNI SPVC.

Source: Displays the NSAP ATM address for the originating side of the PNNI SPVC that corresponds with the terminating PNNI SPVC that you are displaying information about.

Destination PORT Shows the port number of this terminating PNNI SPVC at the destination end if the destination end is a FORE switch. If the port at the destination switch cannot be determined, displays a `?`.

Destination VPI Displays the virtual path number on the destination switch fabric for this PNNI SPVC.

Destination VCI Displays the virtual channel number on the destination switch fabric for this PNNI SPVC.

Destination UPC Shows the backward (going from the remote switch fabric to the local switch fabric) UPC contract index associated with this PNNI SPVC.

Destination VPVC-SEL `NoPref` means that you did not specify which VPI/VCI combination that the destination switch should use when this PNNI SPVC was created. If the destination switch is a FORE switch, the values are returned in the `Destination VPI` and `Destination VCI` fields. If the destination switch is not a FORE switch, a `?` is displayed in the `Destination VPI` and `Destination VCI` fields. `Require` means that the destination switch must use the VPI/VCI combination given when the PNNI SPVC was created.

Destination STATE Displays the state of this SPVC. Can be `up` or `down`.

Destination: Displays the NSAP ATM address for the terminating side of the PNNI SPVC that corresponds with the originating PNNI SPVC that you are displaying information about.

To display advanced and basic information about all PNNI SPVCs on this switch, enter the following parameters:

```
localhost::configuration spvc pnni> show advanced
Originating PNNI SPVC:
       Source             Destination
 INDEX PORT VPI  VCI  UPC PORT VPI  VCI  UPC VPVC-SEL   STATE
 1001  2D2  0    101  0   1D2  0    532  0   noPref     up
       Destination: 0x47.0005.80.ffe100.0000.f21b.19a1.0020480d0019.00
 BearerClass=classX,TrafficType=noIndication,TimingReq=noIndication,Clip=no
 Cost = 200, Reroute = enabled, DTL = 10, Name = N/A
 Uptime = 0 days 00:09
Originating PNNI SPVC:
       Source             Destination
 INDEX PORT VPI  VCI  UPC PORT VPI  VCI  UPC VPVC-SEL   STATE
 1004  2D2  0    101  0   1D2  0    532  0   noPref     up
       Destination: 0x47.0005.80.ffe100.0000.f21b.19a1.0020480d0019.00
 BearerClass=classX,TrafficType=noIndication,TimingReq=noIndication,Clip=no
 Cost = 200, Reroute = enabled, DTL = 23*, Name = N/A
 Uptime = 0 days 00:09
Terminating PNNI SPVCs:
       Source         Destination
 INDEX PORT VPI  VCI  PORT VPI  VCI  STATE
 11    1B1  0    100  1A3  0    32   up
       Source: 0x47.0005.80.ffe100.0000.f21b.19c3.0020480d0008.00
BearerClass=classX,TrafficType=noIndication,TimingReq=noIndication,Clip=no
Uptime = 0 days 00:01
```

The basic information fields in this display are defined as listed previously for **`configuration spvc pnni show`**. The advanced information fields in this display are defined as follows:

BearerClass Shows the broadband bearer class specified for this PNNI SPVC. Can be `classA`, `classC`, or `classX`.

TrafficType Shows the requested broadband bearer traffic type for this PNNI SPVC. Can be `noIndication`, `cbr`, or `vbr`.

TimingReq Shows the broadband bearer timing requirements for this PNNI SPVC. Can be `noIndication`, `end2endRequired` (end-to-end timing is required), or `end2endNotReqd` (end-to-end timing is not required).

Clip Shows `no` if this PNNI SPVC is not susceptible to clipping and shows `yes` if it is susceptible to clipping.

Cost Shows the current call routing cost for this originating PNNI SPVC. If the SPVC is down, shows `N/A`.

Reroute `Enable` means that this SPVC will be examined to see if it is using a sub-optimal route. If it is, it is rerouted according to the parameters in **`conf spvc pnni parameters reroute`**. `Disable` means that this SPVC will not be examined to see if it is using a sub-optimal route.

DTL Shows the Designated Transit List (DTL) index assigned to this SPVC. The DTL specifies the preferred call routing for the SVC portion of the SPVC. An asterisk (*) before the DTL index means the SVC is not currently being routed according to the specified DTL because the route in the DTL has failed or because the switch cannot locate the route.

Name Shows the optional name assigned to this PNNI SPVC to help identify it. If no name is assigned, shows `N/A`.

Last Failure Cause Displays the reason for the last call setup failure for this PNNI SPVC. This field is only displayed for originating SPVCs that are down.

Uptime If applicable, shows, in hundredths of a second, the time since this PNNI SPVC was created or the time since the last successful call setup occurred. The `STATE` shows `up`.

Downtime If applicable, shows, in hundredths of a second, the time that this PNNI SPVC has been down. The `STATE` shows `down`.

Retry Count Displays the number of times the call setup has been attempted since the PNNI SPVC was created or since the last successful call setup occurred.

If no PNNI SPVCs have been configured, you receive the following message:

```
localhost::configuration spvc pnni> show
Originating PNNI SPVCs:
 No originating PNNI SPVC information is available
Terminating PNNI SPVCs:
 No terminating PNNI SPVC information is available
```

2.17 Switch Configuration Commands

These commands allow you to configure default settings for the switch. You can display the list of available subcommands by typing **switch ?** at the **configuration** level.

```
localhost::configuration> switch ?
  callrecord>       name              pmpmaxvci         pmpminvci
  show              timezone
```

2.17.1 Configuring Call Records and Performance Monitoring

These commands let the user configure call records and performance monitoring used for billing purposes. You can display the list of available subcommands by typing **callrecord ?** at the **switch** level.

NOTE

The following commands are not available when using Series LC network modules.

```
localhost::configuration switch> callrecord ?
  new               modify            enable            disable
  delete            password          show
```

2.17.1.1 Creating Call Record and Performance Monitoring Variables

This command lets you configure new call record or performance monitoring transfer variables. Enter the following parameters:

```
localhost::conf switch callrecord> new (cr|perf) <primary-URL> <secondary-URL> <userid>\
        [-interval <recording-interval-in-minutes>]
Note: <primary-URL> and <secondary-URL> are of the form
      //<ip-address>[:port][<pathname>[<filename>]]
```

cr Indicates a new call record transfer variable.

perf Indicates a new performance monitoring transfer variable.

primary-URL Indicates the primary URL for call record transfers. The URL is in the following form:

//<ip-address>[:port][<pathname>[<filename>]]

ip-address Indicates the IP address of the host to contact.

port Indicates the port on the host to contact.

pathname Indicates the directory on the host into which the data should be put.

filename Indicates the specific filename on the host into which the data should be put.

The pathname and filename are each strings of characters consisting of the following special tokens:

%T Identifies the type of switch.

%N Indicates the “SerialNumber” for a TNX-210 or “EnclosureNumber.SerialNumber” for a TNX-1100 or MSC-900.

%I Indicates the switch’s IP address (e.g., 169.144.1.90).

%D Indicates the date and time formatted as follows: YYMMDDhhmm.

%R Indicates the interval between recordings in minutes.

%C Identifies the contents of the call record file; `account` is for call record data and `stats` is for performance monitoring data.

%F Indicates the status of the file; `co` is for the file to which the switch fabric is currently writing, `cc` is for the file to which the switch fabric has completed writing. If the pathname is not specified, the default file is transferred to the login directory specified in *<userid>*. The following string is used as the default filename in the case where the URL ends with a "/" (i.e., without any filename):

`%T_%C.%D.%R.%N.%F`

If multiple switches are to write to the same location, the pathname or filename should contain either a `%I` or a `%N` token. A `%D` token in the filename portion separates each recording interval worth of data into a different file with the name being the time that the file was created. The following example would record every switch type and switch IP into a separate directory with a file at each recording interval:

`//169.144.1.5/usr/auditlog/%T/%I/%D`

Given a TNX-210 switch with an IP address of 169.44.4.4, this would produce files in the following directory tree structure:

`/usr/auditlog/TNX210/169.44.4.4/9608252355`

If the filename specified is not made up of the above tokens, then it is used as a prefix to the default filename. If the file transfer attempt fails, the switch generates a trap and attempts a transfer to the `secondary-URL`. If the `Admin status` is `secondary-URL` and this URL is changed, the change takes effect at the next specified recording interval.

secondary-URL Indicates the URL is to be used in the event that the transfer to the primary URL is not successful. If the file transfer attempt to this URL fails as well, the switch generates a trap. If the `Admin status` is `on` and this URL is changed, the change takes effect at the next specified recording interval.

userid	Indicates the userid to be used for the data transfer sessions to the primary and secondary data servers. If the `Admin status` is `on` and this URL is changed, the change takes effect at the next recording interval.
-interval <recording-interval-in-minutes>	Indicates the interval (in minutes) at which the data is transferred to the host. The interval can be any positive integer. The default setting is `5` minutes. If the `Admin status` is `on` and this value is changed, the change takes effect at the next recording interval.

The following is an example of how to set up the variables for a call record transfer:

```
localhost::conf switch callrecord> new cr //169.14.149.90/us/bob/info/cr/swit-
cha/ //169.14.0.90/us/bob/info/cr/switcha/ bob -interval 1
```

2.17.1.2 Modifying Call Record and Performance Monitoring Variables

This command lets you modify the call record or performance monitoring transfer variables. Enter the following parameters:

```
localhost::conf switch callrecord> modify (cr|perf) [-primary <primary-URL>]\
        [-secondary <secondary-URL>] \
        [-userid <userid>] [-interval <recording-interval-in-minutes>]
Advanced options for cr:
        [-memory <percentage>] [-action <rejectCall|noRecord>]
Note: <primary-URL> and <secondary-URL> are of the form
      //<ip-address>[:port][<pathname>[<filename>]]
```

cr	Indicates a call record transfer variable to be modified.
perf	Indicates a performance monitoring transfer variable to be modified.
-primary <primary-URL>	Indicates the primary URL for call record transfers. The URL is in the following form: `//<ip-address>[:port][<pathname>[<filename>]]` Please refer to the previous section for descriptions of these variables. If the `Admin status` is `on` and this URL is changed, the change takes effect at the next recording interval.

-secondary <secondary-URL>	Indicates the URL is to be used in the event that the transfer to the primary URL is not successful. If the file transfer attempt to this URL fails as well, the switch generates a trap. If the `Admin status` is `on` and this URL is changed, the change takes effect at the next recording interval.
-userid <userid>	Indicates the userid to be used for the data transfer sessions to the primary and secondary data servers. If the `Admin status` is `on` and this URL is changed, the change takes effect at the next recording interval.
-interval <recording-interval-in-minutes>	Indicates the interval (in minutes) at which the data is transferred to the host. The interval can be any positive integer. The default setting is `5` minutes. If the `Admin status` is `on` and this value is changed, the change takes effect at the next recording interval.

The advanced options for call records are as follows:

-memory <percentage>	Indicates a percentage specifying what portion of the processor DRAM is to be reserved for call records. The default setting is `15%`. Valid values are from `1%` to `50%`. Changing this value affects the amount of memory available for signalling and routing, and may result in increased call blocking. A change in this value takes effect only after the next call record initialization (i.e., when the `Admin status` changes from `off` to `on` or when the switch (fabric) is rebooted).
-action <rejectCall| noRecord>	Indicates the action that the switch (fabric) should take if the memory allocated for call records runs out. Choosing `rejectCall` means that the call should be rejected. Choosing `noRecord` means that the call should be allowed, but no call record should be generated for that call. The default setting is `rejectCall`. If this value is changed, it takes effect immediately.

The following is an example of how to modify the variables for a call record transfer:

```
localhost::configuration switch callrecord> modify cr -action noRecord
```

2.17.1.3 Enabling Call Record and Performance Monitoring Transfers

This command allows you to enable (turn on) call record transfers or performance monitoring transfers for the switch (fabric). Enter the following parameters:

```
localhost::configuration switch callrecord> enable perf
or   cr [-memory <percentage>] [-action <rejectCall|noRecord>]
```

perf Indicates that the performance monitoring feature is to be enabled.

cr Indicates that the call record feature is to be enabled.

-memory <percentage> Indicates a percentage specifying what portion of the processor DRAM is to be reserved for call records. The default setting is `15%`. Valid values are from `1%` to `50%`. Changing this value affects the amount of memory available for signalling and routing, and may result in increased call blocking. A change in this value takes effect only after the next call record initialization (i.e., when the `Admin status` changes from `off` to `on` or when the switch (fabric) is rebooted).

-action <rejectCall| noRecord> Indicates the action that the switch (fabric) should take if the memory allocated for call records runs out. Choosing `rejectCall` means that the call is rejected. Choosing `noRecord` means that the call is allowed, but no call record is generated for that call. The default setting is `rejectCall`. If this value is changed, it takes effect immediately.

The following is an example of how to enable a call record transfer:

```
localhost::configuration switch callrecord> enable cr -memory 20 -action
noRecord
```

NOTE

If you have call recording or performance monitoring enabled, and you wish to change the switch time or date using **`oper date`**, disable call recording or performance monitoring first using **`conf switch callrecord disable cr`** or **`conf switch callrecord disable perf`**. Otherwise, your billing records will not be accurate.

2.17.1.4 Disabling Call Record and Performance Monitoring Transfers

This command allows you to disable (turn off) call record transfers or performance monitoring transfers for the switch (fabric). Enter the following parameters:

```
localhost::configuration switch callrecord> disable (cr|perf)
```

cr|perf Indicates whether call record (`cr`) transfers or performance record (`perf`) transfers are being disabled. Both are disabled by default.

The following is an example of how to disable a call record transfer:

```
localhost::configuration switch callrecord> disable cr
Are you sure you want to disable Callrecords [n]? y
Callrecords disabled
```

NOTE Disabling call records or performance monitoring means that this information will not be recorded or transferred. However, the configuration information for the transfer variables (i.e., the primary URL, secondary URL, recording interval) will still be present.

2.17.1.5 Deleting Call Record and Performance Monitoring Transfer Variables

This command allows you to delete call record transfer variables or performance monitoring transfer variables. Enter the following parameters:

```
localhost::configuration switch callrecord> delete (cr|perf)
```

cr|perf Indicates whether the call record (`cr`) transfer variables or the performance record (`perf`) transfer variables are being deleted.

The following is an example of how to delete call record transfer variables:

```
Are you sure you want to delete Callrecords configuration [n]? y
Callrecords configuration deleted.
localhost::configuration switch callrecord> show
Callrecords has not been configured.
```

2.17.1.6 Setting the Data Server Password

This command allows you to change the data server password for call records or for performance monitoring. Enter the following parameters:

```
localhost::configuration switch callrecord> password (cr|perf)
```

password Indicates the password to be used for the data transfer sessions to the primary and secondary data servers.

cr|perf Indicates whether the password being set is for call records (`cr`) or for performance records (`perf`).

```
localhost::configuration switch callrecord> password cr
Enter password:
Retype new password:
```

NOTE For security reasons, the switch will not echo your password, but will ask you to confirm the password by retyping it.

NOTE If the `Admin status` is `on` and the password is changed, the change takes effect at the next recording interval.

2.17.1.7 Displaying Call Record and Performance Monitoring Information

This command allows you to display call records or performance monitoring information for the entire switch fabric. Enter the following parameters:

```
localhost::configuration switch callrecord> show (cr|perf)[advanced]
```

```
localhost::configuration switch callrecord> show cr
   Admin status                      = on
   Primary URL                       = //169.14.149.90/us/bob/info/cr/switcha/
   Secondary URL                     = //169.14.0.90/us/bob/info/cr/switcha/
   Recording interval                = 1
   Data server userid                = bob
```

The fields in this display are defined as follows:

Admin status Shows whether call recording is `on` (enabled) or `off` (disabled). By default, it is set to `off`. If it is changed, it takes effect immediately.

Primary URL Shows the primary URL for call record or performance monitoring transfers.

Secondary URL Shows the URL is to be used in the event that the transfer to the primary URL is not successful.

Recording interval Shows the interval (in minutes) at which the the relevant information is transferred to the host. The default setting is 5 minutes.

Data server userid Shows the userid to be used for the data transfer sessions to the primary and secondary data servers.

To display advanced information for call records or performance monitoring, enter the following parameters:

```
localhost::configuration switch callrecord> show cr advanced
   Admin status                       = on
   Primary URL                        = //169.14.149.90/us/bob/info/cr/switcha/
   Secondary URL                      = //169.14.0.90/us/bob/info/cr/switcha/
   Recording interval                 = 1
   Data server userid                 = bob
   Memory allocated                   = 20 percent
   Memory overflow action             = dontRecordCall
   Failed primary data transfers      = 0
   Failed secondary data transfers    = 0
   File transfer status               = 0
   File transfer error message        =
   Primary trap status                = crXfrNoError
   Secondary trap status              = crXfrNoError
```

The fields in this display are defined as follows:

Admin status Shows whether call recording is `on` (enabled) or `off` (disabled). By default, it is set to `off`. If it is changed, it takes effect immediately.

Primary URL Shows the primary URL for call record or performance monitoring transfers.

Secondary URL	Shows the URL is to be used in the event that the transfer to the primary URL is not successful.
Recording interval	Shows the interval (in minutes) at which the the relevant information is transferred to the host. The default setting is `5` minutes.
Data server userid	Shows the userid to be used for the data transfer sessions to the primary and secondary data servers.
Memory allocated	Shows a percentage specifying what portion of the processor DRAM is to be reserved for call records. The default setting is `15%`. Valid values are from `1%` to `50%`.
Memory overflow action	Shows the action that the switch (fabric) should take if the memory allocated for call records runs out. Choosing `rejectCall` means that the call should be rejected. Choosing `dontRecordCall` means that the call should be allowed, but no call record is generated for that call. The default setting is `rejectCall`.
Failed primary data transfers	Shows the number of failed data transfers to the primary data server.
Failed secondary data transfers	Shows the number of failed data transfers to the secondary data server.
File transfer status	Shows one of the following messages describing the status of the current file transfer: `primaryInProgress`, `secondaryInProgress`, `primarySucceeded`, `secondarySucceeded`, `bothFailed` If the data transfer is not successful, refer to the message in the Primary Trap Status or Secondary Trap Status field.
File transfer error message	Displays a text message describing the status of the last failed file transfer.

Primary trap status Shows the trap status of the file transfer to the primary URL. The trap status is `crXfrNoError` at the start of the data transfer process. If an error condition occurs, a trap is generated and this field is updated to reflect one of the following error conditions: `crXfrNoResponseFromServer`, `crXfrAccessViolation`, `crXfrDiskFullorAllocationExceeded`, `crXfrOtherError`.

Secondary trap status Shows the trap status of the file transfer to the secondary URL. The trap status is `crXfrNoError` at the start of the data transfer process. If an error condition occurs, a trap is generated and this field is updated to reflect one of the error conditions listed above.

If call records have not been configured on this switch fabric, you receive the following message:

```
localhost::configuration switch callrecord> show cr
Callrecords not configured.
```

If performance monitoring has not been configured on this switch fabric, you receive the following message:

```
localhost::configuration switch callrecord> show perf
Performance monitoring not configured.
```

NOTE

Currently, the only utilities that are available to aid in post-processing for call records and performance monitoring data are through *ForeView*. These utilities convert the call record and performance record file data from binary to ASCII format so that the information can be imported into databases or spreadsheet programs. For more information about these utilities, please refer to the *ForeView User's Manual*.

2.17.2 Setting or Changing the Switch Name

This command enables you to set or change the name of the switch. The switch name is shown on the front panel display LED. Enter the following parameters:

```
localhost::configuration switch> name <name>
```

name Indicates the new host name for the switch.

2.17.3 Setting the Maximum Number of Reserved VCIs for PMPs

This command lets you change the upper end of the range of the block of VCIs that are reserved for point-to-multipoint (PMP) SVCs on all paths and all ports on this switch fabric. This range defaults to 155-255, which ensures that 101 PMP SVCs can always be created regardless of the number of point-to-point (PP) SVCs. PVCs can be created on these VCIs, but no PP SVCs may use these VCIs. PMP SVCs attempt to allocate a VCI outside this range only if all of the VCIs in the range have already been allocated.

You should change the default range only if the number of PMP SVCs that the switch must always be able to set up is greater than 101. Each LANE 1.0 ELAN requires two or three PMP SVCs, so if you are using more than 33 ELANs, you should increase the PMP reserved VCI range. However, since older versions of software only support up to 255 VCIs and since all output paths must support the entire range, it is better to lower the minimum reserved PMP VCI instead of increasing the maximum.

NOTE This command is applicable only for TNX-1100s, MSC-900s, and for all other switches running in non-extended mode. For more information about non-extended mode, please see the *TNX ATM Switch Installation and Maintenance Manual.*

Enter the following parameters:

```
localhost::configuration switch> pmpmaxvci <vci>
```

vci Indicates the top number for the range of VCIs to be reserved for PMP SVCs. The default is 255.

2.17.4 Setting the Minimum Number of Reserved VCIs for PMPs

This command lets you change the lower end of the range of the block of VCIs that are reserved for point-to-multipoint (PMP) SVCs on all paths and all ports on this switch fabric. This range defaults to 155-255, which ensures that 101 PMP SVCs can always be created regardless of the number of point-to-point (PP) SVCs. PVCs can be created on these VCIs, but no PP SVCs may use these VCIs. PMP SVCs attempt to allocate a VCI outside this range only if all of the VCIs in the range have already been allocated.

You should change the default range only if the number of PMP SVCs that the switch must always be able to set up is greater than 101. Each LANE 1.0 ELAN requires two or three PMP SVCs, so if you are using more than 33 ELANs, you should increase the PMP reserved VCI range. However, since older versions of software only support up to 255 VCIs and since all output paths must support the entire range, it is better to lower the minimum reserved PMP VCI instead of increasing the maximum.

NOTE

This command is applicable only for TNX-1100s, MSC-900s, and for all other switches running in non-extended mode. For more information about non-extended mode, please see the *TNX ATM Switch Installation and Maintenance Manual.*

Enter the following parameters:

```
localhost::configuration switch> pmpminvci <vci>
```

vci Indicates the bottom number for the range of VCIs to be reserved for PMP SVCs. The default is `155`.

For example, to set the minimum reserved VCI to 100, which effectively increases the PMP reserved VCI range to support the creation of 156 PMP SVCs, enter the following parameters:

```
localhost::configuration switch> pmpminvci 100
```

2.17.5 Displaying the Switch Configuration

This command lets you display switch configuration information including the switch name, the type of switch, the amount of time (in days, hours, and minutes) since the switch has been rebooted, the hardware version, the software version, the number of maximum virtual paths, the number of maximum virtual channels, the SPANS address of the switch, the range of the minimum and maximum number of reserved VCIs for point-to-multipoint connections, and the time zone set for the switch. Enter the following parameters:

```
localhost::configuration switch> show
Switch 'fishtank', Type asx200bx, up 2 days 19:40
Hardware version B, Software version S_ForeThought_4.1.0 (1.73)
Maximum Virtual Path Connections        32768
Maximum Virtual Channels                16384
SPANS address                           00000038f2150e87
PMP Minimum Reserved VCI                155
PMP Maximum Reserved VCI                255
Switch TimeZone                         N/A
```

NOTE

If the display reads 'ATM Switch' in the Switch field in the first line, this indicates that the switch name has not been set. Use the **configuration switch name** command to assign a name.

NOTE

If the Switch TimeZone field reads N/A, then this value has not been configured yet.

2.17.6 Setting the Time Zone

This command lets you set the time zone for your switch. Enter the following:

```
localhost::configuration switch> timezone <timezone>
```

timezone The time zone configured for this ATM switch. The switch supports and automatically converts from Standard to Daylight Savings time for the following time zones: `EST5EDT` (Eastern Standard Time), `CST6CDT` (Central Standard Time), `MST7MDT` (Mountain Standard Time), `PST8PDT` (Pacific Standard Time), `AKST9AKDT` (Alaska Standard Time).

Locations outside of the time zones listed above must supply the following POSIX standard 1003.1-1988 formula for switching between Daylight Savings Time and Standard Time:

stdoffset [dst[offset][, start[/time], end[/time]]]

std and dst Indicates 3 or more bytes that designate standard (`std`) or Daylight Savings Time (`dst`). Only `std` is required; if `dst` is omitted, then it does not apply in this location. Can use uppercase or lowercase letters and any characters, except a leading colon(:), digits, comma (,), minus (-), plus (+), and ACSII NUL.

offset Indicates the value to add to local time to equal Greenwich Mean Time. `offset` is of the form:

hh[:mm[:ss]]

Hour (`hh`) is required and can be a single digit between `0` and `24`. Minutes (`mm`) and seconds (`ss`) are optional and are between `0` and `59`. If no `offset` follows `dst`, it is assumed to be one hour ahead of `std`. If preceded by a “`-`”, the time zone is east of the Prime Meridian; otherwise it is west (with an optional “`+`”).

start[/time], end[/time] `start` indicates the date when the change occurs from `std` to `dst`. `end` indicates the date when you change back. Both `start` and `end` are of the form:

Mm.n.d

`d` is the `d`-th day ($0 \leq d \leq 6$) of week `n` of month `m` of the year ($1 \leq n \leq 5, 1 \leq m \leq 12$), where week 5 is the last `d` day in month `m`, which can occur in either the fourth or the fifth week). Week 1 is the first week in which the `d`-th day occurs. Day 0 is Sunday. `time` is of the same format as `offset`, except that no leading "`-`" or "`+`" is allowed. If `time` is not entered, the default of `02:00:00` is used.

2.18 System Configuration Commands

These commands let you configure system message log features, configure the amount of time of non-activity after which an AMI session times out, and change the units for designating UPC contracts. You can display the list of available subcommands by typing **system ?** at the **configuration** level.

```
localhost::configuration> system ?
  show             dualscp>         syslog>          timeout
  units
```

2.18.1 Displaying System Information

This command lets you display the amount of time of non-activity after which an AMI session will time out and display what type of units will be used when designating UPC contracts. You can get to this level by entering **show** at the **system** level. Enter the following parameters:

```
localhost::configuration system> show
AMI Session Timeout                                        60
UPC Units                                                  cps
```

AMI Session Timeout Shows the number of minutes of no activity after which an AMI session will time out and exit you out of the session. The default is 5 minutes. A value of 0 means that the AMI session will not time out.

UPC Units Cps indicates that UPC contracts are being configured and displayed in cells per second. Kbps means that UPC contracts are being configured and displayed in kilobits per second. The default is cps.

2.18.2 Dual SCP Configuration Commands

These commands let you configure failover support in the TNX-210, TNX-1100, and the MSC-900 when two SCPs are installed in a single switch fabric.

NOTE Only SCP-ASXHAs, or later, support the dual SCP configuration. Using an earlier version SCP in a redundant configuration can cause irreparable damage to SCP or switch fabric.

NOTE For proper synchronization of information between SCPs, ensure that the amount of free space on both SCPs is roughly equal before performing these commands.

```
localhost::configuration system> dualscp ?
  autoremove        autosync          failover          primary
  reset             show              switchover        synchronize
  threshold
```

2.18.2.1 Configuring Dual SCP Automatic File Removal

You can configure the standby SCP to automatically delete unused files (i.e., old versions of switch software), if necessary, when files are being synchronized by the controlling SCP. Enter the following to enable or disable the `autoremove` feature:

```
localhost::configuration system dualscp> autoremove (enable | disable)
```

enable Indicates that `autoremove` is enabled on the standby SCP. When enabled, the SCP automatically deletes unused files and directories as needed.

disable Indicates that `autoremove` is disabled on the standby SCP. If disabled, you are not prompted and synchronization attempts fail in the event that there is not enough free space in FLASH. This is the default.

