NavisCore Physical Interface Configuration Guide

Ascend Communications, Inc.

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About This Guide

The *NavisCore Physical Interface Configuration Guide* is a task-oriented guide that describes how to configure modules and physical ports on the STDX 6000™ , B-STDX 8000/9000™, CBX 500™, and GX 550™ switch platforms.

What You Need to Know

As a reader of this guide, you should be familiar with UNIX operating-system commands, HP OpenView, and relational database software, such as Sybase, which is the database used by NavisCore™. This guide assumes that you have installed the Ascend switch hardware, and NavisCore network management software. Refer to the following guides for hardware installation information:

- *STDX 6000 Hardware Installation Guide* (80006)
- *B-STDX 8000/9000 Hardware Installation Guide* (80005)
- *CBX 500 Hardware Installation Guide* (80011)
- *GX 550 Hardware Installation Guide* (80077)

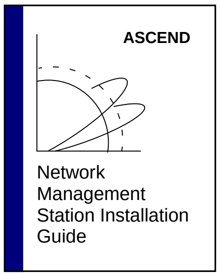
Reading Path

This section describes all of the documents that support the NavisCore NMS and switch software. The documents are grouped as follows:

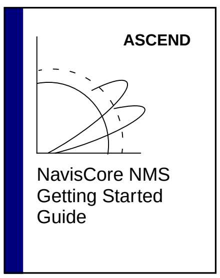
- NMS Documentation
- Switch Software Documentation

NMS Documentation

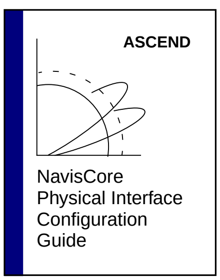
Read the following documents to install and operate NavisCore Release 4.0.



This guide describes prerequisite tasks, hardware and software requirements, and instructions for installing Solaris, HP OpenView, and NavisCore on the NMS.



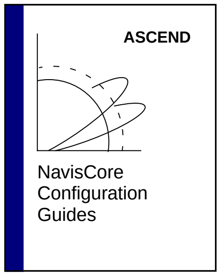
This guide describes how to configure and manage NavisCore, network maps, and Ascend switches.



This guide describes how to configure processor and I/O modules on Ascend switches.

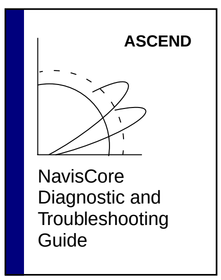
Switch Software Documentation

Read the following documents to configure switch software for B-STDX Release 6.0, CBX Release 3.0, and GX Release 1.0.