2.18.2.2 Configuring Dual SCP Automatic Synchronization

When in dual SCP mode, you can configure the controlling SCP to perform file automatic synchronization with the **`autosync`** command. If `autosync` is enabled, the CDB is saved to the standby SCP every time the CDB is written to FLASH on the controlling SCP. The standby SCP then rereads the CDB once it has been completely received. In addition, you can configure the controlling SCP to automatically copy the password file to the standby SCP if changes are made to it.

NOTE

The automatic synchronization of the CDB and password file can be disabled, but you must remember to manually update these files to the standby SCP when they are modified on the controlling SCP.

To configure automatic synchronization, enter the following at the prompt:

```
localhost::configuration system dualscp> autosync (enable | disable)
```

enable Indicates that automatic synchronization will be enabled on the SCP. This is the default.

disable Indicates that automatic synchronization will not be enabled on the SCP.

CAUTION

Enabling `autosync` does not cause the automatic synchronization of switch software; only the CDB, password file, and other system configuration files are synchronized.

2.18.2.3 Configuring SCP Failover

This command lets you enable or disable failover to a second SCP in the event of a hardware failure on the controlling SCP.

CAUTION

If failover is disabled, the standby SCP will not take control of the switch fabric if the controlling SCP fails, regardless of how other `dualscp` parameters are set.

To configure failover, enter the following at the prompt:

```
localhost::configuration system dualscp> failover (enable | disable)
```

enable Indicates that SCP failover will be enabled. This is the default.

disable Indicates that SCP failover will be disabled.

2.18.2.4 Configuring the Controlling SCP

This command lets you designate which SCP is to control the switch at start-up. To designate the primary SCP, enter the following at the prompt:

```
localhost::configuration system dualscp> primary (X | Y)
```

X Indicates that the SCP in the left slot of the TNX-210 switch fabric (the top slot in a TNX-1100 or MSC-900) is the primary SCP. This is the default.

Y Indicates that the SCP in the right slot of the TNX-210 switch fabric (the bottom slot in a TNX-1100 or MSC-900) is the primary SCP.

NOTE

The primary SCP and the controlling are not necessarily the same. “Primary” refers to the SCP that is supposed to control the switch after it boots. “Controlling” refers to the SCP that actually controls the switch. For example, if the SCP in slot X fails at start-up, the SCP in slot Y will control the switch even though it is not designated as the primary SCP.

2.18.2.5 Resetting the Standby SCP

This command lets you force the standby SCP to reboot. To do this, enter the following at the prompt:

```
localhost::configuration system dualscp> reset
```

You are asked to confirm this command. Type **y** at the prompt to reset the standby SCP. Type **n** or press **<Enter>** at the prompt to cancel the command.

```
localhost::configuration system dualscp> reset
Reset the standby processor [n]? n
```

2.18.2.6 Displaying Dual SCP Information

This command lets you display the settings for dual SCP mode. To view these settings, enter the following at the prompt:

```
localhost::configuration system dualscp> show
                                          Auto    CDB       Sync     Sync
SCP State      Primary Failover Threshold Remove  SyncMode  Requests Failures
3X  standalone X       enable   2 secs    disable automatic        0        0
Synchronization queue: empty
Synchronization state: Suspended
```

The fields in the above display have the following meanings:

SCP Shows the SCP for which the statistics are being displayed. In the above example, 3X indicates that statistics for the SCP in slot X of switch fabric 3 are being displayed.

State Shows the state of the SCP. `standalone` indicates that there is only one SCP in the switch fabric. `dual` indicates that there are two SCPs installed in the switch fabric, and the SCPs are communicating with one another. `other` indicates that there are two SCPs installed in the switch fabric, but they are not communicating with one another.

Primary Shows which SCP (X or Y) is the primary SCP. The SCP in slot X is set to `primary` by default.

Failover Shows whether or not failover is enabled on the switch fabric. `failover` is enabled by default.

Threshold Shows the amount of time, in seconds, that the standby SCP waits to receive a heartbeat from the controlling SCP before taking control of the switch. The minimum and default threshold value is `2` seconds.

Auto Remove Shows whether or not `autoremove` is enabled on the standby SCP. `autoremove` is disabled by default.

CDB SyncMode `automatic` means that CDB synchronization occurs automatically (`autosync` is enabled on the controlling SCP). `manual` means that CDB synchronization does not occur automatically (`autosync` is disabled on the controlling SCP). The default is `automatic`.

Sync Requests Shows the number of synchronization requests that have been made between the controlling and standby SCP.

Sync Failures Shows the number of synchronizations requests that have failed between SCPs.

Synchronization queue Shows how many synchronization requests are waiting to be processed.

Synchronization state Shows the state of the current synchronization attempt between the controlling and standby SCP. `Suspended` means either that the switch is not in dual SCP mode, or that the SCPs are running different versions of switch software. `Idle` means that synchronization is not taking place between SCPs. `Manual` means that a manual synchronization is taking place between SCPs. `Automatic` means an automatic synchronization is taking place between SCPs.

NOTE When manual or automatic synchronization is taking place between SCPs, the name of the file being synchronized is also displayed.

2.18.2.7 Switching over to the Standby SCP

If you wish to force the standby SCP to take control of the switch, this command provides the ability to force a switchover from the controlling to the standby SCP. To force the standby SCP to take control of the switch, enter the following at the prompt:

```
localhost::configuration system dualscp> switchover
```

You will be asked to confirm this command. Type **y** at the prompt to reset the backup SCP. Type **n** or press **<Enter>** at the prompt to cancel the command.

```
localhost::configuration system dualscp> switchover
Switch over to the standby processor [n]? n
```

2.18.2.8 Synchronizing Files Manually

To ensure a reliable failover mechanism, the information contained on both SCPs should be synchronized. Synchronizing the FLASH between SCPs is requested manually by the user via AMI. The CDB, password file, LECS configuration, and switch software version can also be synchronized between SCPs. If free space on the FLASH of the standby SCP is depleted during a synchronization attempt, the standby SCP removes unused files and directories if `autoremove` is enabled. However, if `autoremove` is enabled, and there are no files that can be deleted, the synchronization attempt fails. If `autoremove` is disabled, the synchronization attempt fails. To synchronize information between SCPs, enter the following:

```
localhost::conf system dualscp> synchronize (Flash | CDB | LECS | OS | Password
| Init)
```

Flash Indicates that all directories and files in FLASH on the controlling SCP will be copied to the standby SCP.

CDB Indicates that the Configuration Database (CDB) will be copied from the controlling to the standby SCP.

LECS Indicates that the LAN Emulation Configuration Services (LECS) configuration file will be copied from the controlling to the standby SCP.

OS Indicates that the switch software will be copied from the controlling SCP to the standby SCP.

NOTE

Only the version of switch software to which `CURRENT` is pointing is copied to the standby SCP.

Password Indicates that the password file will be copied from the controlling SCP to the standby SCP.

Init Indicates that the FLASH on the standby SCP will be re-initialized.

CAUTION

Using the `Init` option formats the FLASH on the standby SCP. This removes all information on the FLASH.

2.18.2.9 Setting the Failover Threshold

This command lets you set the threshold time, in seconds, that the standby SCP will wait to receive a heartbeat from the controlling SCP before taking control of the switch. Enter the following at the prompt:

```
localhost::configuration system dualscp> threshold <seconds>
```

seconds Indicates the threshold time, in seconds, that the standby SCP waits for a heartbeat from the controlling SCP. The minimum and default value is 2 seconds.

2.18.3 System Log Configuration Commands

Syslog is a tool that can send system messages to be logged to a user-specified remote host. These commands let you configure the address of the remote syslog host and whether or not these messages are sent to the console. Enter **`syslog ?`** at the **`system`** level to show the list of available **`syslog`** commands.

```
localhost::configuration system> syslog ?
  show              set               delete            console
```

2.18.3.1 Displaying the Address of the System Log Host

This command allows you to display the address of the host to which the switch's system messages are logged. Enter the following parameters:

NOTE This command is only available on the local switch.

```
localhost::configuration system syslog> show
Remote Syslog Host: 169.144.1.216
Syslog Facility: daemon
```

If the host's address has never been set, or if it has been deleted and not set again, the following is shown:

```
localhost::configuration system syslog> show
No remote syslog host set. Syslog messages will not be sent.
Syslog Facility: daemon
```

2.18.3.2 Setting the Address of the System Log Host

This command sets the address of the host to which the switch's system messages are being logged. You may also opt to assign a specific facility name so that the remote syslog can automatically differentiate between switches with different facilities. Enter the following parameters:

NOTE This command is only available on the local switch.

```
localhost::configuration system syslog> set <address> [<facility>]
```

address Indicates the IP address of the remote host to which the switch's system message logs are sent.

facility Indicates the user-assigned name that identifies the facility this switch sends syslogs on. The default is `daemon`. Other valid values are `local0` through `local7`. The names may be assigned in any order.

For example, to have a host with the address 192.88.243.118 be the recipient of the system log messages and to designate this switch's facility name as `local2`, enter the following parameters:

```
localhost::configuration system syslog> set 192.88.243.118 local2
Remote Syslog Host: 192.88.243.118
Syslog Facility is now local2
```

To assign the facility for other switches in your network, you must log in to each one locally and set the facility. You must keep track of which facility was assigned to each switch. Then, when you view the contents of the syslog file, they can be separated according to facility when messages from different facilities are logged on the same remote host.

NOTE If the switch panics, the panic file is automatically written to the syslog, provided that a syslog host had been set prior to the panic. This is especially useful if multiple panics occur, so that each is recorded.

2.18.3.3 Deleting the Address of the System Log Host

This command allows you to delete the address of the host to which the switch's system messages are being logged. Enter the following parameters:

NOTE This command is only available on the local switch.

```
localhost::configuration system syslog> delete

Remove 192.88.243.118 as remote syslog host [n]? y
Remote syslog host removed. Syslog messages will not be sent.
Syslog Facility: local7
```

The switch prompts you to confirm that the address should be deleted. Entering **y** causes the switch to delete the address, as shown above. If you do not want the address to be deleted, enter **n** or press **<RETURN>** and you will be sent back to the **syslog** prompt.

Once the host's address has been deleted, the switch's system messages are no longer logged until a new host address is set. However, if a facility has been assigned to the switch, that facility assignment remains intact. So if you assign another host without changing the facility, the new host will list this switch's syslog messages under the same facility. For example,

```
localhost::configuration system syslog> show
Remote Syslog Host: 169.144.48.41
Syslog Facility: local7

localhost::configuration system syslog> delete
Remove 169.144.48.41 as remote syslog host [n]? y
Remote syslog host removed. Syslog messages will not be sent.

localhost::configuration system syslog> show
No remote syslog host set. Syslog messages will not be sent.
Syslog Facility: local7

localhost::configuration system syslog> set 204.95.89.84
Remote Syslog Host: 204.95.89.84

localhost::configuration system syslog> show
Remote Syslog Host: 204.95.89.84
Syslog Facility: local7
```

2.18.3.4 Turning Off or Turning On System Log Messages to the Console

The system log messages may be directed to three places: to syslog, to the console, and to a remote host. These types of switches are defaulted to send log messages to both the console and to syslog. The **`console`** command can be used in different ways.

To display whether or not log messages are being output to the console, enter **`console`** without any arguments as follows:

```
localhost::configuration system syslog> console
```

If the messages are being sent to the console, the following message is shown:

```
Syslog console output is currently ON.
```

If the messages are not being directed to the console, the following message is displayed:

```
Syslog console output is currently OFF.
```

To enable log messages to be sent to the console, or to stop log messages from being output to the console, enter **`console`** with the appropriate argument as follows:

```
localhost::configuration system syslog> console [enable|disable]
```

enable Indicates that all log messages will be written to the console.

disable Indicates that no log messages will be written to the console.

2.18.4 AMI Timeout Configuration Command

This command lets you set the amount of time of non-activity after which an AMI session will time out. You can get to this level by entering **`timeout`** at the **`system`** level. Enter the following parameters:

```
localhost::configuration system> timeout [<minutes>]
```

minutes Indicates the number of minutes of non-activity after which an AMI session will time out and exit you out of the session. The default is `5` minutes. To configure the switch so that an AMI session does not time out, enter `0`. It is displayed as `off` when you use **`configuration system show`**.

2.18.5 Configuring the Units for UPC Contracts

This command allows you to change the type of units that are being used when configuring and displaying UPC contracts. You can get to this level by entering **`units`** at the **`system`** level. Enter the following parameters:

```
localhost::configuration system> units (cps | kbps)
```

units Using `cps` indicates that UPC contracts are being configured and displayed in cells per second. Using `kbps` means that UPC contracts are being configured and displayed in kilobits per second. The default is `cps`.

2.19 Topology Configuration Commands

These commands allow you to manage the *ForeThought* PNNI topology information and the SPANS topology information of the switch fabric. You can display the list of available subcommands by typing **topology ?** at the **configuration** level.

```
localhost::configuration> topology ?
  forepnni>        spans>
```

2.19.1 *ForeThought* PNNI Configuration Commands

These commands allow you to modify various aspects of *ForeThought* PNNI on a switch. You can display the list of available subcommands by typing **forepnni ?** at the **topology** level.

```
localhost::configuration topology> forepnni ?
  prefix           border           swmask           pgmask
  hello            nsapindication   staticupdate     maxhop
  propmult         minthresh        vcmark           pgsncost
  show
```

2.19.1.1 Setting the *ForeThought* PNNI Switch Prefix

When using *ForeThought* PNNI, a switch fabric is identified by an NSAP switch prefix which consists of 13 fixed bytes. The variable 13 byte mask configured using **conf topology forepnni swmask** determines which bytes are actually significant. This command lets you set the *ForeThought* PNNI prefix on the switch. Enter the following parameters:

```
localhost::configuration topology forepnni> prefix <prefix>
```

prefix Indicates the default NSAP prefix for this ATM switch that is used in the ILMI address registration message and in the hello indication SPANS-NNI message.

NOTE The switch software must be restarted for this command to take effect, so you must be in a local AMI session to perform this command.

AMI Configuration Commands

2.19.1.2 Changing the *ForeThought* PNNI Border Switch Functionality

A switch that has a link to another switch that belonging to a different peergroup is considered a border switch. A border switch advertises reachability to its peergroup to switches outside of its peergroup, but it does not share its peergroup's topology with the other switches. You should enable border switch functionality on all switches that are on the outside edges of all of the peergroups that you have established. This command lets you designate whether or not this switch will act as a *ForeThought* PNNI border switch. Enter the following parameters:

```
localhost::configuration topology forepnni> border (enable | disable)
```

enable|disable Entering `enable` (and rebooting) means that this switch will act as a *ForeThought* PNNI border switch. Entering `disable` (and rebooting) means that this switch will not act as a *ForeThought* PNNI border switch.

NOTE The switch software must be restarted for this command to take effect. Therefore, you must be in a local AMI session to perform this command.

2.19.1.3 Setting the *ForeThought* PNNI Switch Prefix Mask

This command allows you to select the *ForeThought* PNNI switch prefix mask value. Enter the following parameters:

```
localhost::configuration topology forepnni> swmask <mask>
```

mask Indicates the mask that gives the number of leading bits in the switch prefix used to aggregate the addresses that belong to the switch in *ForeThought* PNNI. The default switch prefix mask value is 104.

NOTE The switch software must be restarted for this command to take effect. Therefore, you must be in a local AMI session to perform this command.

2.19.1.4 Setting the *ForeThought* PNNI Peergroup Mask

A peergroup mask is the length (in the number of bits) of the peergroup ID of a switch. This command enables you to set the *ForeThought* PNNI peergroup mask value. This value should be the same for all members of a peergroup. Enter the following parameters:

```
localhost::configuration topology forepnni> pgmask <mask>
```

mask Indicates the mask that gives the number of leading bits in the switch prefix used to aggregate the addresses that belong to this *ForeThought* PNNI peergroup. The default peergroup mask value is 0.

NOTE The switch software must be restarted for this command to take effect. Therefore, you must be in a local AMI session to perform this command.

2.19.1.5 Setting the Hello Indication Interval

Hello indication messages are the "keep alive" messages that two switches send to one another to verify their existence. This command lets you change the interval for *ForeThought* PNNI hello indication messages. Enter the following parameters:

```
localhost::configuration topology forepnni> hello <msec>
```

msec Indicates the period of time, in milliseconds, between transmissions of hello indication messages. The default value is `500` milliseconds.

2.19.1.6 Setting the NSAP Indication Interval

NSAP indication messages are those messages that update topology information between any two switches. This command allows you to select the interval for *ForeThought* PNNI NSAP indication messages. Enter the following parameters:

```
localhost::configuration topology forepnni> nsapindication <msec>
```

msec Indicates the period of time, in milliseconds, between transmissions of NSAP indication messages. The default value is `10,000` milliseconds.

2.19.1.7 Setting the Static Route Update Indication Interval

Static route update indication messages are refresh messages that update topology information about static routes. This command enables you to set the interval for *ForeThought* PNNI static route indication messages. Enter the following parameters:

```
localhost::configuration topology forepnni> staticupdate <msec>
```

msec Indicates the period of time, in milliseconds, between transmissions of static route update indication messages. The default value is `10,000` milliseconds.

2.19.1.8 Setting the Maximum Hop Count

By setting a maximum hop count, you tells the switch to consider only those paths that have less than or equal to the number of hops specified when setting up a connection. If a connection is routed using a path with a large hop count, there is a greater chance that the connection may experience congestion and be delayed or discarded. This command lets you set the maximum hop count for the NSAP router. Enter the following parameters:

```
localhost::configuration topology forepnni> maxhop <hops>
```

hops Indicates the maximum number of hops to use when routing a connection for the NSAP router. The default value is `20` hops.

2.19.1.9 Setting the Proportional Multiplier

This command enables you to set the proportional multiplier for the NSAP router. The proportional multiplier is expressed as a percentage of Available Cell Rate (ACR) on any given link in the network. If the change in percentage of the ACR on any given link in the NSAP topology of the network exceeds this percentage threshold, then the change is considered significant. The topology tables are updated accordingly for that link. Enter the following parameters:

```
localhost::configuration topology forepnni> propmult <percentage>
```

percentage Indicates the threshold, entered as a percentage, above which you consider the change in ACR on any link to be significant. The default value is `20%`.

NOTE If you modify this value, you should modify it on <u>all</u> switches in the network.

2.19.1.10 Setting a Minimum Threshold for NSAP Updates

The minimum threshold is the smallest capacity value that the threshold value for determining the significant change in ACR can take. This minimum value ensures that the threshold value does not become a very small value in cases in which product of the ACR and the proportional multiplier is a very small number. The minimum threshold is used to prevent excessively frequent NSAP updates resulting from minor changes in ACR when the value of ACR is very low. Enter the following parameters:

```
localhost::configuration topology forepnni> minthresh <minthresh>
```

minthresh Indicates the minimum threshold bandwidth value for triggering NSAP updates, entered in kilobits per second. The default value is 50 kilobits per second.

2.19.1.11 Setting a Minimum Virtual Channel Mark

When the number of available virtual channels on a path drops to zero, a link state update is sent out to advertise that there are no more VCs available for use on this path. When the number of VCs indicated by the **vcmark** is available for use on this path again, another link state update is sent out to advertise that there are VCs available for use on this path once again. This command lets you set the **vcmark**, which is the minimum number of virtual channels that need to be to available on a path to make that path usable again. Enter the following parameters:

```
localhost::configuration topology forepnni> vcmark <vcmark>
```

vcmark Indicates the minimum number of virtual channels that need to be to available on a path to make that path usable. The default value is 20 VCs.

2.19.1.12 Selecting the Method for Computing the Cost of a Link

This command lets you select the method of computing the cost of a link from a border node to the peergroup summary node (PGSN).

```
localhost::conf topology forepnni> pgsncost (default | user -cost <cost>)
```

default Indicates that the border node will automatically calculate the cost to the PGSN by taking half of the average cost from this node to all other border nodes in this peergroup. This cost is dynamic.

user Indicates that the link to the PGSN from this border node will be advertised using the value that you specify with the `-cost` parameter.

-cost <cost> Enter the administrative weight for the link that you want the border node to use during path computation. The route which takes the least cost is chosen. The default cost for all links in the network is `100`.

2.19.1.13 Displaying *ForeThought* PNNI Parameters

This command lets you display all of the *ForeThought* PNNI topology parameters. Enter the following parameters:

```
localhost::configuration topology forepnni> show

Switch NSAP prefix                      0x47.0005.80.ffe100.0000.f21c.078e
Switch Prefix Mask                      104
Peer Group Mask                         0

Hello Indication Interval               500 msec
NSAP Indication Interval                10000 msec
Static Route Update Interval            10000 msec
Max hop count for NSAP router           20 hops
Proportional Multiplier                 20 %
Minumum Threshold for NSAP updates      50 Kbps
Minimum VC level                        20
Cost of link to PGSN                    100
Cost of link to PGSN computing method   default

FORE PNNI border switch functionality is enabled
```

The fields in this display are defined as follows:

Switch NSAP prefix	Displays the switch's NSAP prefix.
Switch Prefix Mask	Shows the switch prefix mask value of high-order bits to use for aggregating addresses on the switch for routing purposes.
Peer Group Mask	Lists the peergroup mask value of high-order bits to use for aggregating addresses on the switch for routing purposes.
Hello Indication Interval	Displays the period of time between transmissions of hello indication messages, in milliseconds.
NSAP Indication Interval	Shows the period of time between transmissions of NSAP indication messages, in milliseconds.
Static Route Update Interval	Lists the period of time between transmissions of static route update indication messages, in milliseconds.
Max hop count for NSAP router	Displays the maximum number of hops to use when routing a connection for the NSAP router.
Proportional Multiplier	Shows the threshold, in percentage, above which the change in ACR on any link is considered to be significant.
Minimum Threshold for NSAP updates	Lists the minimum threshold bandwidth value for triggering NSAP updates, in kilobits per second.
Minimum VC level	Lists the minimum number of VCs that need to be available on a path to make that path usable again after the number of available VCs has dropped to 0.
Cost of link to PGSN	Shows the administrative weight for the link that the border node uses during path computation to the PGSN. The route which takes the least cost is chosen. The default cost for all links in the network is `100`. This field is displayed on border switches only.
Cost of link to PGSN computing method	Displays the method used for computing the link cost from the border switch to the PGSN. This field is displayed on border switches only. Can be `default` or `user`.
FORE PNNI border switch functionality is disabled	If this functionality is `enabled`, this switch acts as a *ForeThought* PNNI border switch. If this functionality is `disabled`, this switch does not act as a *ForeThought* PNNI border switch.

AMI Configuration Commands

2.19.2 SPANS Topology Configuration Commands

These commands allow you to modify various aspects of SPANS-NNI on a switch. You can display the list of available subcommands by typing **spans ?** at the **topology** level.

```
localhost::configuration topology> spans ?
  border            area              show
```

NOTE

In order for part of a FORE ATM cloud to be a hierarchical SPANS area, all switches in that cloud must be running a software version that is *ForeThought* 4.0 or greater. Otherwise, SPANS connectivity between the hierarchical area and the SPANS area will be lost.

2.19.2.1 Setting the SPANS-NNI Border Switch Functionality

A switch that has a link to another switch belonging to a different SPANS area is considered a border switch. A border switch advertises reachability to its area to switches outside of its area, but it does not share its area's topology with the other switches. You should enable border switch functionality on all switches that are on the outside edges of all of the areas that you have established. This command lets you designate whether or not this switch will act as a SPANS-NNI border switch. Enter the following parameters:

```
localhost::configuration topology spans> border (enable | disable)
```

enable|disable Entering `enable` (and rebooting) means that this switch will be a SPANS border switch. Entering `disable` (and rebooting) means that this switch will not be a SPANS border switch.

NOTE

The switch software must be restarted for this command to take effect. Therefore, you must be in a local AMI session to perform this command.

2.19.2.2 Setting the SPANS Area ID

This command enables you to set the SPANS area ID. Enter the following parameters:

```
localhost::configuration topology spans> area <area>
```

area Indicates the ID of the area in the SPANS routing hierarchy to which this switch belongs. This number goes into the most significant byte of the SPANS ATM address. The default area ID for all switches is `242` in decimal.

NOTE The switch software must be restarted for this command to take effect. Therefore, you must be in a local AMI session to perform this command.

2.19.2.3 Displaying SPANS-NNI Parameters

This command let you display all of the SPANS-NNI topology parameters. Enter the following parameters:

```
localhost::configuration topology spans> show
SPANS Area ID           242
SPANS NNI border switch functionality is disabled
```

The field in this display is defined as follows:

SPANS Area ID Shows the ID of the area in the SPANS routing hierarchy to which this switch belongs. This number goes into the most significant byte of the SPANS ATM address.

SPANS NNI border switch functionality is disabled If this functionality is `enabled`, this switch is a SPANS-NNI border switch. If it is `disabled`, this switch is not a SPANS-NNI border switch.

2.20 UNI Configuration Commands

These commands let you configure UNI signalling channels. You can display the list of available subcommands by typing **`uni ?`** at the **`configuration`** level.

```
localhost::configuration> uni ?
  delete        new            show
```

2.20.1 Deleting a UNI Signalling Channel

This command allows you to delete an existing UNI signalling channel. Enter the following parameters:

```
localhost::configuration uni> delete <port> <vpi>
```

port Indicates the port on which the UNI signalling channel is to be deleted.

vpi Indicates the virtual path number that contains the UNI signalling channel that is to be deleted.

2.20.2 Creating a UNI Signalling Channel

This command lets you create a UNI signalling channel. Enter the following parameters:

NOTE Before a UNI signalling channel can be created on a given VPI, an originating and a terminating path must exist for that same VPI.

```
localhost::configuration uni> new <port> <vpi> [auto | uni30 | uni31] [-ilmi (up
| down)]
        [(user | network)] [(publicUNI | automode | IISP)]
public options:
        [-ilmireg (disable|ignore)]
        [-addressformat (private | e164)]
        [-e164address <e164Address>]
        [-e164mapping (enable | disable)
av (address validation) options:
        [-av (enable | disable)]
        [-iefilter (one or more of: [cg,cgs,cds,blli,blli23,bhli,aal])]
        [-defaultcpn <NSAPAddress>]
advanced options:
        [-sigvci <vci>] [-ilmivci <vci>]
        [-minvci <vci>] [-maxvci <vci>]
        [-cost <cost>]
scope options:
        [-sig_mode (nonAssoc | vpAssoc)] [-sig_alloc (vp | link)]
signalling options:
        [-insigupc <upc_contract>] [-outsigservice <vbr | ubr>]
        [-send_cproc (on | off)]
SSCOP timer options:
        [-sscopnoresp_timer <sec>]
```

port Indicates the port number on which the UNI signalling channel is going to be created.

vpi Indicates the virtual path number on which the UNI signalling channel is going to be created.

auto|uni30|uni31 Indicates the version of the UNI protocol to use at initialization. `auto` means that the UNI attempts to determine automatically which version of the UNI protocol to use. `uni30` means that this link uses version 30 of the UNI protocol. `uni31` means that this link uses version 31 of the UNI protocol.

-ilmi (up|down)	Enables ILMI for this interface (only when a host is connected). The default is `up`. However, this parameter must be set to `down` if you set the interface type parameter to `IISP`.
user|network	Indicates the switch user side or network side. If the connection is to a host, choose `network`. If the connection is to another switch, one switch must be `user` and the other switch must be `network` when configuring the interface type as `IISP`.
publicUNI | automode | IISP	Indicates the interface type you wish to use for this signalling channel. `publicUNI` means this signalling channel is used between this switch and a public switch. `automode` means the interface type is determined dynamically. `IISP` is used for switch-to-switch signalling. The default is `automode`.

The public options are as follows:

[-ilmireg (disable | ignore)]	`Disable` means that no prefix registration messages are sent by the network-side, and no address registration messages are generated by the user-side. `Ignore`, means the network-side performs as it normally would, except that addresses registered are not published into the routing database. This is not recommended except in public network situations in which CPE2 equipment needs ILMI address registration in order to function correctly. For public UNIs, the default is `disable`.

NOTE

This option may be used for UNIs other than public UNIs (i.e., specifying `automode` or `IISP` above). However, for those UNIs, ILMI registration is enabled by default (even though it is not an option to be specified here.) This means that ILMI address and prefix registration will occur across those UNIs.

[-address-format (private | e164)]	Indicates whether to use the native `e164` address format (used by public UNI) across this signalling channel or to use the `private` address format.
[-e164address <e164Address>]	Indicates the native `e164` address used by public UNI across this signalling channel.

[-e164mapping (enable |disable)] Indicates whether or not to resolve private NSAP addresses into native E.164 addresses. `Enable` means NSAP address-to-E.164 address mapping occurs. `Disable` means NSAP address-to-E.164 address mapping will not occur. However, if you use `disable`, but you are also using the native E.164 address format, then the only address conversion performed at this UNI is for private NSAP addresses in E.164 format.

The av (address validation) options are as follows:

[-av (enable | disable)] Using `enable` means that the calling party NSAP addresses of the UNI signalling channels are validated. If a default calling party address is supplied using the `-defaultcpn` *<NSAPAddress>* option, that address is used in all call setup attempts that do not provide a calling party NSAP address. The Information Elements selected by the `-iefilter` options are filtered (removed from) all call setup attempts. Using `disable` means that all Information Elements are passed to the called party (no IEs are removed) and the values of the `-iefilter` and `-defaultcpn` options are ignored. Thus, all calling party NSAP addresses are assumed valid. If no default calling party address is supplied using the `-defaultcpn` *<NSAPAddress>* option during a call setup attempt, then no address is inserted.

NOTE

A `-defaultcpn` *<NSAPAddress>* must be supplied if you wish to use the `enable` option.

[-iefilter] Indicates the information element filter which controls the filtering of signalling elements of the UNI 3.x signalling channels. Filters can be applied to the following UNI 3.x information elements: `cg`, `cgs`, `cds`, `blli`, `blli23`, `bhli`, `aal`.

cg Filters the address of the calling party.

cgs Filters the subaddress of the calling party.

cds Filters the subaddress of the called party.

blli Filters all (first, second, and third) Broadband Low Layer Information (BLLI) layers, which provides compatibility checking by an addressed entity. This information is normally transferred transparently between the calling party and the called party.

blli23 Filters only the second and third Broadband Low Layer Information (BLLI) layers.

bhli Filters the Broadband High Layer Information (BHLI), which provides compatibility checking by an addressed entity (e.g., a recipient of a call).

aal Filters the AAL (ATM Adaptation Layer) information.

[-defaultcpn <NSAP Address>] Indicates the default calling party number (CPN) to be used if address validation is enabled AND the originator does not provide an address in the call setup request.

NOTE The `-defaultcpn` *<NSAPAddress>* option must be specified for address validation to be enabled.

The advanced options are as follows:

-sigvci <vci> Indicates the VCI to use for UNI signalling messages. The default reserved VCI is `5`.

-ilmivci <vci> Indicates the VCI to use for ILMI messages. The default reserved VCI is `16`.

-minvci <vci> Indicates the bottom number for the range of VCIs to be reserved for UNI SVCs on this path (and other paths created dynamically if the `-sig_alloc` flag is `link`). The default is `32`. You can change this range if you want to limit the number of SVCs on this path, limit the number of SPANS SVCs with respect to UNI SVCs, or divide the VCI range into a region reserved for SPANS SVCs and a region reserved for UNI SVCs.

-maxvci <vci> Indicates the top number for the range of VCIs to be reserved for UNI SVCs on this path (and other paths created dynamically if the `-sig_alloc` flag is `link`). The default is `511`. You can change this range if you want to limit the number of SVCs on this path, limit the number of SPANS SVCs with respect to UNI SVCs, or divide the VCI range into a region reserved for SPANS SVCs and a region reserved for UNI SVCs.

-cost <cost> Indicates the cost (administrative weight) of this link that is used for determining the best route for this UNI signaling channel.

The scope options are as follows:

[-sig_mode (nonAssoc | vpAssoc)] Indicates the mode to be used for signalling. `nonAssoc` stands for Non-associated signalling. If set to this value, the UNI encodes the connection identifier with Non-associated signalling bits. `vpAssoc` stands for VP-associated signalling. If set to this value, the UNI encodes the connection identifier with the VP-associated signalling bits. The default is `nonAssoc`.

[-sig_alloc (vp | link)] Indicates the allocation policy for a network side UNI. If set to `vp`, the network side UNI allocates connections in its containing VP only. If set to `link`, the UNI allocates connections in its containing VP and may allocate connections in other VPs in the VPI range 0 to 255 that are available to it. The `link` option is only available for UNIs on VP 0. The `link` option cannot be specified when the `-sig_mode` is specified as `vpAssoc`. The default is `vp`.

The signalling options are as follows:

-insigupc <upc_contract> Indicates the index number of the UPC traffic contract to be applied to the input signalling channel. Use **`conf upc show`** and look at the `Index` field to find this number.

-outsigservice <vbr|ubr> Indicates into which service queue the output signalling channel should be inserted. Can be VBR or UBR. The default is VBR. By putting the UNI signalling channel in the VBR queue, the UNI signalling messages receive higher priority on the output side.

[-send_cproc (on | off)] By default, the switch sends a UNI Call Proceeding signalling response message when it receives a Setup signalling request message from another switch or a proxy device. A T303 timer (4 seconds) is started by the sending device at the instant that the Setup request is made. If the timer expires before it receives a response, the sending device resets the timer and retransmits the Setup request. If the timer expires again, the call is deemed to have failed and the originating switch clears the call. During heavy signalling, or when the signalling message has to traverse many hops to reach its destination, the timer can start to expire, and the retransmission of Setup messages causes extra network load. The Call Proceeding message may optionally be sent, which causes the switch that originated a Setup message to stop its T303 timer (4 seconds) and to start a new longer timer T310 (10 seconds). While adding a small burden to the switch sending the Call Proceeding message, the reduction in traffic from retransmissions of the Setup messages is beneficial. `On` means the UNI sends Call Proceeding messages for Setup messages that it receives and successfully forwards. `Off` means it does not send them. The default value is `on` for all links, except for IISP links because Call Proceeding messages are not sent on them.

The SSCOP timer option is as follows:

[-sscopnoresp_timer <sec>] Indicates the value to be set for the duration of the SSCOP no response timer. This is the time in seconds to wait before bringing the SSCOP connection down. This parameter can be set to a value higher than the default when the remote host is experiencing a heavy load and cannot process a signalling request in time. The default value is 10 seconds for UNI 3.0 and 7 seconds for UNI 3.1.

2.20.3 Displaying UNI Signalling Channels

This command allows you to list an individual switch fabric's current UNI signalling channel information. Enter the following parameters:

```
localhost::configuration uni> show
 Port  VPI Version  State ILMI  Side     Type   OperType RemoteAddress
 1D1     0 uni30(a) up    up    network  auto   FT-PNNI  169.144.64.42
 1D2     0 auto (a) down  down  network  auto   privUNI
 1D3     0 uni30(a) up    up    user     auto   FT-PNNI  169.144.64.85
 1D4     0 auto (a) down  down  network  auto   privUNI
 1D5     0 uni30(a) up    up    user     auto   FT-PNNI  169.144.64.232
 1D6     0 auto (a) down  down  network  auto   privUNI
 1CTL    0 uni30(a) up    down  network  auto   privUNI
```

The fields in this display have the following meaning:

Port Shows the port number of the network modules that are currently installed in the switch. CTL is the control port, which is a logical (not physical) location where cells that are directed to the switch itself are sent.

VPI Shows the number of the virtual path that contains the UNI signalling channel.

Version Shows the version of the UNI protocol being used at initialization. `uni30` means that this link uses version 30 of the UNI protocol. `uni31` means that this link uses version 31 of the UNI protocol. `auto` means that this link attempts to determine automatically which version of the UNI protocol to use. `(a)` means that the switch is trying to automatically determine whether its peers are using UNI 3.0 or UNI 3.1.

State Shows the current state of the interface. If the state is `up`, then this interface is operational. This is the normal state for a interface that is connected to another FORE Systems' ATM switch or host. If the state is `down`, then this interface is not operational. This can be due to a lack of a physical connection or due to a software problem.

ILMI `Up` means that ILMI is operational for this interface. `Down` means that ILMI is not operational for this interface.

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Side Shows whether the switch is the user side or the network side on a given UNI signalling channel. If the connection is to a host, `network` is displayed. If the connection is to another switch, one switch must be `user` and the other switch must be `network`.

Type Shows the type of configuration for this interface. Can be `publicUNI`, `auto`, or `IISP`. `publicUNI` means that this link is used between this switch and a public switch. `auto` means that the operational type is determined dynamically. `IISP` (Interim Inter-Switch Signalling Protocol) means that this link is used for static routing NNI (Network to Network Interface). The default is `auto`.

OperType Shows the operational type of the interface on this signalling channel. `publicUNI` means that this signalling channel is operating between this switch and a public switch. `privUNI` means this signalling channel is operating between the switch and a host. `IISP` means this signalling channel is used between two switches. `FT-PNNI` is used between two switches using SPANS mapping messages for dynamic routing. If the value configured (at creation time) for `Type` is `auto`, then this value may be either `privUNI` or `FT-PNNI`.

RemoteAddress Shows the IP address of the remote endstation, if it is available.

To list UNI signalling channel information for a specific port, (for example, port 1D3), enter the following parameters:

```
localhost::configuration uni> show 1D3
 Port  VPI Version  State ILMI  Side     Type   OperType RemoteAddress
 1D3     0 uni30(a) up    up    user     auto   FT-PNNI  169.144.64.85
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying UNI signalling channel information on all of the ports on an individual switch fabric.

To list UNI signalling channel information for a specific port and path, (for example, port 1D5 and VPI 0), enter the following parameters:

```
localhost::configuration uni> show 1D5 0
 Port  VPI Version  State ILMI  Side     Type   OperType RemoteAddress
 1D5     0 uni30(a) up    up    user     auto   FT-PNNI  169.144.64.232
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying UNI signalling channel information on all of the ports on an individual switch fabric.

2.20.3.1 Displaying Advanced Information for UNI Signalling Channels

There are several options you can use to show different types of information about the UNI signalling channels.

```
localhost::conf uni> show [<port> [<vpi>]] [advanced|scope|public|av|sig_opts]
```

To show advanced UNI signalling channel information about all of the ports on an individual switch fabric, enter the following parameters:

```
localhost::configuration uni> show advanced
                                          Admin  Admin   Oper   Oper
 Port  VPI SigVCI ILMIVCI SigAAL MinVCI MaxVCI MinVCI MaxVCI OrigCost TermCost
 1A1     0      5      16      5     32    511     32    511      100        0
 1A2     0      5      16      5     32    511   [32]  [511]      100        0
 1A3     0      5      16      5     32    511   [32]  [511]      100        0
 1A4     0      5      16      5     32    511   [32]  [511]      100        0
 1B1     0      5      16      5     32    511     32    511      100      100
 1B2     0      5      16      5     32    511     32    511      100      100
 1B3     0      5      16      5     32    511   [32]  [511]      100        0
 1B4     0      5      16      5     32    511   [32]  [511]      100        0
 1CTL    0      5      16      5     32   1023     32   1023      100        0
```

The fields in the advanced display have the following meanings:

Port Shows the port number of the network modules that are currently installed in the switch. CTL indicates the control port which is a logical (not physical) location where cells that are directed to the switch itself are sent.

VPI Shows the number of the virtual path that contains the UNI signalling channel.

SigVCI Shows the VCI on the UNI signalling channel. The default reserved VCI is 5.

IMLIVCI Shows the VCI to be used for ILMI signalling messages. The default reserved VCI is 16.

SigAAL Shows the AAL type being used for this connection. The default is AAL5.

Admin MinVCI Shows the user-requested bottom number for the range of VCIs to be reserved for UNI SVCs on this path. If no value is entered, the default is 32.

Admin MaxVCI Shows the user-requested top number for the range of VCIs to be reserved for UNI SVCs on this path. If no value is entered, the default is 511.

Oper MinVCI Shows the actual (operational) bottom number for the range of VCIs to be reserved for UNI SVCs on this path. A value that is displayed in brackets indicates that bandwidth negotiation of this value with the UNI peer via ILMI is not complete because either ILMI is not up, or if ILMI is up, the negotiation is still in progress. A value that is displayed without brackets indicates the value has been successfully negotiated (if ILMI is enabled and up) or negotiation did not need to take place (if ILMI is disabled).

Oper MaxVCI Shows the actual (operational) top number for the range of VCIs to be reserved for UNI SVCs on this path. A value that is displayed in brackets indicates that bandwidth negotiation of this value with the UNI peer via ILMI is not complete because either ILMI is not up, or if ILMI is up, the negotiation is still in progress. A value that is displayed without brackets indicates the value has been successfully negotiated (if ILMI is enabled and up) or negotiation did not need to take place (if ILMI is disabled).

OrigCost Shows the cost of each PNNI link configured at the originating end of the signalling channel.

TermCost Shows the cost of each PNNI link configured at the terminating end of the signalling channel.

To list advanced UNI signalling channel information for a specific port and path, (for example, port 1A4 and VPI 0), enter the following parameters:

```
localhost::configuration uni> show 1a4 0 advanced
                                     Admin  Admin   Oper   Oper
 Port  VPI SigVCI ILMIVCI SigAAL MinVCI MaxVCI MinVCI MaxVCI OrigCost TermCost
 1A4     0      5      16      5     32    511   [32]  [511]      100        0
```

The fields in this display are defined in the same manner as those listed in the previous example.

2.20.3.2 Displaying Scope Information for UNI Signalling Channels

To show UNI signalling channel scope information about all of the ports on an individual switch fabric, enter the following parameters:

```
localhost::configuration uni> show scope
 Port  VPI  Allocation  Mode
            Scope
 3B1     0  VP          Non-Associated
 3B2     0  VP          Non-Associated
 3B3     0  VP          Non-Associated
 3B4     0  VP          Non-Associated
 3B5     0  VP          Non-Associated
 3B6     0  VP          Non-Associated
 3E1     0  VP          Non-Associated
 3E2     0  VP          Non-Associated
 3E4     0  VP          Non-Associated
 3CTL    0  VP          Non-Associated
```

The fields in the scope display have the following meanings:

Port Shows the port number of the network modules that are currently installed in the switch.

VPI Shows the number of the virtual path that contains the UNI signalling channel.

Allocation Scope Shows the allocation policy for a network side UNI. If set to `vp`, the network side UNI allocates connections in its containing VP only. If set to `link`, the UNI allocates connections in its containing VP and may allocate connections in other VPs in the range 0 to 255 that are available to it. The `link` option is only available for UNIs on VP 0. The default is `vp`.

Mode Shows the mode to be used for signalling. If set to `nonAssoc` (Non-associated signalling), the UNI encodes the connection identifier with Non-associated signalling bits. If set to `vpAssoc` (VP-associated signalling), the UNI encodes the connection identifier with the VP-associated signalling bits. The default is `nonAssoc`.

To list UNI signalling channel scope information for a specific port and path, (for example, port 3b3 and VPI 0), enter the following parameters:

```
localhost::configuration uni> show 3b3 0 scope
 Port  VPI  Allocation  Mode
            Scope
 3B3     0  VP          Non-Associated
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying UNI signalling channel scope information on all of the ports on an individual switch fabric.

2.20.3.3 Displaying Public Information for UNI Signalling Channels

To show UNI signalling channel public information about all of the ports on an individual switch fabric, enter the following parameters:

```
localhost::configuration uni> show public
 Port  VPI ILMIReg AddressFmt E164Address     E164AddressResolution
 3B1     0 enable  private                    disable
 3B2     0 enable  private                    disable
 3B3     0 enable  private                    disable
 3B4     0 enable  private                    disable
 3B5     0 enable  private                    disable
 3B6     0 enable  private                    disable
 3E1     0 enable  private                    disable
 3E2     0 enable  private                    disable
 3E4     0 enable  private                    disable
 3CTL    0 enable  private                    disable
```

The fields in the public display have the following meanings:

Port Shows the port number of the network modules that are currently installed in the switch.

VPI Shows the number of the virtual path that contains the UNI signalling channel.

ILMIReg Shows whether ILMI address and prefix registration occur across this UNI. `Enable` means that ILMI address and prefix registration occur across this UNI. If `enable` is displayed, then this is not a public UNI. `Disable` means that no prefix registration messages are sent by the network-side, and no address registration messages are generated by the user-side. `Ignore` means that the network-side performs as it normally would, except that addresses registered are not published into the routing database. This setting is not recommended except in public network situations in which CPE equipment needs ILMI address registration in order to function correctly.

AddressFmt Shows if the native `e164` (used by public UNI) address format or if the `private` address format is being used across this link.

E164 Address Shows the native `e164` address assigned to this link.

E164 Address Resolution Shows whether or not to resolve private NSAP addresses into native E.164 addresses. `Enable` means that NSAP address-to-E.164 address mapping occurs. `Disable` means that NSAP address-to-E.164 address mapping does not occur. However, if you use `disable`, but you are also using the native E.164 address format, then the only address conversion performed at this UNI is for private NSAP addresses in E.164 format.

To list UNI signalling channel public information for a specific port and path, (for example, port 3b6 and VPI 0), enter the following parameters:

```
localhost::configuration uni> show 3b6 0 public
 Port  VPI ILMIReg AddressFmt E164Address     E164AddressResolution
 3B6     0 enable  private                    disable
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying UNI signalling channel public information on all of the ports on an individual switch fabric.

2.20.3.4 Displaying AV Information for UNI Signalling Channels

To show UNI signalling channel address validation (av) information about all of the ports on an individual switch fabric, enter the following parameters:

```
localhost::configuration uni> show av
 Port  VPI IEFilter                   DefaultCallingParty
 3B1     0 disabled                   N/A
 3B2     0 disabled                   N/A
 3B3     0 disabled                   N/A
 3B4     0 disabled                   N/A
 3B5     0 disabled                   N/A
 3B6     0 disabled                   N/A
 3E1     0 disabled                   N/A
 3E2     0 disabled                   N/A
 3E4     0 disabled                   N/A
 3CTL    0 disabled                   N/A
```

The fields in the av display have the following meanings:

Port Shows the port number of the network modules that are currently installed in the switch.

VPI Shows the virtual path that contains the UNI signalling channel.

IEFilter Shows whether or not the information element filter which controls the filtering of signalling elements of the UNI 3.x signalling channels has been enabled. Filters can be applied to the following: `cg`, `cgs`, `cds`, `blli`, `blli23`, `bhli`, `aal`. `Disabled` means the calling party NSAP addresses are assumed valid. A default calling party address is not inserted. All Information Elements are passed to the called party (no IEs are removed). Otherwise, address validation is performed. If `DEF_INS` is shown, the default calling party address is inserted, if it has not been supplied. The Information Elements shown are FILTERED (not passed to the called party).

DefaultCallingParty Shows the default calling party number (CPN) to be used in case the user side does not provide one in the call setup request.

To list UNI signalling channel av information for a specific port and path, (for example, port 3b5 and VPI 0), enter the following parameters:

```
localhost::configuration uni> show av 3b5
 Port  VPI IEFilter                  DefaultCallingParty
 3B5     0 disabled                  N/A
```

The fields in this display are defined in the same manner as those listed previously in the example for all of the ports on an individual switch fabric.

2.20.3.5 Displaying Signalling Information for UNI Signalling Channels

To show UNI signalling information about all of the ports on an individual switch fabric, enter the following parameters:

```
localhost::configuration uni> show sig_opts
 Port  VPI SigVCI InSigUpc   OutSigService  SendCallProc SSNoResp
 1A1     0      5        0   vbr            on                 10
 1A2     0      5        0   vbr            on                 10
 1A3     0      5        0   vbr            on                 10
 1A4     0      5        0   vbr            on                 10
 1B1     0      5        0   vbr            on                 10
 1B2     0      5        0   vbr            on                 10
 1B3     0      5        0   vbr            on                 10
 1B4     0      5        0   vbr            on                 10
 1CTL    0      5        0   vbr            on                 10
```

The fields in the signalling options display have the following meanings:

Port Shows the port number of the network modules that are currently installed in the switch.

VPI Shows the number of the virtual path that contains the UNI signalling channel.

SigVCI Shows the VCI used for UNI signalling messages. The default reserved VCI is 5.

InSigUpc Shows the index number of the UPC traffic contract that is applied to the input signalling channel.

OutSigService Shows in which service queue the output signalling channel resides. Can be VBR or UBR. The default is VBR.

SendCallProc `On` means that the UNI sends call proceeding messages for setup messages that it receives and successfully forwards. `Off` means that it does not send them.

SSNoResp Shows the value that has been set for the duration of the SSCOP no response timer. This is the time in seconds to wait before bringing the SSCOP connection down. The default value is 10 seconds for UNI 3.0 and 7 seconds for UNI 3.1.

To list UNI signalling option information for a specific port and path, (for example, port 1B3 and VPI 0), enter the following parameters:

```
localhost::configuration uni> show sig_opts 1b3
localhost::configuration uni> show sig_opts
 Port  VPI SigVCI InSigUpc   OutSigService  SendCallProc SSNoResp
 1B3     0      5        0   vbr            on                 10
```

The fields in this display are defined in the same manner as those listed previously in the example for displaying signalling option information on all of the ports on an individual switch fabric.

2.21 Usage Parameter Control Configuration Commands

These commands let you create, delete, or display usage parameter control (UPC) traffic contracts. These contracts can then be applied to PVCs using the **conf vpc new** command. You can display the list of available subcommands by typing **upc ?** at the **configuration** level.

```
localhost::configuration> upc ?

  delete            new               show
```

2.21.1 Deleting a UPC Traffic Contract

This command allows you to delete an existing UPC contract. Enter the following parameters:

```
localhost::configuration upc> delete <index>
```

index Indicates the integer index that refers to a specific traffic contract.

2.21.2 Creating a UPC Traffic Contract

This command lets you create a UPC contract. Enter the following parameters:

```
localhost::conf upc> new <index> ubr [aal5 [noPktDisc]] [ubrTagging] [-name
<name>]
 OR
new <index> <UPC> [-cdvt <us>] [noGCRA] [aal5 [noPktDisc] [PPPol]] [-name <name>]
Where UPC is one of the following combinations of traffic parameters:
        cbr  <pcr01>
        cbr0 <pcr0>  <pcr01> [tag]
        vbr  <pcr01> <scr01> <mbs01>
        vbr0 <pcr01> <scr0>  <mbs0>  [tag]
```

index Enter an integer index that will be used to refer to this specific traffic contract.

UPC Indicates one of the types of traffic contracts shown above. The parameters in these contracts are defined as follows:

cbr Indicates CBR traffic.

cbr0 Indicates CBR0 traffic.

vbr Indicates VBR traffic.

vbr0 Indicates VBR0 traffic.

pcr0 Indicates the peak cell rate for cells with CLP = 0.

pcr01 Indicates the peak cell rate for all cells.

scr0 Indicates the sustainable cell rate for cells with CLP = 0.

scr01 Indicates the sustainable cell rate for all cells.

mbs0 Indicates the maximum burst size for cells with CLP = 0.

mbs01 Indicates the maximum burst size for all cells.

NOTE

The units for **pcr0**, **pcr01**, **scr0**, **scr01**, **mbs0**, and **mbs01** are specified either in cells per second or in kilobits per second, depending on what you used for **configuration system units**. To display the current setting, use **configuration system show**. The default is **cps** (cells per second).

tag Entering `tag` means that non-conforming CLP = 0 cells are tagged. Otherwise, they are dropped. The default is that they are dropped. This option only applies to the PCR0 parameter of the CBR0 contract and to the SCR0 and MBS0 parameters of the VBR0 contract.

-cdvt us Indicates the Cell Delay Variation Tolerance (CDVT) associated with the peak cell rates, specified in microseconds. If the CDVT is not specified here, the default CDVT value associated with the port will be used. (See **`conf port show`** and **`conf port cdvt`** for more information).

noGCRA Entering `noGCRA` means that GCRA policing is disabled on CBR or VBR (depending on what is configured) connections using this contract. If `noGCRA` is not entered, then GCRA policing is enabled on CBR or VBR (depending on what is configured) connections using this contract. By default, GCRA policing is enabled.

aal5 Indicates that the connection is using the AAL5 Adaptation Layer.

noPktDisc This optional parameter can only be used if the connection is AAL5 (i.e., the `aal5` parameter is present). This parameter suppresses EPD/PPD (AAL5 packet discard) on the connection. The default is for this parameter not to be present, which leaves EPD/PPD enabled.

ubrTagging Entering `ubrTagging` means that all UBR traffic is tagged (set to CLP=1) on this connection. If `ubrTagging` is not entered, then UBR traffic is not tagged on this connection. This command only applies to UBR traffic. By default, UBR traffic is not tagged.

PPPol The optional parameter can only be used if the connection is AAL5 (i.e., the `aal5` parameter is present). This parameter indicates that Partial Packet Policing is going to be performed on this connection. The default is for this parameter not to be present, which leaves Partial Packet Policing disabled.

NOTE

`HDCOMPversion` must be 1 or greater to support AAL5 partial packet policing. To display the ASIC version, use the **`conf board show advanced`** command.

-name <name> Indicates the user-defined name associated with this UPC traffic contract. This helps you remember for what traffic type this specific contract is used. If you do not specify a name, a default name that relates to this type of traffic contract is assigned automatically.

The following is an example of how to create a UPC contract:

```
localhost::conf upc> new 5 vbr0 500 200 250 -cdvt 1000 aal5 PPPol -name vbr0_upc
```

This example specifies a contract named “vbr0_upc”, which is a VBR0 contract with an index of 5, a pcr01 of 500 cells/sec (or kbps), an scr0 of 200 cells/sec (or kbps), an mbs0 of 250 cells (or kilobits), a CDVT of 1,000 microseconds, and partial packet policing enabled.

NOTE

For more information regarding traffic contracts, please refer to Table 5-7 in the ATM Forum UNI 3.0 Specification.

NOTE

PVCs that use UPC contracts that contain any of the `[noGCRA]`, `[aal5 [noPktDisc] [PPPol]]`, and `[ubrTagging]` parameters are valid only when the **`conf port gcrapolicing`**, **`conf port aal5packetdiscard`**, **`conf port pppolicing`**, and **`conf port ubrtagging`** parameters are set to `svcOn` or `svcOff`. Use **`conf port show tm`** to check these settings.

2.21.3 Displaying the UPC Traffic Contracts

This command lets you display all of the UPC contracts. Enter the following parameters:

```
localhost::configuration upc> show
 Index  PCR01  SCR01  MBS01   PCR0   SCR0   MBS0   CDVT TAG Name
 0                                                          default_ubr
 1                                                          ubr
 2                                                          ubr
 3        1000                                              cbr
 4        1000                                              cbr
 5        1000                                              cbr
```

The fields in this display are defined as follows:

Index Shows the UPC contracts listed by index number.

PCR01 Shows the peak cell rate for all cells for this contract.

SCR01 Lists the sustainable cell rate for all cells in this contract.

MBS01 Lists the maximum burst size for all cells in this contract.

PCR0 Shows the peak cell rate for cells with CLP=0 for this contract.

SCR0 Shows the sustainable cell rate for cells with CLP=0 for this contract.

MBS0 Shows the maximum burst size for cells with CLP=0 for this contract.

NOTE

The units for PCR01, SCR01, MBS01, PCR0, SCR0, and MBS0 are shown either in cps or in kbps, depending on what you used for **conf system units**. To display the current setting, use **conf system show**. The default is cps.

CDVT Shows the Cell Delay Variation Tolerance (CDVT) associated with the peak cell rates, in microseconds.

TAG `Tag` means that non-compliant CLP=0 cells are tagged. No entry means that non-compliant cells are dropped. This option only applies to cells measured by the PCR0 parameter of the CBR0 contract and to cells measured by the SCR0 and MBS0 parameters of the VBR0 contract.

Name Shows the user-defined name associated with this UPC traffic contract.

This command also lets you display all of the traffic management flags for the UPC contracts. Enter the following parameters:

```
localhost::configuration upc> show [<index>] [flags]
localhost::configuration upc> show flags
 Index GCRApol PPpol AAL5 PktDisc UBRtag Name
 0                                       default_ubr
 1                   AAL5         UBRtag ubr
 2                   AAL5 PktDisc        ubr
 3                   AAL5 PktDisc        cbr
 4     GCRApol PPpol AAL5                cbr
 5     GCRApol                           cbr
```

The fields in this display are defined as follows:

Index Shows the UPC contracts listed by index number.

GCRApol `GCRApol` means that GCRA policing is enabled on connections that use this contract. If `GCRApol` is not displayed, then GCRA policing is disabled on all connections that use this contract.

PPpol `PPpol` means that partial packet policing is enabled on connections that use this contract. If `PPpol` is not displayed, then partial packet policing is disabled on all connections that use this contract.

AAL5 `AAL5` means that this is an AAL5 connection. If `AAL5` is not displayed, then this is not an AAL5 connection.

PktDisc `PktDisc` means that packet discard is enabled on connections that use this contract. If `PktDisc` is not displayed, then packet discard is disabled on all connections that use this contract.

UBRtag `UBRtag` means that all UBR traffic is tagged (set to CLP=1) as non-compliant on connections that use this contract. If `UBRtag` is not entered, then UBR traffic is not tagged on connections that use this contract.

Name Shows the user-defined name associated with this UPC traffic contract.

2.22 Virtual Channel Configuration Commands

These commands let you configure permanent virtual channels (PVCs). You can display the list of available subcommands by typing **`vcc ?`** at the **`configuration`** level.

```
localhost::configuration> vcc ?
delete          new             show
```

2.22.1 Deleting a Virtual Channel

This command allows you to delete an existing permanent virtual channel. Enter the following parameters:

```
localhost::configuration vcc> delete <iport> <ivpi> <ivci> <oport> <ovpi> <ovci>
```

iport	Indicates the incoming port number.
ivpi	Indicates the incoming virtual path number.
ivci	Indicates the incoming virtual channel number.
oport	Indicates the outgoing port number.
ovpi	Indicates the outgoing virtual path number.
ovci	Indicates the outgoing virtual channel number.

2.22.2 Creating a Virtual Channel

This command enables you to add a new permanent virtual channel. Enter the following parameters:

```
localhost::conf vcc> new <iport> <ivpi> <ivci> <oport> <ovpi> <ovci> [-upc
<index>]\
    [-name <name>]
advanced options:
   [-inctype (orig | tran | term) -outctype (orig | tran | term) [pmp|mpp|mpmp]]
```

iport Indicates the incoming port number.

ivpi Indicates the incoming virtual path number.

ivci Indicates the incoming virtual channel number.

oport Indicates the outgoing port number.

ovpi Indicates the outgoing virtual path number.

ovci Indicates the outgoing virtual channel number.

-upc<index> Indicates the integer index that refers to a specific UPC traffic contract. If no index is specified, then no traffic policing will take place on this VCI. It is assigned a UPC index of 0, and all traffic on this VCI is treated as UBR traffic. This is the default.

-name <name> Indicates the name you want to assign to this channel to help identify it uniquely. It is most useful for billing purposes so you can identify which channels are being used by which customers. Can be up to 32 ASCII characters long.

The advanced options are as follows:

-inctype (orig | tran | term) Indicates the channel connection type for the incoming channel. For billing purposes, it denotes on which switch this channel is arriving. `Orig` (originating) means that the ingress endpoint of the channel is connected to the source node which is outside the network, `tran` (transit) means that the ingress endpoint of the channel is connected to a node within the network, and `term` (terminating) means that the ingress endpoint of the channel is connected to the destination node which is outside the network.

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-outctype (orig | tran | term) Indicates the channel connection type for the outgoing channel. For billing purposes, it denotes on which switch this channel is leaving. `Orig` (originating) means that the egress endpoint of the channel is connected to the source node which is outside the network, `tran` (transit) means that the egress endpoint of the channel is connected to a node within the network, and `term` (terminating) means that the egress endpoint of the channel is connected to the destination node which is outside the network.

pmp Indicates this is a point-to-multipoint channel.

mpp Indicates this is a multipoint-to-point channel.

mpmp Indicates this is a multipoint-to-multipoint channel.

NOTE

By indicating `pmp`, `mpp`, or `mpmp`, you are only assigning a label for record keeping purposes. The switch does not necessarily create the type of channel you have specified. If you assign a connection type, but do not assign a `pmp`, `mpp`, or `mpmp` label, the switch assigns a label of `pp` (point-to-point).

The following is an example of how to create a virtual channel which specifies the connection type:

```
localhost::config vcc> new 3b1 0 100 3b4 0 100 -inctype tran -outctype tran
```

The following is an example of how to create a virtual channel which has a name assigned to it:

```
localhost::configuration vcc> new 3b2 0 145 3b3 0 145 -name customer_a
```

The following is an example of how to create a simple virtual channel on a TNX-1100. To create a vcc going in port 2A1, vpi 0, vci 100 on the switch board installed in slot 2 and going out port 4B1, vpi 0, vci 100 on the switch board installed in slot 4, enter the following:

```
localhost::configuration vcc> new 2a1 0 100 2e4 0 100
localhost::configuration vcc> new 2e4 0 100 2a1 0 100

localhost::configuration vcc> new 4b1 0 100 4e2 0 100
localhost::configuration vcc> new 4e2 0 100 4b1 0 100
```

In the first line in the first pair, notice that the output port is 2E4. This is the intra-fabric port. The 2 means the connection is coming out of the switch board in slot 2 through the intra-fabric port. The E represents the intra-fabric port. The 4 means the connection is destined for switch board in slot 4. 2E4 then becomes the input port in the second line.

In the first line in the second pair, notice that the output port is 4E2. This is the intra-fabric port. The 4 means the connection is coming out of the switch board in slot 4 through the intra-fabric port. The E represents the intra-fabric port. The 2 means the connection is destined for switch board in slot 2. 4E2 then becomes the input port in the second line.

2.22.3 Displaying the Virtual Channel Configuration

This command allows you to display existing virtual channels. You can display either all of the existing virtual channels on an individual switch fabric or all of the existing virtual channels on a specific port. To list all of the existing permanent virtual channels on an individual switch fabric, enter the following parameters:

```
localhost::configuration vcc> show
 Input        Output
 Port  VPI  VCI  Port  VPI  VCI  UPC  Protocol  Name
 3B1     0    5  3CTL    0   49    0  uni       N/A
 3B1     0   14  3CTL    0   48    0  spans     N/A
 3B1     0   15  3CTL    0   47       spans     N/A
 3B1     0   16  3CTL    0   50       uni       N/A
 3B1     0  100  3B4     0  100    0  pvc       N/A
 3B2     0    5  3CTL    0   53    0  uni       N/A
 3B2     0   14  3CTL    0   52    0  spans     N/A
 3B2     0   15  3CTL    0   51       spans     N/A
 3B2     0   16  3CTL    0   54       uni       N/A
 3B2     0  145  3B3     0  145    0  pvc       customer_a
 3B3     0    5  3CTL    0   57    0  uni       N/A
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

Input Port Lists the incoming port number of the virtual channel.

Input VPI Shows the incoming virtual path number.

Input VCI Indicates the incoming virtual channel number.

Output Port Lists the outgoing port number of the virtual channel.

Output VPI Shows the outgoing virtual path number.

Output VCI Indicates the outgoing virtual channel number.

UPC Shows the integer index that refers to the specific UPC traffic contract assigned to this VCI.

Protocol Displays what type of protocol is running on this channel, which can be `spans`, `pvc`, `uni` or `spvc`.

Name Shows the user-assigned name which helps to identify this channel uniquely. If no name has been assigned, displays `N/A`.

To list all of the existing permanent virtual channels on a specific port, (for example, port 3B1), enter the following parameters:

```
localhost::configuration vcc> show 3B1
 Input        Output
 Port  VPI  VCI  Port  VPI  VCI  UPC  Protocol  Name
 3B1     0    5  3CTL    0   49    0  uni       N/A
 3B1     0   14  3CTL    0   48    0  spans     N/A
 3B1     0   15  3CTL    0   47       spans     N/A
 3B1     0   16  3CTL    0   50       uni       N/A
 3B1     0  100  3B4     0  100    0  pvc       N/A
```

The fields in this display are defined in the same manner as those listed above in the example for all of the permanent virtual channels on an individual switch fabric.

To list all of the existing permanent virtual channels on a specific port and path, (for example, port 3B1 and VPI 0), enter the following parameters:

```
localhost::configuration vcc> show 3b1 0
 Input        Output
 Port  VPI  VCI  Port  VPI  VCI  UPC  Protocol  Name
 3B1     0    5  3CTL    0   49    0  uni       N/A
 3B1     0   14  3CTL    0   48    0  spans     N/A
 3B1     0   15  3CTL    0   47       spans     N/A
 3B1     0   16  3CTL    0   50       uni       N/A
 3B1     0  100  3B4     0  100    0  pvc       N/A
```

The fields in this display are defined in the same manner as those listed above in the example for all of the permanent virtual channels on an individual switch fabric.

To list all of the existing permanent virtual channels on a specific port, path, and channel (for example, port 3B1, VPI 0, and VCI 100), enter the following parameters:

```
localhost::configuration vcc> show 3B1 0 100
 Input        Output
 Port  VPI  VCI  Port  VPI  VCI  UPC  Protocol  Name
 3B1     0  100  3B4     0  100    0  pvc       N/A
```

The fields in this display are defined in the same manner as those listed above in the example for all of the permanent virtual channels on an individual switch fabric.

To list advanced information about all of the existing permanent virtual channels on a switch board, enter the following parameters:

```
localhost::configuration vcc> show advanced
 Input        Output
 Port  VPI  VCI  Port  VPI  VCI  Protocol  ConType
 3B1     0    5  3CTL    0   49  uni       N/A
 3B1     0   14  3CTL    0   48  spans     N/A
 3B1     0   15  3CTL    0   47  spans     N/A
 3B1     0   16  3CTL    0   50  uni       N/A
 3B1     0  100  3B4     0  100  pvc       tran-tran-pp
 3B2     0    5  3CTL    0   53  uni       N/A
 3B2     0   14  3CTL    0   52  spans     N/A
 3B2     0   15  3CTL    0   51  spans     N/A
 3B2     0   16  3CTL    0   54  uni       N/A
Press return for more, q to quit: q
```

The fields in the advanced display have the following meanings:

Input Port Lists the incoming port number of the virtual channel.

Input VPI Shows the incoming virtual path number.

Input VCI Indicates the incoming virtual channel number.

Output Port Lists the outgoing port number of the virtual channel.

Output VPI Shows the outgoing virtual path number.

Output VCI Indicates the outgoing virtual channel number.

Protocol Displays what type of protocol is running on this channel, which can be `spans`, `pvc`, `uni` or `spvc`.

ConType Indicates the connection type for the endpoints of this channel with respect to a particular network. `Orig` (originating) means that the ingress/egress endpoint of the channel is connected to the source node which is outside the network, `tran` (transit) means that the ingress/egress endpoint of the channel is connected to a node within the network, and `term` (terminating) means that the ingress/egress endpoint of the channel is connected to the destination node which is outside the network. `pp` means this is labelled as a point-to-point channel, `pmp` means this is labelled as a point-to-multipoint channel, `mpp` means this is labelled as a multipoint-to-point channel. `mpmp` means this is labelled as a multipoint-to-multipoint channel.

To list advanced information about all of the existing permanent virtual channels on a specific port, (e.g., port 3B1), enter the following parameters:

```
localhost::configuration vcc> show 3b1 advanced
 Input         Output
 Port  VPI  VCI  Port  VPI  VCI  Protocol  ConType
 3B1     0    5  3CTL    0   49  uni       N/A
 3B1     0   14  3CTL    0   48  spans     N/A
 3B1     0   15  3CTL    0   47  spans     N/A
 3B1     0   16  3CTL    0   50  uni       N/A
 3B1     0  100  3B4     0  100  pvc       tran-tran-pp
```

The fields in this display are defined in the same manner as those listed above in the example for advanced information about all of the permanent virtual channels on an individual switch fabric.

To list all of the existing permanent virtual channels on a specific port, path, and channel (e.g., port 3B1, VPI 0, and VCI 100), enter the following parameters:

```
localhost::configuration vcc> show 3B1 0 100 advanced
 Input         Output
 Port  VPI  VCI  Port  VPI  VCI Protocol  ConType
 3B1     0  100  3B4     0  100  pvc       tran-tran-pp
```

The fields in this display are defined in the same manner as those listed above in the example for advanced information about all of the permanent virtual channels on an individual switch fabric.

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2.23 Virtual Path Configuration Commands

These commands let you configure virtual paths. You can display the list of available subcommands by typing **`vpc ?`** at the **`configuration`** level.

NOTE

These commands are only used to configure through paths. To configure originating or terminating paths you must use the **`conf vpt`** commands.

```
localhost::configuration> vpc ?
delete          new             show
```

2.23.1 Deleting a Virtual Path

This command lets you delete an existing virtual (through) path. Enter the following parameters:

```
localhost::configuration vpc> delete <iport> <ivpi> <oport> <ovpi>
```

iport Indicates the number of the input port on which the through path is to be deleted.

ivpi Indicates the number of the input VPI to be deleted.

oport Used to delete a through path. Indicates the number of the output port on which the through path is to be deleted.

ovpi Used to delete a through path. Indicates the number of the output VPI to be deleted.

2.23.2 Creating a Virtual Path

This command lets you add a virtual (through) path. There are advanced options which may be used in combination with the required parameters. Enter the following parameters:

```
localhost::conf vpc> new <iport> <ivpi> <oport> <ovpi> [-upc <index>] [-name
<name>]
advanced options:
    [-inctype (orig|tran|term) -outctype (orig|tran|term) [pmp|mpp|mpmp]] \
    [-shapeivpi <vpi>]
```

iport Indicates the incoming port number.

ivpi Indicates the incoming virtual path number.

oport Indicates the outgoing port number.

ovpi Indicates the outgoing virtual path number.

-upc <index> Indicates the integer index that refers to a specific UPC traffic contract. If no index is specified, then no traffic policing will take place on this VPI. It is assigned a UPC index of 0, and all traffic on this VPI is treated as UBR traffic. This is the default.

-name <name> Indicates the name you want to assign to this through path to help identify it uniquely. It is most useful for billing purposes so you can identify which paths are being used by which customers. Can be up to 32 ASCII characters long.

The advanced options are as follows:

-inctype (orig | tran | term) Indicates the path connection type for the incoming path. For billing purposes, it denotes on which switch this path is arriving. `Orig` (originating) means that the ingress endpoint of the path is connected to the source node which is outside the network, `tran` (transit) means that the ingress endpoint of the path is connected to a node within the network, and `term` (terminating) means that the ingress endpoint of the path is connected to the destination node which is outside the network.

-outctype (orig | tran | term) Indicates the path connection type for the outgoing path. For billing purposes, it denotes on which switch this path is leaving. `Orig` (originating) means that the egress endpoint of the path is connected to the source node which is outside the network, `tran` (transit) means that the egress endpoint of the path is connected to a node within the network, and `term` (terminating) means that the egress endpoint of the path is connected to the destination node which is outside the network.

pmp Indicates this is a point-to-multipoint path.

mpp Indicates this is a multipoint-to-point path.

mpmp Indicates this is a multipoint-to-multipoint path.

NOTE By indicating `pmp`, `mpp`, or `mpmp`, you are only assigning a label for record keeping purposes. The switch does not necessarily create the type of path you have specified. If you assign a connection type, but do not assign a `pmp`, `mpp`, or `mpmp` label, the switch assigns a label of `pp` (point-to-point).

-shapeivpi <vpi> Indicates the incoming VPI for this through path. When the traffic shaping port is not the port connected to the WAN, a through path must be created from the WAN port to the traffic shaping port. Cells arrive from the network at the traffic shaping port with this value equal to the VPI of the terminating path at the traffic shaping port.

NOTE If you want to shape traffic on more than two ports on a given network module, it is recommended that you set the traffic memory model to model number 5 for that network module. Please see the sections, Displaying Traffic Models for a Network Module, and, Setting Traffic Models on a Network Module, found earlier in this chapter for information about how to do this.

The following is an example of how to create a virtual path which specifies a name:

```
localhost::configuration vpc> new 3b1 75 3b5 75 -name customer_b
```

The following is an example of how to create a virtual path which specifies a name and a connection type:

```
localhost::conf vpc> new 3b6 62 3b2 62 -name customer_c -inctype tran - outctype
tran
```

NOTE

Terminating and originating paths cannot be created across the intra-fabric ports on a TNX-1100 or MSC-900; only through paths can be created across the intra-fabric ports as shown in the following example.

The following is an example of how to create a simple virtual path on a TNX-1100. To create a through path going in port 2A1, vpi 1 on the switch board installed in slot 2 and going out port 4B1, vpi 1 on the switch board installed in slot 4, enter the following:

```
localhost::configuration vpc> new 2a1 1 2e4 1
localhost::configuration vpc> new 2e4 1 2a1 1

localhost::configuration vpc> new 4b1 1 4e2 1
localhost::configuration vpc> new 4e2 1 4b1 1
```

In the first line in the first pair, notice that the output port is 2E4. This is the intra-fabric port. The 2 means the connection is coming out of the switch board in slot 2 through the intra-fabric port. The E represents the intra-fabric port. The 4 means the connection is destined for switch board in slot 4. 2E4 then becomes the input port in the second line.

In the first line in the second pair, notice that the output port is 4E2. This is the intra-fabric port. The 4 means the connection is coming out of the switch board in slot 4 through the intra-fabric port. The E represents the intra-fabric port. The 2 means the connection is destined for switch board in slot 2. 4E2 then becomes the input port in the second line.

NOTE

Through paths cannot use VPI 0 on the intra-fabric port connections on a TNX-1100 or MSC-900.

2.23.3 Displaying Virtual Paths

This command lets you display existing virtual (through) paths. You can show either all of the existing virtual paths on an individual switch fabric or all of the existing virtual paths on a specific port. Enter the following parameters:

```
localhost::configuration vpc> show
Input       Output
Port  VPI  Port  VPI  UPC  Prot  Name
3B1    40  3B4    40    0  pvc   customer_a
3B1    75  3B5    75    0  pvc   customer_b
3B2    95  3B3    95    0  pvc   customer_e
3B6    62  3B2    62    0  pvc   customer_c
3B6    68  3B3    68    0  pvc   customer_d
```

The fields in this display are defined as follows:

Input Port Shows the number of the input port of the through path.

Input VPI Shows the input virtual path.

Output Port Shows the number of the output port of the through path.

Output VPI Shows the output virtual path.

UPC Shows the integer index that refers to a specific traffic contract assigned to this through path.

Prot Lists pvc for a permanent virtual circuit.

Name Shows the user-assigned name which helps to identify this through path uniquely.

To list advanced options about all of the existing virtual (through) paths, enter the following parameters:

```
localhost::configuration vpc> show advanced
 Input       Output
 Port  VPI  Port  VPI  Shape  ConType
 3B1    40  3B4    40         N/A
 3B1    75  3B5    75         N/A
 3B2    95  3B3    95         tran-tran-pmp
 3B6    62  3B2    62         tran-tran-pp
 3B6    68  3B3    68         N/A
```

The fields in this display are defined as follows:

Input Port Shows the number of the input port of the path.

Input VPI Indicates the input virtual path.

Output Port Shows the number of the output port of the path.

Output VPI Shows the output virtual path.

Shape Indicates whether or not traffic shaping has been enabled for this path.

ConType Indicates the connection type for the endpoints of this path with respect to a particular network. `Orig` (originating) means that the ingress/egress endpoint of the path is connected to the source node which is outside the network, `tran` (transit) means that the ingress/egress endpoint of the path is connected to a node within the network, and `term` (terminating) means that the ingress/egress endpoint of the path is connected to the destination node which is outside the network. `pp` means this is labelled as a point-to-point path, `pmp` means this is labelled as a point-to-multipoint path, `mpp` means this is labelled as a multipoint-to-point path. `mpmp` means this is labelled as a multipoint-to-multipoint path.

2.24 Virtual Path Terminator Configuration Commands

These commands let you configure virtual path terminators. You can display the list of available subcommands by typing **`vpt ?`** at the **`configuration`** level.

NOTE

These commands are only used to configure originating or terminating paths. To configure through paths, you must use the **`conf vpc`** commands.

```
localhost::configuration> vpt ?
  delete          modify          new             show
```

2.24.1 Deleting a Virtual Path Terminator

This command lets you delete a virtual path terminator. Enter the following parameters:

```
localhost::configuration vpt> delete <port> <vpi> (term | orig)
```

port Indicates the number of the port on which the virtual path is to be deleted.

vpi Indicates the number of the path that is to be deleted.

term Indicates that a terminating path is to be deleted.

orig Indicates that an originating path is to be deleted.

NOTE

Virtual Path 0 cannot be deleted on any of the connections to the intra-fabric ports on a TNX-1100 or MSC-900. Virtual Path 0 cannot be deleted on the control port (CTL) on any switch.

The following is an example of how to delete a terminating path:

```
localhost::configuration vpt> del 3b4 88 term
Would you like to delete the originating side also [y]? y
```

The following is an example of how to delete an originating path:

```
localhost::configuration vpt> del 3b3 99 orig
Would you like to delete the terminating side also [y]? y
```

NOTE Before deleting a virtual path, you must first delete all VCCs which use that path.

2.24.2 Modifying a Virtual Path Terminator

This command lets you modify an existing virtual path terminator. Enter the following parameters:

```
localhost::configuration vpc> modify <port> <vpi> (term|orig) -reserved <Kbps>
```

port	Indicates the port number for this path.
vpi	Indicates the number for this virtual path.
term	Specifies that the vpt to be modified is a terminating path. If this option is not used, an elastic path is created. Elastic paths allocate and de-allocate bandwidth for their channels from the link.
orig	Specifies that the vpt to be modified is an originating path.
-reserved <Kbps>	Indicates the amount of bandwidth, specified in Kbps, that you want to reserve on this vpt.

2.24.3 Creating a Virtual Path Terminator

This command lets you create a new virtual path terminator. Enter the following parameters:

```
localhost::configuration vpt> new <port> <vpi> (term | orig) [-reserved <Kbs>] \
        [-minvci <vci>] [-maxvci <vci>]
advanced options for orig paths:
        [-shapeovpi <vpi>] [-vbrob <percent>] [-vbrbuffob <percent>]
```

The following parameters make up a vpt:

port Indicates the port number for this vpt.

vpi Indicates the path number for this vpt.

term Specifies that the vpt to be created is a terminating path. If this option is not used, an elastic path is created. Elastic paths allocate and de-allocate bandwidth for their channels from the link.

orig Specifies that the vpt to be created is an originating path.

-reserved <Kbs> Indicates the amount of bandwidth specified in Kbps that you want to reserve on this vpt.

-minvci <minvci> Indicates the bottom number for the range of VCIs to be reserved for VCCs on this virtual path terminator. The default is `1`.

-maxvci <maxvci> Indicates the top number for the range of VCIs to be reserved for VCCs on this virtual path terminator. The default is `511`.

The following are advanced options for vpts:

-shapeovpi <vpi> Indicates the output port of a traffic shaping originating vpt. Setting this value configures traffic shaping on the originating path. Cells bound for the network leave the traffic shaping port with this VPI. When the traffic shaping port is the WAN port, this value equals the input VPI of the originating path. If the traffic shaping port is not the WAN port, this value equals the input VPI of the through path from the shaping port to the WAN port.

-vbrob <percent> Indicates the bandwidth overbooking level assigned to this vpt, specified as a percentage. Enter an integer value from `1` to `99,999`. The default is `100`, which means that no overbooking has been defined. Values less than `100` cause underbooking. Values greater than `100` denote overbooking.

-vbrbuffob <percent> Indicates the buffer overbooking level assigned to this vpt, specified as a percentage. Enter an integer value greater than or equal to `1`. The default is `100`, which means that no overbooking has been defined. Values less than `100` cause underbooking. Values greater than `100` denote overbooking.

The following is an example of how to create a terminating path:

```
localhost::configuration vpt> new 3b3 99 term
Would you like to create the originating side also [y]? y
```

The following is an example of how to create a originating path:

```
localhost::configuration vpt> new 3b4 88 orig
Would you like to create the terminating side also [y]? y
```

2.24.4 Displaying Virtual Path Terminators

This command lets you display virtual path terminators for all of the ports on a switch board. Enter the following parameters:

```
localhost::configuration vpt> show
 Input      Output
 Port  VPI  Port  VPI   ResBW  CurBW MinVCI MaxVCI  VCs  Protocol
 3B1     0  terminate     N/A   0.8K      1    511    6  pvc
 3B2     0  terminate     N/A   0.8K      1    511    6  pvc
 3B3     0  terminate     N/A   0.8K      1    511    6  pvc
 3B3    99  terminate     N/A   0.8K      1    511    2  pvc
 3B4     0  terminate     N/A   0.8K      1    511    6  pvc
 3B4    88  terminate     N/A   0.8K      1    511    2  pvc
 3B5     0  terminate     N/A   0.8K      1    511    6  pvc
 3B6     0  terminate     N/A   0.8K      1    511    6  pvc
 3E1     0  terminate     N/A   0.0K      0   7167    4  pvc
 3E2     0  terminate     N/A   0.0K      0   7167    4  pvc
 3E4     0  terminate     N/A   0.0K      0   7167    4  pvc
 3CTL    0  terminate     N/A   0.0K      1   1023   35  pvc
 originate  3B1     0     N/A   0.0K      1    511    6  pvc
 originate  3B2     0     N/A   0.0K      1    511    6  pvc
 originate  3B3     0     N/A   0.0K      1    511    6  pvc
 originate  3B3    99     N/A   0.0K      1    511    2  pvc
 originate  3B4     0     N/A   0.0K      1    511    6  pvc
 originate  3B4    88     N/A   0.0K      1    511    2  pvc
 originate  3B5     0     N/A   0.0K      1    511    6  pvc

Press return for more, q to quit: q
```

Input Port Shows the number of the input port of the vpt. Shows `originate` if it is an originating path.

Input VPI Shows the input virtual path number.

Output Port Shows the number of the output port of the vpt. Shows `terminate` if it is a terminating path.

Output VPI Shows the output virtual path number.

ResBW Shows the maximum amount of bandwidth (in Kbps) that is reserved for the virtual channels using this vpt. A value of N/A indicates that this path is an elastic path. Elastic paths allocate and de-allocate bandwidth for their channels from the link.

CurBW Shows the amount of bandwidth (in Kbps) that is being used by the virtual channels using this vpt.

MinVCI Shows the bottom number for the range of VCIs that are reserved for VCCs on this virtual path terminator. The default is `1`.

MaxVCI Shows the top number for the range of VCIs that are reserved for VCCs on this virtual path terminator. The default is `511`.

VCs Shows the number of virtual channels that are currently using this vpt.

Protocol Shows `pvc` for a permanent virtual circuit.

To list all of the advanced options about all of the existing virtual path terminators, enter the following parameters:

```
localhost::configuration vpt> show advanced
 Input      Output
 Port   VPI  Port  VPI   Shape VBROB BuffOB
 3B1      0  terminate    N/A   N/A    N/A
 3B2      0  terminate    N/A   N/A    N/A
 3B3      0  terminate    N/A   N/A    N/A
 3B3     99  terminate    N/A   N/A    N/A
 3B4      0  terminate    N/A   N/A    N/A
 3B4     88  terminate    N/A   N/A    N/A
 3B5      0  terminate    N/A   N/A    N/A
 3B6      0  terminate    N/A   N/A    N/A
 3E1      0  terminate    N/A   N/A    N/A
 3E2      0  terminate    N/A   N/A    N/A
 3E4      0  terminate    N/A   N/A    N/A
 3CTL     0  terminate    N/A   N/A    N/A
 originate  3B1     0           100    100
 originate  3B2     0           100    100
 originate  3B3     0           100    100
 originate  3B3    99           100    100
 originate  3B4     0           100    100
 originate  3B4    88           100    100
 originate  3B5     0           100    100

Press return for more, q to quit: q
```

AMI Configuration Commands

The fields in this display are defined as follows:

Input Port Shows the number of the input port of the vpt. Shows `originate` if it is an originating path.

Input VPI Indicates the input virtual path number.

Output Port Shows the number of the output port of the vpt. Shows `terminate` if it is a terminating path.

Output VPI Shows the output virtual path number.

Shape Indicates whether or not traffic shaping has been enabled for this originating vpt.

VBROB Shows the bandwidth overbooking level assigned to this vpt, specified as a percentage. Valid values are integers from `1` to `99,999`. The default is `100`, which means that no overbooking has been defined. Values less than `100` cause underbooking. Values greater than `100` denote overbooking.

BuffOB Shows the buffer overbooking level assigned to this vpt, specified as a percentage. Valid values are integers greater than or equal to `1`. The default is `100`, which means that no overbooking has been defined. Values less than `100` cause underbooking. Values greater than `100` denote overbooking.

CHAPTER 3 AMI Operation Commands

This chapter contains a detailed description of the AMI `operation` commands. The main `operation` menu can be found at the root level. There are several commands available under `operation`. Commands that are submenus are immediately followed by a “>” symbol. Typing **`operation ?`** at the prompt at the root level displays the `operation` commands as follows:

```
localhost::operation> ?
  cdb>            environment>     panic>           date
  flash>          password         upgrade          version
  reboot
```

3.1 Configuration Database (CDB) Commands

These commands allow the user to manage the configuration database (CDB). Typing **`cdb ?`** at the prompt at the `operation` level displays the `cdb` commands as follows:

```
localhost::operation> cdb ?
  backup          init             reset            restore
```

3.1.1 Backing Up the Database

This command lets the user make a backup of the configuration database. The remote host to which the file will be backed up must be running the tftp server code. Enter the following parameters:

```
localhost::operation cdb> backup [<host>:] <full path to backup file>
```

host Indicates the name or the IP address of the host to which the CDB file will be backed up.

full path to backup file Indicates the full path name of the file to which the CDB will be backed up.

Since the SCP uses tftp to perform the CDB backup, you must first create an empty file in the `/tftpboot` directory on the remote host to receive the CDB. Use the **touch** command to do this. Then, use the **chmod** command to change the permissions of that file so that it will let the switch write the backup CDB to that file.

Perform the following steps to back up your CDB:

1. First, telnet to your remote host and log in.
2. Enter the following commands in sequence:

```
cd  /tftpboot

touch <backup file name>

chmod 777 <backup file name>
```

3. Then exit from the telnet session.
4. Telnet to the switch and log into AMI.
5. Enter the following command:

```
oper cdb backup <host>:/tftpboot/<backup file name>
```

You should receive the following message:

```
CDB backup was successful
```

Your backup file now resides in the file and on the host you specified.

3.1.2 Initializing the Database

This command lets the user initialize the CDB. The switch asks you to verify this action before it re-initializes the CDB.

Enter the following parameters:

```
localhost::operation cdb> init
This command will re-initialize the CDB and reboot the switch
Do you really want to remove ALL permanent information from
the database INCLUDING the configuration of all the network
interfaces? [n] n

localhost::operation cdb>
```

3.1.3 Resetting the Database

This command enables the user to reset the configuration database. The only information that is retained is the IP configuration which includes the switch name and interface descriptions. The switch cautions the user that all ATM information is deleted. The switch then asks the user to confirm that resetting the cdb is the desired action. Enter the following parameters:

```
localhost::operation cdb> reset

********** W A R N I N G **********

This operation resets the switch configuration database.
As a result, the switch control software will be restarted.
You will lose connectivity with the switch while this
operation is progressing.

Are you sure you want to reset the CDB [n]? n
localhost::operation cdb>
```

If the user enters yes to the reset question, the switch responds as follows:

```
Are you sure you want to reset the CDB [n]? y
The switch will restart momentarily.
```

At this point, the switch resets the CDB, closes the user out of all active sessions, and restarts the switch. The user must then log in to AMI again to perform any more actions on the switch.

3.1.4 Restoring the Database

This command allows the user to restore the configuration database. Enter the following parameters:

```
localhost::operation cdb> restore [<host>:]<full path to backup file>
```

host — Specifies the IP address of the host on which the CDB file that is to be restored resides.

full path to backup file — Indicates the full path name of the CDB file that is to be restored.

AMI Operation Commands

3.2 Environment Commands

These commands allow the user to monitor the switch's environmental parameters. Typing **`environment ?`** at the prompt at the `operation` level displays the `environment` commands as follows:

```
localhost::operation> environment ?
  cpu               fabric>          fans              power
  temperature
```

3.2.1 CPU Operation

This command lets the user display information about the CPU on a TNX-210, TNX-1100, or MSC-900. Enter the following parameters:

```
localhost::operation environment> cpu
 CPU        Type       State      DRAMSize   RevLevel   FlashSize
 1Y         i960cf     normal     16777216   5          3145728
```

The fields in this display are defined as follows:

CPU Displays the slot in which the CPU resides. The number indicates in which switch fabric it resides (`1` in a TNX-210, or `1`, `2`, `3`, or `4` in a TNX-1100 or MSC-900). The letter indicates in which of the two slots it resides. `X` indicates the left slot of the switch fabric (the top slot in a TNX-1100 or MSC-900) and `Y` indicates the right slot (the bottom slot in a TNX-1100 or MSC-900).

Type Shows the type of processor.

State Shows the current condition of the CPU. `normal` means that this CPU is functioning properly and that this CPU is the primary CPU if more than one is installed. `standby` means that this is the secondary SCP if more than one CPU is installed. `fail` means that something is wrong with this SCP.

NOTE When the primary SCP can not get information about the standby SCP (e.g., the standby is running a lesser version of software that did not support the `DRAMSize`, `RevLevel`, and `FlashSize` fields), `N/A` is displayed for those fields.

DRAMSize Shows the amount of DRAM, in bytes, installed on the SCP board.

RevLevel Shows the hardware revision level of the processor.

FlashSize Shows the size of FLASH, in bytes, installed on this SCP board.

3.2.2 Switch Fabric Operation

These commands allow the user to monitor the temperature of the individual switch fabrics or multiplexer modules on a TNX-1100 or MSC-900. Typing **`fabric ?`** at the prompt at the `environment` level displays the `cdb` commands as follows:

```
localhost::operation environment> fabric ?
  show              temperature
```

3.2.3 Showing Switch Fabric Temperature Information

This command displays the current temperatures in degrees Celsius of each installed switch fabric or multiplexer module on a TNX-1100 or MSC-900, the current state of the temperature sensor, and the current thresholds at which a temperature alarm trips and then later resets. The current temperature and state values are displayed for all installed fabrics. Enter the following parameters:

```
localhost::operation environment fabric> show

 Fabric     Deg C      State
 1          31         normal
 2          28         normal
 3          37         normal
 4          35         normal
 Alarm/trap reset threshold (this fabric): 60 degrees C or lower
Alarm/trap trip threshold (this fabric): 65 degrees C or greater
```

The fields in this display are defined as follows:

Fabric Shows the number of the fabrics currently installed in the switch. Switch fabric 1 is in the slot labeled 1 on the enclosure, switch fabric 2 is in the slot labeled 2 on the enclosure, and so on.

Deg C Lists the current temperature of the switch fabrics in degrees Celsius.

State Displays `overTemp` if an alarm has been tripped because of this sensor, based on the trip and reset values that have been configured. Shows `normal` if otherwise, or if the alarm has reset.

Alarm/trap reset threshold Shows the temperature in ^{o}C at which an overtemperature alarm is reset. For example, if you set the reset and trip thresholds to 50 ^{o}C and 60 ^{o}C, respectively, then the alarm will trip at 60 ^{o}C, and it will be reset when the temperature drops back down to 50 ^{o}C.

Alarm/trap trip threshold Shows the temperature in ^{o}C at which an overtemperature alarm trips. For example, if you set the reset and trip thresholds to 50 ^{o}C and 60 ^{o}C, respectively, then the alarm will trip at 60 ^{o}C, and it will be reset when the temperature drops back down to 50 ^{o}C.

3.2.4 Configuring the Switch Fabric Temperature Thresholds

This command allows the user to set the thresholds at which a temperature alarm is tripped and then later reset on a TNX-1100 or MSC-900. Any temperature can cause the switch to display a state of `normal` or `overTemp`, depending on the trip and reset thresholds set by the user. For example, a temperature of 55 ^{o}C shows a state of `normal` if the trip threshold was 60 ^{o}C and the switch fabric temperature never reached 60 ^{o}C, but it would show a state of `overTemp` if the switch fabric temperature reached 60 ^{o}C, and then had dropped to 55 ^{o}C, but had not yet reached a reset threshold set at 50 ^{o}C. Enter the following parameters:

```
localhost::operation environment fabric> temperature <reset threshold> <trip
threshold>
```

reset threshold Indicates the temperature in ^{o}C at which an overtemperature alarm is reset. The default is 60 ^{o}C.

trip threshold Indicates the temperature in ^{o}C at which an overtemperature alarm trips. The default is 65 ^{o}C.

3.2.5 Fan Operation

This command enables the user to display information about the fans on a TNX-1100 or MSC-900. Enter the following parameters:

```
localhost::operation environment> fans
 FanBank          FanBankState
 1                normal
 2                normal
 3                normal
 4                normal
```

FanBank FanBank corresponds to a single fan, indicating the number of the fan.

FanBankState Displays the current state of the fan. In general, it reads `normal`. If the fan has malfunctioned, it reads `failed`.

3.2.6 Power Supply Operation

This command enables the user to display information about power supplies. Enter the following parameters to display information for a DC-powered TNX-1100 or MSC-900:

```
localhost::operation environment> power

 PS  Type          InputState OutputState 5VoltState Current S/N  Version
 1   ps30ADC       normal     normal      normal     normal  10         1
 2   ps30ADC       normal     normal      normal     normal  10         1
```

Enter the following parameters to display information for a TNX-1100 or MSC-900 with model B AC power supplies:

```
localhost::operation environment> power
 PowerSupply  Type            InputState  OutputState S/N         Version
 1            psRM1000HA      normal      normal      12          1
 2            psRM1000HA      normal      normal      22          1
```

Enter the following parameters to display information about a TNX-210:

```
localhost::operation environment> power
 PowerSupply  Type            InputState  OutputState
 1            psAutoRangeAC   normal      normal
 2            psAutoRangeAC   normal      normal
```

The fields in these displays are defined as follows:

PowerSupply On a TNX-210, 1 indicates the left power supply and 2 indicates the right power supply. On a TNX-1100 or MSC-900, 1 indicates the power supply in slot 1 in the chassis and 2 indicates the power supply in slot 2 in the chassis.

Type Displays whether it is an AC or a DC power supply.

InputState Shows if the voltage coming into the power supply is normal or not.

OutputState Shows if the voltage going out of the power supply is normal or not.

S/N Indicates the serial number of the power supply.

Version Lists the power supply’s hardware version number.

3.2.7 Temperature Sensor Operation

This command enables the user to display information gathered by the overtemperature sensors. Enter the following parameters to display temperature information about a TNX-1100 or MSC-900:

```
localhost::operation environment> temperature
 TemperatureSensor              SensorState
 enclosure                      normal
 power-supply-A                 normal
 power-supply-B                 normal
```

Enter the following parameters to display temperature information about a TNX-210:

```
localhost::operation environment> temperature
 TemperatureSensor              SensorState
 enclosure                      normal
```

The fields in these displays are defined as follows:

TemperatureSensor Indicates where the temperature sensor is located on the unit.

SensorState Shows if the temperature at the specified location is normal or not.

NOTE The information for the power supply temperature sensors is only displayed on a TNX-1100 or MSC-900. When this command is issued on a TNX-210, information is displayed only for the enclosure temperature sensor. No power supply temperature sensor information is displayed for these types of switches.

3.3 Panic Acknowledgment Commands

On occasion, the SCP may go into a state called panic, in which it reboots, closes a user out of session, or goes into a hung or frozen state as the result of a software bug. When the SCP returns to a normal state and an active session is running again, the first thing the user should do is to use the **`operation panic show`** AMI command to display information about what happened to the SCP when it panicked. This information helps FORE's Technical Support staff to diagnose the problem. Typing **`panic ?`** at the prompt at the `operation` level displays the `panic` commands as follows:

```
localhost::operation> panic ?
  clear          show
```

3.3.1 Clearing the Panic Flag

This command lets the user clear the panic acknowledgment flag without viewing the contents of the panic dump file. Once the flag is cleared, the user may return to normal operation.

NOTE Do not clear a panic condition until after you have performed the following three steps.

1. Use the **`operation panic show`** command to display the contents of the panic file.
2. Cut and paste this panic file information to another file on a host and save that file.
3. Send this information via e-mail to FORE's Technical Support along with a description of the events leading up to the panic. Ask the Technical Support staff to open a case for you based on that information. Once you have sent them the information, you may clear the panic.

Enter the following parameters to clear a panic condition:

```
localhost::operation panic> clear
OK.
```

The message above is shown when a panic has been cleared.

The message below is shown when no panic dump file exists (i.e., the SCP did not panic).

```
localhost::operation panic> clear
There is no panic condition to clear.
```

3.3.2 Displaying the Panic Dump File

This command lets the user view the contents of the panic dump file, which contains information about what happened to the SCP when it panicked, without clearing the panic flag. This information can assist FORE's Technical Support staff in troubleshooting the cause of the panic. Once the flag is cleared, the user may return to normal operation.

The following is an example of the kind of message that appears on your console when a panic occurs:

```
********************************************
ForeThought SCP Software
Copyright (C) 1992-1996 FORE Systems, Inc.
All rights reserved.
********************************************
Starting kernel....
PANIC REBOOT! (Complete)
Panicked at Wed Nov 8 17:38:58 1996
with message: Fault
and 10 trace entries.
Use the AMI command `oper panic clear' to clear the panic.
```

At this point, the user must log in to AMI and enter the following parameters to display the panic message:

```
localhost::> oper panic show
--------------------------------------------------------------------------------
-------
The last recorded panic occurred at Wed Nov  8 17:38:58 1995
It was for version 3.4.0 revision 1.29 with 2 deltas.
Message: [fault]
Global registers:
       G0  002C284D   G1  001F0000   G2  00000003   G3  00000000
       G4  002414A0   G5  00000028   G6  000000D8   G7  003368D0
       G8  000001F0   G9  00011D70   G10 00020001   G11 00039B50
       G12 00000002   G13 000000FF   G14 00000000   G15 0000CB60
    Stack trace:
         0. 00245F64
         1. 00039B50
         2. 00245FE4
         3. 00230258
         4. 002414A4
         5. 00229B04
         6. 00229930
         7. 00232E60
         8. 001111A4
          9. 00100088
--------------------------------------------------------------------------------
-------
```

Once the information has been displayed, follow the steps listed in the previous subsection for clearing a panic.

The following message is displayed whenever there is no panic dump file:

```
localhost::operation panic> show
There is no panic dump to show you.
```

NOTE

If the switch panics, the panic file is automatically written to syslog upon reboot, provided that a syslog host had been set prior to the panic. This is especially useful if multiple panics occur, so that each is separately recorded and is not overwritten as they are here. For more information about setting the syslog host, please refer to Chapter 2 of this manual.

3.4 Displaying and Setting the Date and Time

This command allows the user to display the current date and time on the switch. To display this information, enter **date** at the operation level.

```
localhost::operation> date
Mar 14  12:44:13 +00:00 1997
```

This command also enables the user to set the current date and time on the switch. To set or change this information, enter the following parameters:

```
localhost::operation> date ?
localhost::operation> date [gmt] [<mm>/<dd>/<yyyy> <hh>:<mm>:<ss>> [(+|-
)<hh>:<mm>]]
```

mm/dd/yyyy Indicates the current date. Enter the month, the day, and the year numerically. For example, enter 02/11/1997.

gmt Indicates the switch's notion of Greenwich Mean Time.

hh:mm:ss Indicates the current time. Enter the hour (in terms of a 24-hour clock; i.e., 1:00 pm is 13), the minutes, and the seconds. For example, to set the time as 2:02 pm, enter 14:02:00.

<(+|-)hh:mm> Indicates your time difference from Greenwich Mean Time. Enter the hours and minutes. For example, if your time zone is two and one-half hours ahead of Greenwich Mean Time, enter +02:30. Currently, changing this parameter has no effect.

NOTE

If you have call recording or performance monitoring enabled, and you wish to change the switch time or date using **oper date**, disable call recording or performance monitoring first using **conf switch callrecord disable cr** or **conf switch callrecord disable perf**. Otherwise, your billing records will not be accurate.

3.5 FLASH Operation Commands

These commands enable management of the FLASH memory system. Typing **flash ?** at the prompt at the `operation` level displays the **flash** commands as follows:

```
localhost::operation> flash ?

  copy            delete          dir             free
  get             init            put             rename
```

3.5.1 Copying a File to FLASH Memory

This command allows the user to copy a file within the FLASH memory system. Enter the following parameters:

```
localhost::operation flash> copy <from> <to>
```

from Indicates the file to be copied.

to Indicates the file within the FLASH memory system to which the first file is copied.

3.5.2 Deleting a File from FLASH Memory

This command allows the user to delete a file from the FLASH memory system. Enter the following parameters:

```
localhost::operation flash> delete <file>
```

file Indicates the name of the file in FLASH memory that is to be deleted.

In order to delete a directory from the FLASH memory system (e.g., `sp100.20`), you must first delete all files in that directory. For example, you would list all directories in your FLASH memory system as follows:

```
localhost::operation flash> dir
SP100.20
SP100.16
CURRENT
```

Then you need to list all files in the directory that you want to delete as follows:

```
localhost::operation flash> dir sp100.20
FOREOS.EXE
```

Now delete the file in the directory as follows:

```
localhost::operation flash> del sp100.20/foreos.exe
```

Now you can delete the directory as follows:

```
localhost::operation flash> del sp100.20
```

3.5.3 Displaying the FLASH Memory Directory

This command enables the user to display the directory listing of the FLASH memory system. Enter the following parameters:

```
localhost::operation flash> dir
SP100.20
SP100.16
CURRENT
```

3.5.4 Displaying Free Space on the FLASH File

This command lets the user display the amount of remaining free space in the FLASH memory system. Enter the following parameters:

```
localhost::operation flash> free
There are 1891974 bytes of flash still available
```

3.5.5 Getting a FLASH File

This command lets the user retrieve a file from a remote host.

NOTE The remote host must be a tftpboot server.

Enter the following parameters:

```
localhost::operation flash> get <host:remotefile> <localfile>
```

host:remotefile Indicates the name of the host and file from which the file is to be retrieved.

localfile Indicates the name of the FLASH file where the retrieved file is to be stored.

3.5.6 Initializing the FLASH File

This command lets the user initialize the FLASH file.

CAUTION

Initializing the FLASH file deletes all information from the FLASH file, including the switch software.

Because this action results in the removal of data, the switch asks you to verify this action before it re-initializes the FLASH file. Enter the following parameters:

```
localhost::operation flash> init

Are you sure you want to format the flash [n]? n

localhost::operation flash>
```

3.5.7 Putting a FLASH File on a Remote Host

This command allows the user to put a FLASH file on a remote host. Enter the following parameters:

NOTE

The remote host must be a tftpboot server.

```
localhost::operation flash> put <localfile> <host:remotefile>
```

localfile Indicates the name of the FLASH file to be copied.

host:remotefile Indicates the name of the host and file to which the FLASH file is to be copied.

3.5.8 Renaming a FLASH File

This command enables the user to rename a file that is in FLASH memory. Enter the following parameters:

```
localhost::operation flash> rename <from> <to>
```

from Indicates the current name of the file to be renamed.

to Indicates the new name of the file to be renamed.

3.6 Setting or Changing the Password

This command allows the user to set or to change the switch's administrative password.

NOTE Be sure that this is the action you want to take because you are prompted for a new password immediately.

If you do not type a long enough password, you are prompted to do so. For security reasons, your keystrokes are not echoed when you enter the new password. You are asked to verify the change by entering the new password again. If you enter a password less than five characters long, you are asked to use a longer password. You can get to this level by entering **password** at the operation level. Enter the following parameters:

```
localhost::operation> password

Old password:
New password:

Please use a longer password.
New password:
Retype new password:

password changed.
```

3.7 Upgrading the Switch

This command allows the user to upgrade the software on an individual SCP.

NOTE

The remote host on which the upgrade file resides must be a tftpboot server.

To perform the initial switch software upgrade successfully, the bootp server and the tftpboot server must be configured properly. For complete instructions about performing a software upgrade, see Chapter 5 of the *TNX ATM Switch Installation and Maintenance Manual*.

The user can get to this level by entering **upgrade** at the operation level. Enter the following parameters:

```
localhost::operation> upgrade <remotehost>:<full path to remotefile>
```

remotehost Indicates the IP address of the remote host on which the upgrade file resides.

full path to remotefile Indicates the full path name of the upgrade file.

3.8 Displaying and Changing the Version of Software

This command allows the user to display and/or change the version of software that is currently running on the SCP. To display the current version, enter the following parameters:

```
localhost::operation> version
Current software version is SP100.20
Software versions installed : SP100.20 SP100.16
```

If more than one version is installed, you can type the following parameters to change the current version:

```
localhost::operation> version [<new-version>]
```

new-version Indicates the name of the software version with which the user wants to replace the current version.

ForeThought-SP provides forward compatibility of CDBs between releases, but not backward compatibility. Therefore, you should store and save your CDB if you downgrade from *ForeThought*-SP 1.0.x to a previous release.

CAUTION

Although you can change the version of software which will run on a switch, it is recommended that this feature be used to upgrade/downgrade only when absolutely necessary. The different software versions vary in functionality, and switching between these versions can result in the loss of certain configuration information on the switch.

NOTE

For complete instructions about changing between multiple versions of software, see Chapter 5 of the *TNX ATM Switch Installation and Maintenance Manual*.

3.9 Rebooting the Switch

This command enables the user to reboot the SCP. The user can get to this level by entering **reboot** at the operation level. You are asked to verify that you want to take this action. Enter the following parameters:

```
localhost::operation> reboot

Are you sure you want to reboot this switch [n]? y
```

Upon reboot, the SCP immediately closes the user out of all open AMI sessions.

CHAPTER 4 AMI Statistics Commands

This chapter contains a detailed description of the AMI statistics commands that display operational performance and error information for the various hardware and software features of the switch and the network modules. The main `statistics` menu can be found at the root level. To display the available commands, type **?** at the `statistics` level as follows:

```
localhost::statistics> ?
  aal0            aal4            aal5            atm
  board           cec>            cese1           cesds1
  ces             cr              ctlport         icmp
  interface       ip              module          oam>
  port            spans           tcp             udp
  uni             vcc             vpc             vpt
```

Each of these commands is described in the following subsections.

4.1 AAL0 Statistics

You can display AAL0 statistics for an individual switch fabric by entering **`aal0`** at the `statistics` level as follows:

```
localhost::statistics> aal0
Interface                XmtCell         RcvCell         CellDsc
asx0                           0               0               0
qaa0                           0               0               0
qaa1                           0               0               0
qaa2                           0               0               0
qaa3                           0               0               0
```

The fields in this display have the following meanings:

Interface Displays the AAL0 interface.

XmtCell Lists the number of transmitted cells.

RcvCell Shows the number of received cells.

CellDsc Displays the number of discarded cells.

4.2 AAL4 Statistics

You can display AAL4 statistics for an individual switch fabric by entering **aal4** at the `statistics` level as follows:

```
localhost::statistics> aal4
Intfce  XmtCell  RcvCell   XmtPDU   RcvPDU   CRCErr   SARErr    CSErr  CellDsc
asx0   13325692 11975493  8640802  2895586      357       54        0      357
qaa0   13325692 11975493  8640802  2895586      357       54        0      357
qaa1   13325692 11975497  8640802  2895587      357       54        0      357
qaa2   13325692 11975497  8640802  2895587      357       54        0      357
qaa3   13325694 11975498  8640803  2895587      357       54        0      357
```

The fields in this display have the following meanings:

Intfce Displays the AAL4 interface.

XmtCell Lists the number of transmitted cells.

RcvCell Shows the number of received cells.

XmtPDU Indicates the number of PDU packets transmitted.

RcvPDU Displays the number of PDU packets received.

CRCErr Lists the number of CRC errors.

SARErr Shows the number of segmentation and reassembly errors.

CSErr Indicates the number of convergence sublayer errors.

CellDsc Displays the number of discarded cells.

4.3 AAL5 Statistics

You can display AAL5 statistics for an individual switch fabric by entering **`aal5`** at the `statistics` level as follows:

```
localhost::statistics> aal5

Intfce  XmtCell  RcvCell   XmtPDU   RcvPDU  CRCErrs   CSErrs  CellDsc   PDUDsc
asx0    9825000  9201985  5963056  2307103        0        0  8879636        0
qaa0    9825004  9201989  5963060  2307107        0        0  8879636        0
qaa1    9825004  9201989  5963060  2307107        0        0  8879636        0
qaa2    9825004  9201989  5963060  2307107        0        0  8879636        0
qaa3    9825088  9201997  5963102  2307109        0        0  8879642        0
```

The fields in this display have the following meanings:

Intfce Shows the AAL5 interface.

XmtCell Shows the number of transmitted cells.

RcvCell Shows the number of received cells.

XmtPDU Shows the number of PDU packets transmitted.

RcvPDU Shows the number of PDU packets received.

CRCErrs Shows the number of CRC errors.

CSErrs Shows the number of convergence sublayer errors.

CellDsc Shows the number of discarded cells.

PDUDsc Shows the number of discarded PDU packets.

4.4 ATM Statistics

You can display ATM statistics for an individual switch fabric by entering **atm** at the `statistics` level as follows:

```
localhost::statistics> atm

Interface    XmtCell    RcvCell    VPI-OOR    VPI-Noc    VCI-OOR    VCI-Noc
asx0        23162276   21187910          0          0          0          1
qaa0        23162276   21187911          0          0          0          1
qaa1        23162276   21187912          0          0          0          1
qaa2        23162287   21187913          0          0          0          1
qaa3        23162287   21187914          0          0          0          1
```

The fields in this display have the following meanings:

Interface Displays the ATM interface.

XmtCell Lists the number of transmitted cells.

RcvCell Shows the number of received cells.

VPI-OOR Indicates the number of VPIs out of range.

VPI-Noc Lists the number of VPIs with no connection which means that there is no mapping entry listed for them.

VCI-OOR Indicates the number of VCIs out of range.

VCI-Noc Lists the number of VCIs with no connection which means that there is no mapping entry listed for them.

4.5 Switch Board Statistics

You can display switch board statistics for an individual switch board by entering **`board`** at the `statistics` level as follows:

```
localhost::statistics> board
Board      VPI-Lookup-Errors      VCI-Lookup-Errors
1                       1241                    562
```

The fields in this display have the following meanings:

Board	Shows the board (switch fabric number).
VPI-Lookup-Errors	Lists the number of cells that do not match any VPI lookup tables.
VCI-Lookup-Errors	Displays the number of cells that do not match any VCI lookup tables.

4.6 CEC Statistics

This section contains a detailed description of the statistics commands that display operational performance and error information received by the CEC-Plus. The **cec** statistics menu is available at the main **statistics** menu.

```
localhost::statistics> cec
localhost::statistics cec>
```

To display the available commands, a TCM (the one in slot X or slot Y) must be selected. To select the TCM in slot X (the top slot), type **slotx** at the **cec** sublevel. To select the TCM in slot Y (the bottom slot), type **sloty** at the **cec** sublevel.

```
localhost::statistics cec> slotx
localhost::statistics cec slotx>
```

After selecting a TCM, type **?** to display the available commands, as follows:

```
localhost::statistics cec slotx> ?
  icmp              interface        ip                tcp
  udp
```

Each of these commands is described in the following subsections.

4.6.1 ICMP Statistics

You can list ICMP statistics for the interfaces by entering **icmp** at the **statistics** level as follows:

```
localhost::statistics cec slotx> icmp
icmp Counter                          Value               Delta
------------------------------ -------------------- --------------------
icmpInMsgs                                        1                    0
icmpInErrors                                      0                    0
icmpInDestUnreachs                                1                    0
icmpInTimeExcds                                   0                    0
icmpInParmProbs                                   0                    0
icmpInSrcQuenchs                                  0                    0
icmpInRedirects                                   0                    0
icmpInEchos                                       0                    0
icmpInEchoReps                                    0                    0
icmpInTimestamps                                  0                    0
icmpInTimestampReps                               0                    0
icmpInAddrMasks                                   0                    0
icmpInAddrMaskReps                                0                    0
icmpOutMsgs                                       1                    0
icmpOutErrors                                     1                    0
icmpOutDestUnreachs                               1                    0
icmpOutTimeExcds                                  0                    0
icmpOutParmProbs                                  0                    0
icmpOutSrcQuenchs                                 0                    0
icmpOutRedirects                                  0                    0
icmpOutEchos                                      0                    0
icmpOutEchoReps                                   0                    0
icmpOutTimestamps                                 0                    0
icmpOutTimestampReps                              0                    0
icmpOutAddrMasks                                  0                    0
icmpOutAddrMaskReps                               0                    0
```

The fields in this display have the following meanings:

icmpInMsgs Shows the total number of ICMP messages which the entity received. This counter includes all those counted by `icmpInErrors`.

icmpInErrors Shows the number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).

icmpInDest Unreachs Shows the number of ICMP Destination Unreachable messages received.

icmpInTimeExcds Shows the number of ICMP Time Exceeded messages received.

icmpInParmProbs Shows the number of ICMP Parameter Problem messages received.

icmpInSrcQuenchs Shows the number of ICMP Source Quench messages received.

icmpInRedirects Shows the number of ICMP Redirect messages received.

icmpInEchos Shows the number of ICMP Echo (request) messages received.

icmpInEchoReps Shows the number of ICMP Echo Reply messages received.

icmpInTimestamps Shows the number of ICMP Timestamp (request) messages received.

icmpInTimestamp Reps Shows the number of ICMP Timestamp Reply messages received.

icmpInAddrMasks Shows the number of ICMP Address Mask Request messages received.

icmpInAddr MaskReps Shows the number of ICMP Address Mask Reply messages received.

icmpOutMsgs Shows the total number of ICMP messages which this entity attempted to send. Note that this counter includes all those counted by icmpOutErrors.

icmpOutErrors Shows the number of ICMP messages which this entity did not send due to problems discovered within ICMP such as a lack of buffers. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no types of error which contribute to this counter’s value.

icmpOutDest Unreachs	Shows the number of ICMP Destination Unreachable messages sent.
icmpOutTimeExcds	Shows the number of ICMP Time Exceeded messages sent.
icmpOutParm Probs	Shows the number of ICMP Parameter Problem messages sent.
icmpOutSrc Quenchs	Shows the number of ICMP Source Quench messages sent.
icmpOutRedirects	Shows the number of ICMP Redirect messages sent. For a host, this object is always zero, since hosts do not send redirects.
icmpOutEchos	Shows the number of ICMP Echo (request) messages sent.
icmpOutEchoReps	Shows the number of ICMP Echo Reply messages sent.
icmpOut Timestamps	Shows the number of ICMP Timestamp (request) messages sent.
icmpOut TimestampReps	Shows the number of ICMP Timestamp Reply messages sent.
icmpOutAddr Masks	Shows the number of ICMP Address Mask Request messages sent.
icmpOutAddr MaskReps	Shows the number of ICMP Address Mask Reply messages sent.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.6.2 Interface Statistics

You can list interface statistics for the TCM by entering **interface** at the **statistics** level as follows:

```
localhost::statistics cec slotx> interface
Interface ie0 Counter                Value                Delta
------------------------------ -------------------- --------------------
ifInOctets                                4294967295                    0
ifInUcastPkts                                   4980                    0
ifInNUcastPkts                                     0                    0
ifInDiscards                                       0                    0
ifInErrors                                         0                    0
ifInUnknownProtos                                  0                    0
ifOutOctets                               4294967295                    0
ifOutUcastPkts                                  1549                    0
ifOutNUcastPkts                                    0                    0
ifOutDiscards                                      0                    0
ifOutErrors                                        1                    0
ifOutQLen                                          0                    0
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

ifInOctets Indicates the total number of octets received on the interface, including framing characters.

ifInUcastPkts Shows the number of subnetwork-unicast packets delivered to a higher-layer protocol.

ifInNUcastPkts Lists the number of non-unicast (i.e., subnetwork-broadcast or subnetwork-multicast) packets delivered to a higher-layer protocol.

ifInDiscards Displays the number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.

ifInErrors Indicates the number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

ifInUnknown Protos Shows the number of packets received via the interface which were discarded because of an unknown or unsupported protocol.

ifOutOctets Displays the total number of octets transmitted out of the interface, including framing characters.

ifOutUcastPkts Lists the total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

ifOutNUcastPkts Indicates the total number of packets that higher-level protocols requested be transmitted to a non-unicast (i.e., a subnetwork-broadcast or subnetwork-multicast) address, including those that were discarded or not sent.

ifOutDiscards Shows the number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.

ifOutErrors Displays the number of outbound packets that could not be transmitted because of errors.

ifOutQLen Specifies the length of the output packet queue (in packets).

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.6.3 IP Statistics

You can display IP statistics for the TCM by entering **ip** at the **statistics** level as follows:

```
localhost::statistics cec slotx> ip
ip Counter                                  Value                Delta
------------------------------ -------------------- --------------------
ipInReceives                                 4546                    0
ipInHdrErrors                                   0                    0
ipInAddrErrors                                  2                    0
ipForwDatagrams                                 0                    0
ipInUnknownProtos                               1                    0
ipInDiscards                                    0                    0
ipInDelivers                                 3443                    0
ipOutRequests                                1655                    0
ipOutDiscards                                   0                    0
ipOutNoRoutes                                   0                    0
ipReasmReqds                                  220                    0
ipReasmOKs                                    220                    0
ipReasmFails                                    0                    0
ipFragOKs                                       0                    0
ipFragFails                                     0                    0
ipFragCreates                                   0                    0
```

The fields in this display have the following meanings:

ipInReceives Shows the total number of input datagrams received from interfaces, including those received in error.

ipInHdrErrors Lists the number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, etc.

ipInAddrErrors Shows the number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This includes invalid addresses (e.g., 0.0.0.0) and addresses of unsupported Classes (e.g., Class E). For entities which are not IP Gateways and, therefore, do not forward datagrams, this includes datagrams discarded because the destination address was not local.

ipForwDatagrams Shows the number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities which do not act as IP Gateways, this counter includes only those packets which were Source-Routed via this entity, and the Source-Route option processing was successful.

ipInUnknownProtos Shows the number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.

ipInDiscards Lists the number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (e.g., for lack of buffer space). This counter does not include any datagrams discarded while awaiting re-assembly.

ipInDelivers Shows the total number of input datagrams successfully delivered to IP user-protocols (including ICMP).

ipOutRequests Shows the total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission. This counter does not include datagrams counted in `ipForwDatagrams`.

ipOutDiscards Displays the number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (e.g., for lack of buffer space). This counter includes datagrams counted in `ipForwDatagrams` if any such packets met this (discretionary) discard criterion.

ipOutNoRoutes Lists the number of IP datagrams discarded because no route could be found to transmit them to their destination. This counter includes any packets counted in `ipForwDatagrams` which meet this “no-route” criterion. This includes datagrams which a host cannot route because all of its default gateways are down.

ipReasmReqds Shows the maximum number of seconds which received fragments are held while they are awaiting reassembly at this entity.

ipReasmOKs Shows the number of IP datagrams successfully reassembled.

ipReasmFails Shows the number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, etc). This is not necessarily a count of discarded IP fragments since some algorithms (notably the algorithm in RFC-815) can lose track of the number of fragments by combining them as they are received.

ipFragOKs Shows the number of IP datagrams that have been successfully fragmented at this entity.

ipFragFails Shows the number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be; e.g., because their Don't Fragment flag was set.

ipFragCreates Shows the number of IP datagram fragments that have been generated as a result of fragmentation at this entity.

NOTE

The value column shows the current value of the counter. The delta column shows the change in the counter since the last time you checked it. The counters are reset when the switch is restarted.

4.6.4 TCP Statistics

You can display TCP statistics for the TCM by entering **tcp** at the **statistics** level as follows:

```
localhost::statistics cec slotx> tcp
tcp Counter                          Value              Delta
----------------------------- ------------------- --------------------
tcpActiveOpens                                 1                    0
tcpPassiveOpens                                3                    0
tcpAttemptFails                                1                    0
tcpEstabResets                                 0                    0
tcpCurrEstab                                   1                    0
tcpInSegs                                   2183                   20
tcpOutSegs                                  1276                   14
tcpRetransSegs                                 2                    0
```

The fields in this display have the following meanings:

tcpActiveOpens Shows the number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

tcpPassiveOpens Lists the number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.

tcpAttemptFails Displays the number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

tcpEstabResets Indicates the number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.

tcpCurrEstab Shows the number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.

tcpInSegs Lists the total number of segments received, including those received in error. This count includes segments received on currently established connections.

tcpOutSegs Displays the total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.

tcpRetransSegs Indicates the total number of segments retransmitted; i.e., the number of TCP segments transmitted containing one or more previously transmitted octets.

NOTE The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.6.5 UDP Statistics

You can display UDP statistics for the TCM by entering **udp** at the **statistics** level as follows:

```
localhost::statistics cec slotx> udp
udp Counter                          Value                Delta
------------------------------ -------------------- --------------------
udpInDatagrams                                   0                    0
udpNoPorts                                       0                    0
udpInErrors                                      0                    0
udpOutDatagrams                                  0
```

The fields in this display have the following meanings:

udpInDatagrams Shows the total number of UDP datagrams delivered to UDP users.

udpNoPorts Lists the total number of received UDP datagrams for which there was no application at the destination port.

udpInErrors Indicates the number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.

udpOutDatagrams Displays the total number of UDP datagrams sent from this entity.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.7 CESE1 Statistics

To view statistics for E1 CES ports, enter the following at the `statistics` level:

```
localhost::statistics> cese1
Current Statistics
Port    ES   SES   SEF   UAS   CSS   PCV   LES   BES    DM   LCV
 3C1     0     0     0     0     0     0     0     0     0     0
Total Statistics
Port    ES   SES   SEF   UAS   CSS   PCV   LES   BES    DM   LCV
 3C1     0     0     0     0     0     0     0     0     0     0
Interval Statistics
Port  Interval    ES   SES   SEF   UAS   CSS   PCV   LES   BES    DM   LCV
 3C1         1     0     0     0     0     0     0     0     0     0     0
 3C1         2     0     0     0     0     0     0     0     0     0     0
 3C1         3     0     0     0     0     0     0     0     0     0     0
 3C1         4     0     0     0     0     0     0     0     0     0     0
 3C1         5     0     0     0     0     0     0     0     0     0     0
 3C1         6     0     0     0     0     0     0     0     0     0     0
 3C1         7     0     0     0     0     0     0     0     0     0     0
 3C1         8     0     0     0     0     0     0     0     0     0     0
 3C1         9     0     0     0     0     0     0     0     0     0     0
 3C1        10     0     0     0     0     0     0     0     0     0     0
 3C1        11     0     0     0     0     0     0     0     0     0     0

Press return for more, q to quit: q
```

`Current Statistics`, `Total Statistics`, and `Interval Statistics` are displayed for each E1 CES port. The fields in this display have the following meanings:

port Shows the E1 CES port for which statistics are shown.

ES Shows the number of Errored Seconds seen on the port.

SES Shows the number of Severely Errored Seconds seen on the port.

SEF Shows the number of Severely Errored Framing Seconds seen on the port.

UAS Shows the number of Unavailable Seconds seen on the port.

CSS Shows the number of Controlled Slip Seconds seen on the port.

PCV Shows the number of Path Coding Violations seen on the port.

LES Shows the number of Line Errored Seconds seen on the port.

BES Shows the number of Bursty Errored Seconds seen on the port.

DM Shows the number of Degraded Minutes seen on the port.

LCV Shows the number of Line Coding Violations seen on the port.

NOTE RFC1406 contains more detailed information about DS1/E1 line status parameters.

NOTE Current statistics are the values accumulated in the current interval. Interval statistics are the statistics associated with a given 15 minute interval. Total statistics are the accumulated values over all intervals and the current interval.

4.8 CESDS1 Statistics

To view statistics for DS1 CES ports, enter the following at the `statistics` level:

```
localhost::statistics> cesds1
Current Statistics
Port     ES    SES    SEF    UAS    CSS    PCV    LES    BES     DM    LCV
 1D1    351      0      0      0      0      0      0      0      0      0
Total Statistics
Port     ES    SES    SEF    UAS    CSS    PCV    LES    BES     DM    LCV
 1D1    351      0      1      0      0      0      1      0      0      0
Interval Statistics
Port  Interval     ES    SES    SEF    UAS    CSS    PCV    LES    BES     DM    LCV
 1D1         1      0      0      1      0      0      0      1      0      0      0
 1D1         2      0      0      0      0      0      0      0      0      0      0
 1D1         3      0      0      0      0      0      0      0      0      0      0
 1D1         4      0      0      0      0      0      0      0      0      0      0
 1D1         5      0      0      0      0      0      0      0      0      0      0
 1D1         6      0      0      0      0      0      0      0      0      0      0
 1D1         7      0      0      0      0      0      0      0      0      0      0
 1D1         8      0      0      0      0      0      0      0      0      0      0
 1D1         9      0      0      0      0      0      0      0      0      0      0
 1D1        10      0      0      0      0      0      0      0      0      0      0
 1D1        11      0      0      0      0      0      0      0      0      0      0

Press return for more, q to quit: q
```

`Current Statistics`, `Total Statistics`, and `Interval Statistics` are displayed for each DS1 CES port. The fields in this display have the following meanings:

port Shows the DS1 CES port for which statistics are shown.

ES Shows the number of Errored Seconds seen on the port.

SES Shows the number of Severely Errored Seconds seen on the port.

SEF Shows the number of Severely Errored Framing Seconds seen on the port.

UAS Shows the number of Unavailable Seconds seen on the port.

CSS Shows the number of Controlled Slip Seconds seen on the port.

PCV Shows the number of Path Coding Violations seen on the port.

LES Shows the number of Line Errored Seconds seen on the port.

BES Shows the number of Bursty Errored Seconds seen on the port.

DM Shows the number of Degraded Minutes seen on the port.

LCV Shows the number of Line Coding Violations seen on the port.

NOTE RFC1406 contains more detailed information about DS1/E1 line status parameters.

NOTE Current statistics are the values accumulated in the current interval. Interval statistics are the statistics associated with a given 15 minute interval. Total statistics are the accumulated values over all intervals and the current interval.

4.9 CES Statistics

To view general Circuit Emulation Services (CES) statistics, enter the following at the `statistics` level:

```
localhost::statistics> ces
 Port Service  Reass Header  Pointer   Lost   Buffer    Buffer   CellLoss
    Id      Id  Cells Errors Reframes  Cells UnderFlows OverFlows  Status
   3C1    2024      0      0        0      0          0         0        0
   3C2    2025      0      0        0      0          0         0        0
```

The fields in this display have the following meanings:

port Indicates the CES port for which CES statistics are shown.

Service Id Indicates the CES service ID of the CES connection for which statistics are shown.

Reass Cells Indicates the number of cells that have been reassigned on the port.

Header Errors Indicates the number of header errors that have been seen on the port.

Pointer Reframes Indicates the number of errors encountered in the AAL1 pointer.

Lost Cells Indicates the number of cells that have been lost on the port.

Buffer UnderFlows Indicates the number of bytes lost due to missing cells.

Buffer OverFlows Indicates the number of extra bytes received which were not anticipated.

CellLoss Status Indicates whether the AAL1 state machine is currently in a state where cells are not being received.

4.10 Call Record Statistics

You can display call record statistics for an individual switch board by entering **cr** at the `statistics` level as follows:

```
localhost::statistics> cr
   Up   time                          = 0 days 00:01
   Failed primary data transfers      = 0
   Failed secondary data transfers    = 0
   Calls rejected                     = 0
   Calls not recorded                 = 0
   Calls recorded                     = 2
   Skipped data transfers             = 0
   Terminating callrecords lost       = 0
```

The fields in this display have the following meanings:

Up time Shows the time, in hundredths of a second, since call records has been on at the primary, secondary, or both sides.

Failed primary data transfers Shows the number of failed data transfers to the primary data server.

Failed secondary data transfers Shows the number of failed data transfers to the secondary data server.

Calls rejected Shows the number of calls rejected due to a failure to allocate a call record.

Calls not recorded Shows the number of calls accepted even when there was a failure to allocate a call record.

Calls recorded Shows the number of calls for which a “start” call record was successfully generated.

Skipped data transfers Shows the number of skipped data transfers due to the preceding data transfers not being completed within the specified recording interval.

Terminating callrecords lost Shows the number of terminated call records lost due to a failure to allocate a data transfer buffer.

If call records have not been configured, you receive the following message:

```
localhost::statistics> cr
Callrecords not configured.
```

4.11 Control Port Statistics

You can list the control port statistics for an individual switch fabric by entering **`ctlport`** at the `statistics` level as follows:

```
localhost::statistics> ctlport

Interface        Framing-Errors      CRC-Errors
asx0                          0               0
qaa0                          0               0
qaa1                          0               0
qaa2                          0               0
qaa3                          0               0
```

The fields in this display have the following meanings:

Interface Displays the control port interface.

Framing-Errors Shows the number of ATM cells received with incorrect physical layer framing.

CRC-Errors Shows the number of ATM cells received with bad header CRCs.

4.12 ICMP Statistics

You can list ICMP statistics for an individual switch fabric by entering **icmp** at the statistics level as follows:

```
localhost::statistics> icmp

icmp Counter                          Value               Delta
------------------------------ -------------------- --------------------
icmpInMsgs                                      815                    2
icmpInErrors                                      0                    0
icmpInDestUnreachs                               13                    0
icmpInTimeExcds                                   0                    0
icmpInParmProbs                                   0                    0
icmpInSrcQuenchs                                  0                    0
icmpInRedirects                                   0                    0
icmpInEchos                                     802                    2
icmpInEchoReps                                    0                    0
icmpInTimestamps                                  0                    0
icmpInTimestampReps                               0                    0
icmpInAddrMasks                                   0                    0
icmpInAddrMaskReps                                0                    0
icmpOutMsgs                                     802                    2
icmpOutErrors                                     0                    0
icmpOutDestUnreachs                               0                    0
icmpOutTimeExcds                                  0                    0
icmpOutParmProbs                                  0                    0
icmpOutSrcQuenchs                                 0                    0
icmpOutRedirects                                  0                    0
Press return for more, q to quit:
icmpOutEchos                                      0                    0
icmpOutEchoReps                                 802                    2
icmpOutTimestamps                                 0                    0
icmpOutTimestampReps                              0                    0
icmpOutAddrMasks                                  0                    0
icmpOutAddrMaskReps                               0                    0
```

The fields in this display have the following meanings:

icmpInMsgs	Shows the total number of ICMP messages which the entity received. This counter includes all those counted by `icmpInErrors`.
icmpInErrors	Shows the number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).
icmpInDestUnreachs	Shows the number of ICMP Destination Unreachable messages received.
icmpInTimeExcds	Shows the number of ICMP Time Exceeded messages received.
icmpInParmProbs	Shows the number of ICMP Parameter Problem message received.
icmpInSrcQuenchs	Shows the number of ICMP Source Quench messages received.
icmpInRedirects	Shows the number of ICMP Redirect messages received.
icmpInEchos	Shows the number of ICMP Echo (request) messages received.
icmpInEchoReps	Shows the number of ICMP Echo Reply messages received.
icmpInTimestamps	Shows the number of ICMP Timestamp (request) messages received.
icmpInTimestampReps	Shows the number of ICMP Timestamp Reply messages received.
icmpInAddrMasks	Shows the number of ICMP Address Mask Request messages received.
icmpInAddrMaskReps	Shows the number of ICMP Address Mask Reply messages received.
icmpOutMsgs	Shows the total number of ICMP messages which this entity attempted to send. Note that this counter includes all those counted by icmpOutErrors.

icmpOutErrors Shows the number of ICMP messages which this entity did not send due to problems discovered within ICMP such as a lack of buffers. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no types of error which contribute to this counter's value.

icmpOutDestUnreachs Shows the number of ICMP Destination Unreachable messages sent.

icmpOutTimeExcds Shows the number of ICMP Time Exceeded messages sent.

icmpOutParmProbs Shows the number of ICMP Parameter Problem messages sent.

icmpOutSrcQuenchs Shows the number of ICMP Source Quench messages sent.

icmpOutRedirects Shows the number of ICMP Redirect messages sent. For a host, this object is always zero, since hosts do not send redirects.

icmpOutEchos Shows the number of ICMP Echo (request) messages sent.

icmpOutEchoReps Shows the number of ICMP Echo Reply messages sent.

icmpOutTimestamps Shows the number of ICMP Timestamp (request) messages sent.

icmpOutTimestampReps Lists the number of ICMP Timestamp Reply messages sent.

icmpOutAddrMasks Shows the number of ICMP Address Mask Request messages sent.

icmpOutAddrMaskReps Shows the number of ICMP Address Mask Reply messages sent.

NOTE The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.13 Interface Statistics

You can list interface statistics for an individual switch fabric by entering **`interface`** at the `statistics` level as follows:

```
localhost::statistics> interface
Interface lo0 Counter               Value              Delta
---------------------------- ------------------- -------------------
ifInOctets                              1211364              20944
ifInUcastPkts                              3933                 68
ifInNUcastPkts                                0                  0
ifInDiscards                                  0                  0
ifInErrors                                    0                  0
ifInUnknownProtos                             0                  0
ifOutOctets                             1211364              20944
ifOutUcastPkts                             3933                 68
ifOutNUcastPkts                               0                  0
ifOutDiscards                                 0                  0
ifOutErrors                                   0                  0
ifOutQLen                                     0                  0

Press return for more, q to quit: q
```

The fields in this display have the following meanings:

ifInOctets Displays the total number of octets received on the interface, including framing characters.

ifInUcastPkts Shows the number of subnetwork-unicast packets delivered to a higher-layer protocol.

ifInNUcastPkts Lists the number of non-unicast (i.e., subnetwork-broadcast or subnetwork-multicast) packets delivered to a higher-layer protocol.

ifInDiscards Displays the number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.

ifInErrors Displays the number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

ifInUnknownProtos Shows the number of packets received via the interface which were discarded because of an unknown or unsupported protocol.

ifOutOctets Displays the total number of octets transmitted out of the interface, including framing characters.

ifOutUcastPkts Lists the total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

ifOutNUcastPkts Displays the total number of packets that higher-level protocols requested be transmitted to a non-unicast (i.e., a subnetwork-broadcast or subnetwork-multicast) address, including those that were discarded or not sent.

ifOutDiscards Shows the number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.

ifOutErrors Displays the number of outbound packets that could not be transmitted because of errors.

ifOutQLen Specifies the length of the output packet queue (in packets).

NOTE The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.14 IP Statistics

You can display IP statistics for an individual switch fabric by entering **ip** at the `statistics` level as follows:

```
localhost::statistics> ip
ip Counter                              Value                Delta
------------------------------ -------------------- --------------------
ipInReceives                                    74056                   11
ipInHdrErrors                                       0                    0
ipInAddrErrors                                      0                    0
ipForwDatagrams                                     0                    0
ipInUnknownProtos                                   0                    0
ipInDiscards                                        0                    0
ipInDelivers                                    74056                   11
ipOutRequests                                       0                    0
ipOutDiscards                                       0                    0
ipOutNoRoutes                                       0                    0
ipReasmReqds                                        0                    0
ipReasmOKs                                          0                    0
ipReasmFails                                        0                    0
ipFragOKs                                           0                    0
ipFragFails                                         0                    0
ipFragCreates                                       0                    0
```

The fields in this display have the following meanings:

ipInReceives Shows the total number of input datagrams received from interfaces, including those received in error.

ipInHdrErrors Lists the number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, etc.

ipInAddrErrors Shows the number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (e.g., 0.0.0.0) and addresses of unsupported Classes (e.g., Class E). For entities which are not IP Gateways and, therefore, do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.

ipForwDatagrams Shows the number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities which do not act as IP Gateways, this counter includes only those packets which were Source-Routed via this entity, and the Source-Route option processing was successful.

ipInUnknownProtos Shows the number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.

ipInDiscards Lists the number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (e.g., for lack of buffer space). This counter does not include any datagrams discarded while awaiting re-assembly.

ipInDelivers Shows the total number of input datagrams successfully delivered to IP user-protocols (including ICMP).

ipOutRequests Shows the total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission. This counter does not include datagrams counted in `ipForwDatagrams`.

ipOutDiscards Displays the number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (e.g., for lack of buffer space). This counter includes datagrams counted in `ipForwDatagrams` if any such packets met this (discretionary) discard criterion.

ipOutNoRoutes Lists the number of IP datagrams discarded because no route could be found to transmit them to their destination. This counter includes any packets counted in `ipForwDatagrams` which meet this “no-route” criterion. This includes datagrams which a host cannot route because all of its default gateways are down.

ipReasmReqds Shows the maximum number of seconds which received fragments are held while they are awaiting reassembly at this entity.

ipReasmOKs Shows the number of IP datagrams successfully reassembled.

ipReasmFails Shows the number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, etc). This is not necessarily a count of discarded IP fragments since some algorithms (notably the algorithm in RFC-815) can lose track of the number of fragments by combining them as they are received.

ipFragOKs Shows the number of IP datagrams that have been successfully fragmented at this entity.

ipFragFails Shows the number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be; e.g., because their Don’t Fragment flag was set.

ipFragCreates Shows the number of IP datagram fragments that have been generated as a result of fragmentation at this entity.

NOTE The value column shows the current value of the counter. The delta column shows the change in the counter since the last time you checked it. The counters are reset when the switch is restarted.

4.15 Network Module Statistics

You can list network module statistics about all of the network modules in an individual switch fabric by entering **module** at the `statistics` level. The following statistics are displayed on the TNX-210:

```
localhost::statistics> module
Module Priority   Status      Size  QLength Overflows
1A     0          enabled      512        0         0
1A     1          enabled      512        0         0
1B     0          enabled      512        0         0
1B     1          enabled      512        0         0
1C     0          enabled      512        0         0
1C     1          enabled      512        0         0
1D     0          enabled      512        0         0
1D     1          enabled      512        0         0
```

The following statistics are displayed on an TNX-1100 or MSC-900:

```
localhost::statistics> module
Module Priority   Status      Size  QLength Overflows
4A     0          enabled     4096        0         0
4A     1          enabled     4096        0         0
4A     2          enabled     4096        0         0
4A     3          enabled     4096        0         0
4B     0          enabled     4096        0         0
4B     1          enabled     4096        0         0
4B     2          enabled     4096        0         0
4B     3          enabled     4096        0         0
4C     0          enabled     4096        0         0
4C     1          enabled     4096        0         0
4C     2          enabled     4096        0         0
4C     3          enabled     4096        0         0
4D     0          enabled     4096        0         0
4D     1          enabled     4096        0         0
4D     2          enabled     4096        0         0
4D     3          enabled     4096        0         0
4CTL   0          enabled     4096        0         0
```

The fields in these displays have the following meanings:

Module Shows the number of each network module that is currently installed in the switch fabric. The number designates which switch fabric it is. The letters show the position of the network module in the switch fabric.

Priority Indicates the priority level for each network module.

Status Shows whether the buffer is enabled or disabled.

Size Displays the buffer size.

QLength Lists the number of cells currently in this queue.

Overflows Indicates the number of overflows in this queue.

You can list module statistics about a specific network module as follows:

```
localhost::statistics> module [<module>]
localhost::statistics> module 4B
Module Priority   Status      Size  QLength Overflows
4B     0          enabled     4096        0        0
4B     1          enabled     4096        0        0
4B     2          enabled     4096        0        0
4B     3          enabled     4096        0        0
```

The fields in this display have the same meanings as the descriptions listed above for all of the network modules.

You can also list traffic statistics about all of the network modules or about a specific network module as follows:

NOTE The traffic option is valid only for Series LC, Series LE, and Series C shared memory network modules.

The following is displayed for Series C network modules:

```
localhost::statistics> module [traffic] [<module>]
localhost::statistics> module traffic
 Module Model Ucasts Mcasts  MOuts  Cells Shared   Used
 1B         2     30      1      6      0   7392      4
 1C         2     20      1      4      0   8928      4
```

The following is displayed for Series LC and Series LE network modules:

```
localhost::statistics> module traffic
 Module Model Ucasts Mcasts  Cells Shared   Used
 2B         2     16      1      0  21916      1
```

The fields in these displays have the following meanings:

Module Indicates the shared memory network module for which information is being displayed.

Model Shows the traffic memory model being used for this shared memory network module.

Ucasts Shows the number of unicast connections that are currently active on this shared memory network module.

Mcasts Shows the number of multicast connections that are currently active on this shared memory network module.

MOuts Shows the number of multicast outputs that are currently active on this shared memory network module. This field does not apply to Series LC or Series LE network modules.

Cells Shows the number of cells currently in the dedicated queues and in the shared memory for this network module.

Shared Shows the amount of shared memory that was configured for this network module.

Used Shows the amount of shared memory that is currently being used on this network module.

4.16 OAM Statistics

When a physical layer fault (loss of carrier, loss of frame, etc.) is detected on a port that has AIS/RDI (Alarm Indication Signal)/(Remote Defect Indication) enabled, OAM cells are generated for all through paths, originating paths, PVCs, and PNNI SPVCs that originate on that port. If a virtual path AIS condition is indicated (by receipt of F4 AIS cells on a terminating path), OAM cells are generated for only that path and for channels (PVCs and PNNI SPVCs) that originate on that path.

An AIS is sent in the downstream direction (away from the failure). Receiving an AIS cell indicates that a physical layer failure condition is present upstream from the receiver. An RDI cell is sent toward the failure when a physical fault or AIS condition is detected on the virtual path and channel. Receiving a RDI cell indicates that a fault exists in the transit pathway of the virtual connection described by the RDI cell.

NOTE

Currently, AIS/RDI OAM cell generation is supported only for point-to-point connections.

You can display OAM statistics about all of the network modules in an individual switch fabric. Entering **?** at the `statistics oam` level to list the following submenu:

```
localhost::statistics oam> ?
  f4                f5
```

4.16.1 F4 Statistics

The F4 cell is an OAM cell that reports alarm conditions which are relevant to virtual paths. You can display F4 statistics by entering **f4** at the `statistics oam` level as follows:

```
localhost::statistics oam> f4
 Input       Output         TxAIS      RxAIS      TxRDI      RxRDI
 Port   VPI  Port   VPI     Cells      Cells      Cells      Cells
 1B2      0  orig/term        N/A          0          5          0
 1B4      0  orig/term        N/A          5          2          0
 1B6      0  orig/term        N/A          0          0          6
 1B2     10  1A2     10         8        N/A        N/A        N/A
```

The fields in this display have the following meanings:

Input Port Shows the incoming port number.

Input VPI Shows the incoming virtual path number for this port.

Output Port Shows the outgoing port number if it is a through path. Shows `orig/term` if it is an originating or terminating path (virtual path terminator).

Output VPI Shows the outgoing virtual path number for this port if it is a through path. Shows `orig/term` if it is an originating or terminating path (virtual path terminator).

TxAIS Cells Shows the number of AIS OAM cells sent on this path and port.

RxAIS Cells Shows the number of AIS OAM cells received on this path and port.

TxRDI Cells Shows the number of AIS OAM cells sent on this path and port.

RxRDI Cells Shows the number of RDI OAM cells received on this path and port.

This command is valid only if AIS/RDI OAM cell generation has been enabled. If it is not enabled on any ports, then the following is displayed:

```
No F4 (VP) OAM activity has occurred.
```

You can also display F4 statistics for a specific port or for a specific port and path as follows:

```
localhost::statistics oam> f4 [<port> [<vpi>]]
localhost::statistics oam> f4 1B4 0
 Input        Output        TxAIS     RxAIS     TxRDI     RxRDI
 Port   VPI   Port   VPI    Cells     Cells     Cells     Cells
 1B4      0   orig/term       N/A         5         2         0
```

The fields in this display are defined in the same manner as those listed in the previous example for all of the ports on an individual switch fabric.

4.16.2 F5 Statistics

The F5 cell is an OAM cell that reports alarm conditions which are relevant to virtual channels. You can display F5 statistics by entering **f5** at the `statistics oam` level as follows:

```
localhost::statistics oam> f5
 Input              Output             TxAIS
 Port   VPI   VCI   Port   VPI   VCI   Cells
 1B2      0   100   1A1      0   100      17
 1B2      0   110   1A2      0   110       2
```

The fields in this display have the following meanings:

Input Port Shows the incoming port number.

Input VPI Shows the incoming virtual path number for this port.

Input VCI Shows the incoming virtual channel number for this port.

Output Port Shows the outgoing port number.

Output VPI Shows the outgoing virtual path number for this port.

Output VCI Shows the outgoing virtual channel number for this port.

TxAIS Cells Shows the number of AIS OAM cells sent on this path, port, and channel.

This command is valid only if AIS/RDI OAM cell generation has been enabled. If it is not enabled on any ports, then the following is displayed:

```
No F5 (VC) OAM activity has occurred.
```

You can also display F5 statistics for a specific port or for a specific port and path as follows:

```
localhost::statistics oam> f5 [<port> [<vpi>]][<vci>]]]
localhost::statistics oam> f5 1B2 100
 Input            Output              TxAIS
 Port  VPI  VCI  Port  VPI  VCI     Cells
 1B2     0  100  1A1     0  100        17
```

The fields in this display are defined in the same manner as those listed in the previous example for all of the ports on an individual switch fabric.

4.17 Port Statistics

You can display port statistics about all of the ports on an individual switch fabric by entering **`port`** at the `statistics` level as follows:

```
localhost::statistics> port
         Input              Output                    Cells       Cells
Port VPs  VCs     BW VPs  VCs      BW    Received Transmitted ErrSecs Overflows
1A1    1    7   0.8K   1    7    3.4M       20452       20670       0         0
1A2    1    6   0.8K   1    6    0.8K           0       19662       0         0
1A3    1    6   0.8K   1    6    0.8K           0       19662       0         0
1A4    1    6   0.8K   1    6    0.8K           0       19662       0         0
1B1    1    7   3.4M   1    7    0.8K       83960       83724       0         0
1B2    1    6   0.8K   1    6    0.8K       18765       36667       0         0
1B3    1    6   0.8K   1    6    0.8K           0       19662       0         0
1B4    1    6   0.8K   1    6    0.8K           0       19662       0         0
1CTL   2   31   0.0K   1   38    0.0K      256444           0       0         0
```

The fields in this display have the following meanings:

Port Shows the port number.

Input VPs Shows the total number of incoming VPCs and VPTs that exist on this port.

Input VCs Shows the total number of incoming virtual channels that exist on this port.

Input BW Shows the amount of bandwidth currently being used by all of the incoming VPCs and VPTs on this port.

Output VPs Shows the total number of outgoing VPCs and VPTs that exist on this port.

Output VCs Shows the total number of outgoing virtual channels that exist on this port.

Output BW Shows the amount of bandwidth currently being used by all of the outgoing VPCs and VPTs on this port.

Cells Received Shows the number of cells received on this port.

Cells Transmitted Shows the number of cells transmitted on this port.

ErrSecs Lists the number of seconds in which errored cells were dropped by this port.

Overflows Shows the number of cells dropped on this port because the output buffer was full.

You can also display statistics about a particular kind of network module or just a specific port on a network module. Additionally, you can display port traffic statistics for a specified port. Enter the following parameters to display your choices:

```
localhost::> stat port [(ds1 | ds3 | e1 | e3 | j2 | sonet | tp25 | fabric |
traffic)] [<port>]
```

See the following subsections for more information about each of these options.

4.17.1 DS1 Port Statistics

You can display statistics about all of the DS1 network modules in an individual switch fabric by entering **ds1** at the `statistics port` level. This command is available only when at least one DS1 network module is installed in the switch fabric.

```
localhost::statistics> port ds1
ds1 Port 1C1 Counter                Value           Delta
------------------------------  --------------  --------------
ds1FramingLOSs                              0               0
ds1FramingLCVs                              0               0
ds1FramingFERRs                             0               0
ds1FramingOOFs                              0               0
ds1FramingAISs                              0               0
ds1FramingB8ZSPatterns                   1031              18
ds1Framing8Zeros                            0               0
ds1Framing16Zeros                           0               0
ds1FramingYellowAlarms                      0               0
ds1FramingRedAlarms                         0               0
ds1FramingBEEs                              1               0
ds1PlcpBIP8s                               11               0
ds1PlcpFERRs                                0               0
ds1PlcpFEBEs                                5               0
ds1PlcpLOFs                                 0               0
ds1PlcpYellows                              0               0
ds1AtmHCSs                                  6               0
ds1AtmRxCells                           25986             384
ds1AtmTxCells                           25975             384

Press return for more, q to quit: q
```

NOTE

All of the PLCP counters listed above increment only when the DS1 network module is running in the PLCP mode. However, the HCS counter always increments, regardless of which mode is running.

The fields in the DS1 display have the following meanings:

ds1FramingLOSs	Shows the number of seconds in which Loss Of Signal (LOS) errors have been detected.
ds1FramingLCVs	Shows the number of Line Code Violations (LCV) that have been detected.
ds1FramingFERRs	Shows the number of DS1 framing error (FERR) events that have been detected.
ds1FramingOOFs	Shows the number of seconds in which DS1 Out Of Frame (OOF) error events were experienced.
ds1FramingAISs	Shows the number of seconds in which Alarm Indication Signals (AIS) were detected by the DS1 Receive Framer block. AIS indicates that an upstream failure has been detected by the far end.
ds1FramingB8ZS Patterns	Shows the number of seconds in which B8ZS pattern error events have been detected.
ds1Framing8Zeros	Shows the number of seconds in which 8-zero error events have been detected.
ds1Framing16Zeros	Shows the number of seconds in which 16-zero error events have been detected.
ds1FramingYellow Alarms	Shows the number of seconds in which Yellow Alarm events have been detected.
ds1FramingRedAlarms	Shows the number of seconds in which Red Alarm events have been detected.
ds1FramingBEEs	Shows the number of Bit Encoding Error (BEE) events that have been detected.
ds1PlcpBIP8s	Shows the number of BIP-8 (Bit Interleaved Parity-8) error events. The BIP-8 is calculated over the Path Overhead field and the associated ATM cell of the previous PLCP frame. A BIP-N is a method of error monitoring. An N-bit code is generated by the transmitting equipment in such a manner that the first bit of the code provides even parity over the first bit of all N-bit sequences in the previous VT SPE, the second bit provides even parity over the second bits of all N-bit sequences within the specified portion, etc.

ds1PlcpFERRs Shows the number of Physical Layer Convergence Protocol (PLCP) octet error events.

ds1PlcpFEBEs Shows the number of ATM Far End Block Error (FEBE) events.

ds1PlcpLOFs Shows the number of seconds in which Loss Of Frame (LOF) errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. LOF is declared when an Out Of Frame state persists for more than 1ms. LOF is removed when an in-frame state persists for more than 12ms.

ds1PlcpYellows Shows the number of seconds in which Yellow alarm errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. Yellow alarm is asserted when 10 consecutive yellow signal bits are set to logical 1. Yellow signals are used to alert upstream terminals of a downstream failure in order to initiate trunk conditioning on the failure circuit.

ds1AtmHCSs Shows the number of header check sequence (HCS) error events. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

ds1AtmRxCells Shows the number of ATM cells that were received, not including idle/unassigned cells.

ds1AtmTxCells Shows the number of ATM cells that were transmitted, not including idle/unassigned cells.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted or when a network module is replaced.

4.17.2 DS3 Port Statistics

You can list statistics about all of the DS3 network modules in an individual switch fabric by entering **ds3** at the `statistics port` level. This command is available only when at least one DS3 network module is installed in the switch fabric.

```
localhost::statistics> port ds3
ds3 Port 1C1 Counter            Value           Delta
------------------------------  --------------  --------------
ds3FramingLOSs                               0               0
ds3FramingLCVs                               0      3047081531
ds3FramingSumLCVs                   3533754755               0
ds3FramingFERRs                      122265891               0
ds3FramingOOFs                           59758               0
ds3FramingFERFs                              0               0
ds3FramingAISs                               0               0
ds3FramingPbitPERRs                 1713276195               0
ds3FramingCbitPERRs                 1583241699               0
ds3FramingFEBEs                      976095339               0
ds3PlcpFERRs                            956136               0
ds3PlcpLOFs                                  0               0
ds3PlcpBIP8s                         252419904               0
ds3PlcpFEBEs                         603317432               0
ds3PlcpYellows                               0               0
ds3AtmHCSs                           176407092               0
ds3AtmRxCells                       3709807680               0
ds3AtmTxCells                           203023               0
```

NOTE

All of the PLCP counters listed above increment only when the DS3 network module is running in the PLCP mode. However, the HCS counter always increments, regardless of which mode is running.

The fields in the DS3 display have the following meanings:

ds3FramingLOSs Shows the number of seconds in which Loss Of Signal (LOS) errors were detected by the DS3 Receive Framer block.

ds3FramingLCVs Shows the number of Line Code Violations (LCV) that were detected by the DS3 Receive Framer block.

ds3FramingSumLCVs Shows the number of DS3 information blocks (85 bits) which contain one or more Line Code Violations (LCV).

ds3FramingFERRs Shows the number of DS3 framing error (FERR) events.

ds3FramingOOFs Shows the number of seconds in which DS3 Out Of Frame (OOF) error events were experienced.

ds3FramingFERFs Shows the number of seconds in which a Far End Receive Failure (FERF) state has been detected by the DS3 Receive Framer block. The FERF signal alerts the upstream terminal that a failure has been detected along the downstream line.

ds3FramingAISs Shows the number of seconds in which Alarm Indication Signals (AIS) were detected by the DS3 Receive Framer block. AIS means that an upstream failure has been detected by the far end.

ds3FramingPbitPERRs Shows the number of P-bit parity error (PERR) events.

ds3FramingCbitPERRs Shows the number of C-bit parity error (PERR) events.

ds3FramingFEBEs Shows the number of DS3 far end block error (FEBE) events.

ds3PlcpFERRs Shows the number of Physical Layer Convergence Protocol (PLCP) octet error events.

ds3PlcpLOFs Shows the number of seconds in which Loss Of Frame (LOF) errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. LOF is declared when an Out-Of-Frame state persists for more than 1ms. LOF is removed when an in-frame state persists for more than 12ms.

ds3PlcpBIP8s Shows the number of BIP-8 (Bit Interleaved Parity-8) error events. The BIP-8 is calculated over the Path Overhead field and the associated ATM cell of the previous PLCP frame. A BIP-N is a method of error monitoring. An N-bit code is generated by the transmitting equipment in such a manner that the first bit of the code provides even parity over the first bit of all N-bit sequences in the previous VT SPE, the second bit provides even parity over the second bits of all N-bit sequences within the specified portion, etc.

ds3PlcpFEBEs Shows the number of ATM Far End Block Error (FEBE) events.

ds3PlcpYellows Shows the number of seconds in which Yellow alarm errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. The yellow alarm is asserted when 10 consecutive yellow signal bits are set to logical 1. Yellow signals are used to alert upstream terminals of a downstream failure in order to initiate trunk conditioning on the failure circuit.

ds3AtmHCSs Shows the number of the header check sequence (HCS) error events. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

ds3AtmRxCells Shows the number of ATM cells that were received, not including idle/unassigned cells.

ds3AtmTxCells Shows the number of ATM cells that were transmitted, not including idle/unassigned cells.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted or when a network module is replaced.

4.17.3 E1 Port Statistics

You can display statistics about all of the E1 network modules in an individual switch fabric by entering **e1** at the `statistics port` level. This command is available only when at least one E1 network module is installed in the switch fabric.

```
localhost::statistics> port e1
e1 Port 1D1 Counter                  Value          Delta
------------------------------  --------------  --------------
e1FramingLCVs                                0               0
e1FramingFERRs                               0               0
e1FramingFEBEs                               0               0
e1FramingCRCs                                0               0
e1FramingOOFs                                1               0
e1FramingLOSs                                0               0
e1FramingAISs                                0               0
e1FramingAISDs                               0               0
e1FramingRedAlarms                           0               0
e1PlcpBIP8s                                  0               0
e1PlcpFERRs                                  0               0
e1PlcpFEBEs                                  0               0
e1PlcpLOFs                                 844              17
e1PlcpYellows                                0               0
e1AtmHCSs                                    0               0
e1AtmRxCells                             19007             264
e1AtmTxCells                             19352             264

Press return for more, q to quit: q
```

NOTE

All of the PLCP counters listed above increment only when the E1 network module is running in the PLCP mode. However, the HCS counter always increments, regardless of which mode is running.

The fields in the E1 display have the following meanings:

e1FramingLCVs Shows the number of Line Code Violations (LCV) that were detected by the E1 Receive Framer block.

e1FramingFERRs Shows the number of E1 framing error (FERR) events.

e1FramingFEBEs Shows the number of E1 far end block errors.

e1FramingCRCs Shows the number of cyclic redundancy check errors.

e1FramingOOFs Shows the number of seconds in which OOF (loss of basic frame alignment) errors were detected.

e1FramingLOSs Shows the number of seconds in which LOS (loss of signal) error events were experienced.

e1FramingAISs Shows the number of seconds in which AIS (alarm indication signal) error events were experienced.

e1FramingAISDs Shows the number of seconds in which AISD (unframed pattern of all ones) error events were experienced.

e1FramingRedAlarms Shows the number of seconds in which Red Alarm events were experienced.

e1PlcpBIP8s Shows the number of BIP-8 (Bit Interleaved Parity-8) error events. The BIP-8 is calculated over the Path Overhead field and the associated ATM cell of the previous PLCP frame. A BIP-N is a method of error monitoring. An N-bit code is generated by the transmitting equipment in such a manner that the first bit of the code provides even parity over the first bit of all N-bit sequences in the previous VT SPE, the second bit provides even parity over the second bits of all N-bit sequences within the specified portion, etc.

e1PlcpFERRs Shows the number of Physical Layer Convergence Protocol (PLCP) octet error events.

e1PlcpFEBEs Shows the number of ATM Far End Block Error (FEBE) events.

e1PlcpLOFs Shows the number of seconds in which Loss Of Frame (LOF) errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. OOF is declared when an error is detected in both the A1 and A2 octets or when 2 consecutive POHID octets are found in error. LOF is declared when an OOF state persists for more than 20ms. LOF is removed upon finding two valid consecutive sets of framing (A1 and A2) octets and two valid sequential path overhead identifier octets.

e1PlcpYellows Shows the number of seconds in which Yellow alarm errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. Yellow alarm is asserted when 10 consecutive yellow signal bits are set to logical 1. Yellow signals are used to alert upstream terminals of a downstream failure in order to initiate trunk conditioning on the failure circuit.

e1AtmHCSs Shows the number of header check sequence (HCS) error events. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

e1AtmRxCells Shows the number of ATM cells that were received, not including idle / unassigned cells.

e1AtmTxCells Shows the number of ATM cells that were transmitted, not including idle / unassigned cells.

NOTE The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted or when a network module is replaced.

4.17.4 E3 Port Statistics

You can display statistics about all of the E3 network modules in an individual switch fabric by entering **e3** at the `statistics port` level. This command is available only when at least one E3 network module is installed in the switch fabric.

```
localhost::statistics> port e3
e3 Port 1D1 Counter                  Value          Delta
------------------------------  --------------  --------------
e3FramingLOSs                            85974               0
e3FramingLCVs                       3684415794               0
e3FramingFERRs                        85173622               0
e3FramingOOFs                            85974               0
e3FramingFERFs                               0               0
e3FramingAISs                                0               0
e3FramingBIP8s                       636877586               0
e3FramingFEBEs                         2465566               0
e3PlcpFERRs                                  0               0
e3PlcpLOFs                              171950               0
e3PlcpBIP8s                                  0               0
e3PlcpFEBEs                                  0               0
e3PlcpYellows                                0               0
e3AtmHCSs                                    0               0
e3AtmRxCells                                 0               0
e3AtmTxCells                            281929               0

Press return for more, q to quit: q
```

NOTE

All of the PLCP counters listed above increment only when the E3 network module is running in the PLCP mode. However, the HCS counter always increments, regardless of which mode is running.

The fields in the E3 display have the following meanings:

e3FramingLOSs Shows the number of seconds in which Loss Of Signal (LOS) errors were detected by the E3 Receive Framer block.

e3FramingLCVs Shows the number of Line Code Violations (LCV) that were detected by the E3 Receive Framer block.

e3FramingFERRs Shows the number of E3 framing error (FERR) events.

e3FramingOOFs Shows the number of seconds in which E3 Out Of Frame (OOF) error events were experienced.

e3FramingFERFs Shows the number of seconds in which Far End Receive Failures for a port configured with HCS framing were experienced. Indicates the number of seconds in which Remote Alarm Indications for a port configured with PLCP framing were experienced.

e3FramingAISs Shows the number of seconds in which Alarm Indication Signals (AIS) were detected by the E3 Receive Framer block. AIS indicates that an upstream failure has been detected by the far end.

e3FramingFEBEs Shows the number of E3 far end block error (FEBE) events.

e3FramingBIP8s Shows the number of E3 G.832 BIP-8 errors. This counter is only valid for a port using HCS framing.

e3PlcpFERRs Shows the number of Physical Layer Convergence Protocol (PLCP) octet error events.

e3PlcpLOFs Shows the number of seconds in which Loss Of Frame (LOF) errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. LOF is declared when an Out-Of-Frame state persists for more than 1ms. LOF is removed when an in-frame state persists for more than 12ms.

e3PlcpBIP8s Shows the number of BIP-8 (Bit Interleaved Parity-8) error events. The BIP-8 is calculated over the Path Overhead field and the associated ATM cell of the previous PLCP frame. A BIP-N is a method of error monitoring. An N-bit code is generated by the transmitting equipment in such a manner that the first bit of the code provides even parity over the first bit of all N-bit sequences in the previous VT SPE, the second bit provides even parity over the second bits of all N-bit sequences within the specified portion, etc.

e3PlcpFEBEs Shows the number of ATM Far End Block Error (FEBE) events.

e3PlcpYellows Shows the number of seconds in which Yellow alarm errors were detected by the PLCP (Physical Layer Convergence Protocol) receiver. Yellow alarm is asserted when 10 consecutive yellow signal bits are set to logical 1. Yellow signals are used to alert upstream terminals of a downstream failure in order to initiate trunk conditioning on the failure circuit.

e3AtmHCSs Shows the number of header check sequence (HCS) error events. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

e3AtmRxCells Shows the number of ATM cells that were received, not including idle/unassigned cells.

e3AtmTxCells Shows the number of ATM cells that were transmitted, not including idle/unassigned cells.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted or when a network module is replaced.

4.17.5 J2 Port Statistics

You can display statistics about all of the J2 network modules in an individual switch fabric by entering **j2** at the `statistics port` level. This command is available only when at least one J2 network module is installed in the switch.

```
localhost::statistics> port j2
j2 Port 1A1 Counter                  Value          Delta
------------------------------  --------------  --------------
j2B8ZSCodingErrors                         255               0
j2CRC5Errors                                 0               0
j2FramingErrors                              0               0
j2RxLossOfFrame                              0               0
j2RxLossOfClock                              0               0
j2RxAIS                                      0               0
j2TxLossOfClock                              0               0
j2RxRemoteAIS                                0               0
j2AtmHCSs                                    0               0
j2AtmRxCells                            136924               0
j2AtmTxCells                            120988               0

Press return for more, q to quit: q
```

The fields in this display have the following meanings:

j2B8ZSCodingErrors Displays the number of B8ZS coding violation errors.

j2CRC5Errors Shows the number of CRC-5 received errors.

j2FramingErrors Lists the number of framing patterns received in error.

j2RxLossOfFrame Indicates the number of seconds during which the receiver was experiencing Loss Of Frame.

j2RxLossOfClock Displays the number of seconds during which the receiver was not observing transitions on the received clock signal.

j2RxAIS Shows the number of seconds during which the receiver detected an Alarm Indication Signal.

j2TxLossOfClock Lists the number of seconds during which the transmitter was experiencing Loss Of Clock.

j2RxRemoteAIS Displays the number of seconds during which the receiver observed the Alarm Indication Signal in the m-bits channel.

j2AtmHCSs Indicates the number of header check sequence (HCS) error events. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

j2AtmRxCells Lists the number of ATM cells that were received.

j2AtmTxCells Shows the number of ATM cells that were transmitted.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted or when a network module is replaced.

4.17.6 SONET Port Statistics

You can display statistics about all of the SONET network modules on an individual switch fabric by entering **sonet** at the `statistics port` level. This command is available only when at least one SONET (OC-3, OC-12, or UTP) network module is installed in the switch fabric.

```
localhost::statistics> port sonet
sonet Port 1D1 Counter              Value          Delta
------------------------------  --------------  --------------
sonetSectionBIPs                    1571776380         863766
sonetSectionLOSs                         32745             18
sonetSectionLOFs                         32745             18
sonetLineBIPs                                0              0
sonetLineFEBEs                               0              0
sonetLineAISs                            32745             18
sonetLineRDIs                                0              0
sonetPathBIPs                                0              0
sonetPathFEBEs                               0              0
sonetPathLOPs                                0              0
sonetPathAISs                            32745             18
sonetPathRDIs                            32745             18
sonetPathUNEQs                               0              0
sonetPathPLMs                                0              0
sonetAtmCorrectableHCSs                      0              0
sonetAtmUncorrectableHCSs                    0              0
sonetAtmLCDs                             32745             18
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

sonetSectionBIPs Shows the number of Section BIP-8 (Bit Interleaved Parity) errors that have been detected. The calculated BIP-8 code is compared with the BIP-8 code extracted from the B1 byte of the following frame. Differences indicate that a section level bit error has occurred.

sonetSectionLOSs Shows the number of seconds in which Loss Of Signal (LOS) has occurred. A LOS is declared when 20 +/- 3ms of all zeros patterns is detected. LOS is cleared when two valid framing words are detected and during the intervening time no LOS condition is detected.

sonetSectionLOFs Shows the number of seconds in which Loss Of Frame (LOF) has occurred. A LOF is declared when an out-of-frame (OOF) condition persists for 3ms. It is cleared when an in-frame condition persists for 3ms. While in-frame, the framing bytes (A1, A2) in each frame are compared against the expected pattern. OOF is declared when four consecutive frames containing one or more framing pattern errors have been received.

sonetLineBIPs Shows the number of Line BIP-24 (Bit Interleaved Parity) errors that have been detected. The calculated BIP-24 code is based on the line overhead and synchronous payload envelope (SPE) of the STS-3c stream. The line BIP-24 code is a bit interleaved parity calculation using even parity. The calculated code is compared with the BIP-24 code extracted from the B2 bytes of the following frame. Differences indicate that a line layer bit error has occurred.

sonetLineFEBEs Shows the number of line Far End Block Errors (FEBE) that have been detected.

sonetLineAISs Shows the number of seconds in which line Alarm Indication Signal (AIS) has occurred. A line AIS is asserted when a 111 binary pattern is detected in bits 6, 7, 8 of the K2 byte for five consecutive frames. It is removed when any pattern other than 111 is detected in these bits for five consecutive frames.

sonetLineRDIs Shows the the number of seconds in which a line Remote Defect Indication (RDI) has occurred. A line RDI is asserted when a 110 binary pattern is detected in bits 6, 7, 8 of the K2 byte for five consecutive frames. It is removed when any pattern other than 110 is detected in these bits for five consecutive frames.

sonetPathBIPs Shows the number of Path BIP-8 (Bit Interleaved Parity) errors that have been detected. A path BIP-8 error is detected by comparing the path BIP-8 byte (B3) extracted from the current frame, to the path BIP-8 computed for the previous frame.

sonetPathFEBEs Shows the number of path Far End Block Errors (FEBE) that have been detected. FEBEs are detected by extracting the 4-bit FEBE field from the path status byte (G1). The valid range for the 4-bit field is between 0000 and 1000, representing zero to eight errors. Other values are interpreted as zero errors.

sonetPathLOPs Shows the number of seconds in which path Loss Of Pointer (LOP) has occurred. A path LOP is detected when a “normal pointer value” is not found in eight consecutive frames. It is cleared when a “normal pointer value” is found for three consecutive frames.

sonetPathAISs Shows the number of seconds in which a path Alarm Indication Signal (AIS) has occurred. A path AIS is asserted when an all-ones pattern is detected in the pointer bytes (H1 and H2) for three consecutive frames and is cleared when a valid pointer is found for three consecutive frames. AIS means an upstream failure has been detected.

sonetPathRDIs Shows the number of seconds in which a path Remote Defect Indication (RDI) alarm has occurred. A path RDI is detected by extracting bit 5 of the path status byte. If bit 5 is high for 10 consecutive frames, then an RDI alarm is declared. An RDI alarm is cleared when bit 5 is low for 10 consecutive frames. RDI signals are used to alert upstream terminals of a downstream failure in order to initiate trunk conditioning on the failure circuit.

sonetPathUNEQs Shows the number of seconds in which a path UNEQ defect has occurred. A path UNEQ defect is detected when the STS Signal label (C2 byte) == 0x00.

sonetPathPLMs Shows the number of seconds in which a Path Label Mismatch (PLM) defect has occurred. A PLM defect is detected when the STS Signal label (C2 bytes) != 0x00, 0x01, 0x13, 0xFC, or 0xFF.

sonetAtmCorrectable HCSs Shows the number of correctable Header Check Sequence (HCS) error events that occurred. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

sonetAtm UncorrectableHCSs Shows the number of uncorrectable Header Check Sequence (HCS) error events that occurred. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

sonetAtmLCDs Shows the number of seconds in which a Loss of Cell Delineation (LCD) has occurred. An LCD defect is detected when an out of cell delineation state has persisted for 4ms. An LCD defect is cleared when the sync state has been maintained for 4ms.

4.17.7 TP25 Port Statistics

You can display statistics about all of the TP25 network modules in an individual switch fabric by entering **tp25** at the `statistics port` level. The following TP25 command is available only when at least one TP25 network module is installed in the switch fabric.

```
localhost::statistics> port tp25
tp25 Port 1A1 Counter              Value          Delta
------------------------------  --------------  --------------
tp25ErrorSymbol                       40452300               0
tp25AtmHCSs                                  8               0
tp25AtmRxCells                           13722               0
tp25AtmTxCells                               0               0
Press return for more, q to quit: q
```

The fields in this display are defined as follows:

tp25ErrorSymbol Shows the number of undefined symbols received.

tp25AtmHCSs Lists the number of header check sequence (HCS) error events. The HCS is a CRC-8 calculation over the first 4 octets of the ATM cell header.

tp25AtmRxCells Shows the number of ATM cells that were received.

tp25AtmTxCells Shows the number of ATM cells that were transmitted.

NOTE The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted or when a network module is replaced.

4.17.8 Fabric Port Statistics

Fabric port counters record the number of CAC (Connection Admission Control) failures, VPI allocation failures, VCI allocation failures, and connection setup errors for each port. Each port counter maintains all errors of that type that occurred on that port or on any path on that port. The counters are direction specific, meaning that errors that occurred on the input side are differentiated from errors that occurred on the output side. You can display fabric statistics about all of the ports in a switch fabric by entering **`fabric`** at the `statistics port` level.

```
localhost::> stat port fabric
        InputFailures                OutputFailures
Port    CAC    VPI    VCI  Setup    CAC    VPI    VCI  Setup
2A1       0      0      0      0      0      0      0      0
2A2       0      0      0      0      0      0      0      0
2A3       0      0      0      0      0      0      0      0
2A4       0      0     50      0      0      0      0      0
2E1       0      0      0      0      0      0      0      0
2E3       0      0      0      0      0      0      0      0
2E4       0      0      0      0      0      0      0      0
2CTL      0      0      0      0      0      0      0      0
```

The fields in this display have the following meanings:

Port Shows the port number.

Input Failures CAC Shows the number of input CAC failures on this port. These failures occur when there is not enough input bandwidth on the link or on an input path of that link for a connection.

Input Failures VPI Shows the number of input VPI allocation failures on this port that occur when an input VPI cannot be allocated because the VPI is already in use, because the VPI is out of range, or because no more VPIs are available for allocation.

Input Failures VCI Shows the number of input VCI allocation failures on this port that occur when an input VCI cannot be allocated on a path because the VCI is already in use, because the VCI is out of range, or because no more VCIs are available for allocation on the input path.

Input Failures Setup Shows the number of input connection setup failures on this port that occur if the connection cannot be set up on the fabric because the output network module cannot support the connection for various reasons, or because a connection ID cannot be allocated on an TNX-1100 fabric or MSC-900 multiplexer module.

Output Failures CAC Shows the number of output CAC failures on this port that occur when there is not enough output bandwidth on the link or on a path of that link for a connection.

Output Failures VPI Shows the number of output VPI allocation failures on this port that occur when an output VPI cannot be allocated because the VPI is already in use, because the VPI is out of range, or because no more VPIs are available for allocation.

Output Failures VCI Shows the number of output VCI allocation failures on this port that occur when an output VCI cannot be allocated on a path because the VCI is already in use, because the VCI is out of range, or because no more VCIs are available for allocation on the output path.

Output Failures Setup Shows the number of output connection setup failures on this port that occur if the connection cannot be set up on the fabric because the output network module cannot support the connection for various reasons, or because a connection ID cannot be allocated on an TNX-1100 fabric or MSC-900 multiplexer module.

You can also display fabric statistics for just a specified port in a switch fabric as follows:

```
localhost::> stat port fabric 2A4
        InputFailures                OutputFailures
Port    CAC    VPI    VCI  Setup    CAC    VPI    VCI  Setup
2A4       0      0     50      0      0      0      0      0
```

4.17.9 Traffic Port Statistics

You can display traffic statistics about all of the ports in a switch fabric by entering **traffic** at the `statistics port` level. This command is valid only when at least one Series C or Series LC network module is installed in the switch fabric. It is also valid for all ports on an LE 155 switch. The following is displayed for Series C network modules:

```
localhost::statistics> port traffic
                          Cells           Cells            Cells
Port Priority           Current     Transmitted             Lost
1C1  ABR                      0          254969                0
1C1  VBR                      0         1150885                0
1C1  CBR                      0               0                0
1C2  ABR                      0          254969                0
1C2  VBR                      0         1150901                0
1C2  CBR                      0               0                0
1C3  ABR                      0          254969                0
1C3  VBR                      0         1150849                0
1C3  CBR                      0               0                0
1C4  ABR                      0          254969                0
1C4  VBR                      0         1150889                0
1C4  CBR                      0               0                0
```

The following is displayed for Series LC and Series LE network modules:

```
localhost::statistics> port traffic
                          Cells       Cells      Cells  CellsLost  CellsLost
Port Priority           Current Transmitted       Lost     Intent   Unintent
2B1  ABR                      0           0          0          0          0
2B1  VBR                      0         559          0          0          0
2B1  CBR                      0           0          0          0          0
2B1  UBR                      0         115          0          0          0
2B2  ABR                      0           0          0          0          0
2B2  VBR                      0         527          0          0          0
2B2  CBR                      0           0          0          0          0
2B2  UBR                      0         109          0          0          0
2B3  ABR                      0           0          0          0          0
2B3  VBR                      0         528          0          0          0
2B3  CBR                      0           0          0          0          0
2B3  UBR                      0         109          0          0          0
2B4  ABR                      0           0          0          0          0
2B4  VBR                      0         528          0          0          0
2B4  CBR                      0           0          0          0          0
2B4  UBR                      0         109          0          0          0
```

The fields in these displays have the following meanings:

Port Shows the port number.

Priority Shows the traffic type for this port.

Cells Current Shows the number of cells currently in shared memory for this port and priority.

Cells Transmitted Shows the number of cells transmitted out this port for this priority.

Cells Lost Shows the number of cells for this port and priority that were dropped by the output network module.

CellsLost Intent Shows the number of cells that were dropped for this port and priority queue due to EPD (Early Packet Discard) or PPD (Partial Packet Discard). This field applies only to Series LC and Series LE network modules.

CellsLost Unintent Shows the number of cells that were dropped for this port and priority queue due to output memory shortages or the CLP (Cell Loss Priority) threshold. This field applies only to Series LC and Series LE network modules.

You can also display traffic statistics for just a specified port. Enter the following parameters:

```
localhost::statistics> port traffic 1c2
                   Cells            Cells            Cells
Port Priority    Current      Transmitted             Lost
1C2  ABR               0           254969                0
1C2  VBR               0          1150901                0
1C2  CBR               0                0                0
```

These fields are defined in the same manner as those listed above.

4.18 SPANS Statistics

You can list SPANS statistics for an individual switch fabric by entering **spans** at the `statistics` level as follows:

```
localhost::statistics> spans
Port 1D1 Counter                      Value            Delta
---------------------------------- -------------- --------------------
sigPathVCCs                                    0                    0
sigPathRestarts                                0                    0
sigPathCallsCompletions                        0                    0
sigPathCallsFailures                           0                    0
sigPathCallsRejections                         0                    0
sigPathSpansTransmittedMessages           193416                   76
sigPathSpansReceivedMessages                   0                    0
sigPathClsTransmittedMessages                  0                    0
sigPathClsReceivedMessages                     0                    0
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

sigPathVCCs	Shows the number of VCCs on this signalling path.
sigPathRestarts	Shows the number of times this switch has lost and regained contact with the other side of the connection.
sigPathCalls Completions	Shows the number of signalling requests that were successfully completed.
sigPathCallsFailures	Shows the number of failed signalling calls.
sigPathCallsRejections	Shows the number of rejected requests.
sigPathSpans TransmittedMessages	Shows the number of SPANS messages that were sent.
sigPathSpansReceived Messages	Shows the number of SPANS messages that were received.
sigPathCls TransmittedMessages	Shows the number of connectionless messages that were sent.
sigPathClsReceived Messages	Shows the number of connectionless messages that were received.

4.19 TCP Statistics

You can display TCP statistics for an individual switch fabric by entering **`tcp`** at the `statistics` level as follows:

```
localhost::statistics> tcp
tcp Counter                            Value              Delta
------------------------------ -------------------- --------------------
tcpActiveOpens                              0                    0
tcpPassiveOpens                            20                    0
tcpAttemptFails                             0                    0
tcpEstabResets                              1                    0
tcpCurrEstab                                2                    0
tcpInSegs                                4307                   10
tcpOutSegs                               3290                    7
tcpRetransSegs                              0                    0
```

The fields in this display have the following meanings:

tcpActiveOpens Shows the number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

tcpPassiveOpens Lists the number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.

tcpAttemptFails Displays the number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

tcpEstabResets Indicates the number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.

tcpCurrEstab Shows the number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.

tcpInSegs Lists the total number of segments received, including those received in error. This count includes segments received on currently established connections.

tcpOutSegs Displays the total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.

tcpRetransSegs Indicates the total number of segments retransmitted; i.e., the number of TCP segments transmitted containing one or more previously transmitted octets.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.20 UDP Statistics

You can display UDP statistics for an individual switch fabric by entering **udp** at the `statistics` level as follows:

```
localhost::statistics> udp
udp Counter                          Value              Delta
----------------------------- ------------------- -------------------
udpInDatagrams                                  0                   0
udpNoPorts                                      0                   0
udpInErrors                                     0                   0
udpOutDatagrams                                 0
```

The fields in this display have the following meanings:

udpInDatagrams Shows the total number of UDP datagrams delivered to UDP users.

udpNoPorts Lists the total number of received UDP datagrams for which there was no application at the destination port.

udpInErrors Indicates the number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.

udpOutDatagrams Displays the total number of UDP datagrams sent from this entity.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

4.21 UNI Statistics

You can display UNI statistics for an individual switch fabric by entering **uni** at the `statistics` level as follows:

```
localhost::statistics> uni
Port 4A1 Counter                       Value               Delta
---------------------------------- ---------------- --------------------
q2931VCCs                                        0                    0
q2931Restarts                                    0                    0
q2931CallsCompletions                            0                    0
q2931CallsFailures                               0                    0
q2931CallsRejections                             0                    0
q2931TransmittedMessages                         0                    0
q2931ReceivedMessages                            0                    0
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

q2931VCCs Indicates the number of Virtual Channel Connections (VCCs) on this signalling path.

q2931Restarts Displays the number of times the switch has lost and regained contact with the remote signalling entity on this path.

q2931CallsCompletions Shows the number of successfully completed calls on this signalling path.

q2931CallsFailures Shows the number of call failures on this signalling path.

q2931CallsRejections Indicates the number of connections on this signalling path that were rejected by the far end.

q2931TransmittedMessages Shows the total number of Q.2931 messages that have been transmitted over this signalling path.

q2931ReceivedMessages Shows the total number of Q.2931 messages that have been received on this signalling path.

NOTE

The value column displays the current value of the counter. The delta column displays the change in the counter since the last time you checked this value. The counters are reset when the switch is restarted.

You can also display UNI AV (address validation) statistics for all ports on a switch fabric. Enter the following parameters:

```
localhost::statistics> uni av
Port  VPI   Accept   Reject Unmatched CurrentUnmatched
----  ---   ------   ------ --------- ----------------
 4A1    0        0        0         0                0
 4A2    0        0        0         0                0
 4A3    0        0        0         0                0
 4A4    0        0        0         0                0
 4E1    0        0        0         0                0
 4E2    0        0        0         0                0
 4E3    0        0        0         0                0
4CTL    0        0        0         0                0
```

The fields in this display have the following meanings:

Port Shows the port number.

VPI Shows the UNI virtual path number.

Accept Shows the total number of Q.2931 messages that have been accepted by address validation on this UNI.

Reject Shows the total number of Q.2931 messages that have been rejected because the supplied address matched a rule in the address validation table where the action was to reject the call.

Unmatched Shows the total number of Q.2931 messages that have been rejected because the supplied address matched no rule in the address validation table.

CurrentUnmatched Shows the number of Q.2931 messages that have been rejected because the supplied address matched no rule in the address validation table since the last address validation trap was generated.

You can also display UNI AV statistics for a specific port, or for a port and path on an individual switch fabric. Enter the following parameters:

```
localhost::statistics> uni [av] [<port> [<vpi>]]
localhost::statistics> uni av 4a3 0
Port  VPI   Accept   Reject Unmatched CurrentUnmatched
----  ---   ------   ------ --------- ----------------
 4A3    0        0        0         0                0
```

4.22 VCC Statistics

You can display virtual channel statistics for an individual switch fabric by entering **vcc** at the statistics level as follows:

```
localhost::statistics> vcc
Input          Output                                    Cells      Cells
Port VPI   VCI Port VPI   VCI  Uptime           Received   Rejected
1A1    0     5 1CTL   0    34  0d:03:22            24123          0
1A1    0    14 1CTL   0    33  0d:03:22            29056          0
1A1    0    15 1CTL   0    32  0d:03:22            67821          0
1A1    0    16 1CTL   0    53  0d:03:22             9250          0
1A2    0     5 1CTL   0    37  0d:03:22                0          0
1A2    0    14 1CTL   0    36  0d:03:22                0          0
1A2    0    15 1CTL   0    35  0d:03:22                0          0
1A2    0    16 1CTL   0    54  0d:03:22                0          0
1A3    0     5 1CTL   0    40  0d:03:22                0          0
1A3    0    14 1CTL   0    39  0d:03:22                0          0
1A3    0    15 1CTL   0    38  0d:03:22                0          0
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

Input Port Shows the incoming port number.

Input VPI Shows the incoming virtual path number.

Input VCI Shows the incoming virtual channel number.

Output Port Shows the outgoing port number.

Output VPI Shows the outgoing virtual path number.

Output VCI Shows the outgoing virtual channel number.

Uptime Shows the length of time that this virtual channel has been in its current state.

Cells Received Shows the total (aggregate) number of cells that were transferred over this channel.

Cells Rejected Shows the total (aggregate) number of cells over this channel that were rejected (dropped) by the hardware due to a traffic policing violation. This does not include any cells that may have been tagged with CLP=1 by the policer, only cells that were discarded.

You can also display virtual channel statistics for a specific port, for a port and path, or for a port, path, and channel on an individual switch fabric. Enter the following parameters:

```
localhost::statistics> vcc [traffic] [<port> [<vpi> [<vci>]]]
localhost::statistics> vcc 1a1 0 15
Input          Output                          Cells      Cells
Port VPI   VCI Port VPI   VCI  Uptime       Received   Rejected
1A1    0    15 1CTL   0    32  0d:03:22        67821          0
```

The fields in this display are defined in the same manner as those listed in the previous example.

You can also display virtual channel traffic statistics for an individual switch fabric. Enter the following parameters:

```
localhost::statistics> vcc traffic
Input          Output               Cells  CellsLost  CellsLost       Cells
Port VPI   VCI Port VPI   VCI        Lost     Intent   Unintent Transmitted
2E1    0   719 2C1    0   248           0          0          0           0
2E1    0   720 2C1    0   249           0          0          0           0
2E1    0   721 2C1    0   250           0          0          0           0
2E1    0   722 2C1    0   251           0          0          0           0
2E1    0   723 2C1    0   252           0          0          0           0
2E1    0   724 2C1    0   257           0          0          0           0
2E1    0   725 2C1    0   258           0          0          0           0
2E1    0   726 2C1    0   263           0          0          0           0
2E1    0   727 2C1    0   265           0          0          0           0
2E1    0   728 2C1    0   266           0          0          0           0
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

Input Port	Shows the incoming port number.
Input VPI	Shows the incoming virtual path number.
Input VCI	Shows the incoming virtual channel number.
Output Port	Shows the outgoing port number.
Output VPI	Shows the outgoing virtual path number.
Output VCI	Shows the outgoing virtual channel number.
Cells Lost	Shows the number of cells on this channel that were dropped by the output network module. This field applies only to Series LC network modules.
CellsLost Intent	Shows the number of cells that were dropped on this channel due to EPD (Early Packet Discard) or PPD (Partial Packet Discard). This field applies only to Series LC network modules.
CellsLost Unintent	Shows the number of cells that were dropped on this channel due to output memory shortages or the CLP (Cell Loss Priority) threshold. This field applies only to Series LC network modules.
Cells Transmitted	Shows the number of cells transmitted out this channel. This field applies only to Series LC network modules.

4.23 VPC Statistics

You can display virtual path statistics for an individual switch fabric by entering **vpc** at the `statistics` level as follows:

NOTE

This command shows statistics for through paths only. To display statistics for originating and terminating paths, use the **stat vpt** command.

```
localhost::statistics> vpc
Input      Output                              Cells          Cells
Port  VPI  Port  VPI  Uptime               Received       Rejected
1C1   100  1E4   100  4d:21:22                    0              0
1C2   115  1E4   115  4d:16:35                    0              0
1E4   100  1C1   100  4d:21:22                    0              0
1E4   115  1C2   115  4d:16:35                    0              0
```

The fields in this display have the following meanings:

Input Port Shows the incoming port number.

Input VPI Shows the incoming virtual path number.

Output Port Shows the outgoing port number.

Output VPI Shows the outgoing virtual path number.

Uptime Shows the length of time that this virtual path has been in its current state.

Cells Received Shows the total (aggregate) number of cells that were transferred over this path.

Cells Rejected Shows the total (aggregate) number of cells over this path that were rejected (dropped) by the hardware due to a traffic policing violation. This does not include any cells that may have been tagged with CLP=1 by the policer, only cells that were discarded.

If no vpcs have been configured, the following message is displayed:

```
localhost::statistics> vpc
No virtual path connection input statistics are available
```

You can also display virtual path statistics for a specific port, or for a port and path on an individual switch fabric. Enter the following parameters:

```
localhost::statistics> vpc [traffic] [<port> [<vpi>]]
localhost::statistics> vpc 1c1 100
Input      Output                               Cells            Cells
Port  VPI  Port  VPI  Uptime                 Received         Rejected
1C1   100  1E4   100  4d:21:22                      0                0
1E4   100  1C1   100  4d:21:22                      0                0
```

The fields in this display are defined in the same manner as those listed in the previous example.

You can also display virtual path statistics for a specific port, or for a port and path on an individual switch fabric. Enter the following parameters:

```
localhost::stat> vpc traffic
Input      Output          Cells  CellsLost  CellsLost        Cells
Port  VPI  Port  VPI        Lost     Intent   Unintent Transmitted
1C1    87  1D1    87           0        N/A        N/A     6704864
1C3    95  1D2    95           0        N/A        N/A     8243008
```

The fields in this display have the following meanings:

Input Port Shows the incoming port number.

Input VPI Shows the incoming virtual path number.

Output Port Shows the outgoing port number.

Output VPI Shows the outgoing virtual path number.

Cells Lost Shows the number of cells on this path that were dropped by the output network module.

CellsLost Intent Shows the number of cells that were dropped on this path due to EPD (Early Packet Discard) or PPD (Partial Packet Discard). This field applies only to Series LC network modules.

CellsLost Unintent Shows the number of cells that were dropped on this path due to output memory shortages or the CLP (Cell Loss Priority) threshold. This field applies only to Series LC network modules.

Cells Transmitted Shows the number of cells transmitted out this path for this priority.

4.24 VPT Statistics

Fabric path counters record the number of CAC (Connection Admission Control) failures, VPI allocation failures, VCI allocation failures, and connection setup errors for each path. Each path counter only records errors that occurred on that path. The counters are direction specific, meaning that errors that occurred on the input side are differentiated from errors that occurred on the output side. You can display virtual path terminator statistics for an individual switch fabric by entering **vpt** at the `statistics` level as follows:

NOTE

This command shows statistics for originating and terminating paths. To display statistics for through paths, use the **stat vpc** command.

```
localhost::statistics> vpt
Input           Output          Failures
Port   VPI   Port  VPI       CAC     VCI   Setup
2A1      0   terminate         0       0       0
2A2      0   terminate         0       0       0
2A3      0   terminate         0       0       0
2A4      0   terminate         0      50       0
2B1      0   terminate         0       0       0
2B2      0   terminate         0       1       0
2B3      0   terminate         0       0       0
2CTL     0   terminate         0       0       0
originate  2A1      0          0       0       0
originate  2A2      0          0       0       0
originate  2A3      0          0       0       0
originate  2A4      0          0       0       0
originate  2B1      0          0       0       0
originate  2B2      0          0       0       0
Press return for more, q to quit: q
```

The fields in this display have the following meanings:

Input Port Shows the incoming port number for a terminating path and shows `originate` for an originating path.

Input VPI Shows the incoming virtual path number for a terminating path and shows `originate` for an originating path.

Output Port Shows the outgoing port number for an originating path and shows `terminate` for a terminating path.

Output VPI Shows the outgoing virtual path number for an originating path and shows `terminate` for a terminating path.

Failures CAC Shows the number of CAC (Connection Admission Control) failures on this path. If it is an elastic, terminating path, these failures occur if there is not enough bandwidth on the input path or link for the connection. If it is an elastic, originating path, these failures occur if there is not enough bandwidth on the output path or link for the connection.

Failures VCI Shows the number of VCI allocation failures on this path. These failures occur when an input VCI cannot be allocated because the VCI is already in use, because the VCI is out of range, or because no more VCIs are available for allocation on the path.

Failures Setup Shows the number of connection setup failures on this path. These failures occur if the connection cannot be set up on the fabric because the output network module cannot support the connection for various reasons, or because a connection ID cannot be allocated on an TNX-1100 fabric or MSC-900 multiplexer module.

You can also list vpt statistics for just an individual port or path as follows:

```
localhost::statistics> vpt [<port> [<vpi>]]
localhost::statistics> vpt 2a4

Input           Output          Failures
Port   VPI      Port   VPI      CAC     VCI   Setup
2A4      0      terminate         0      50       0
originate       2A4      0        0       0       0
```

The fields in this display are defined in the same manner as those listed in the previous example.

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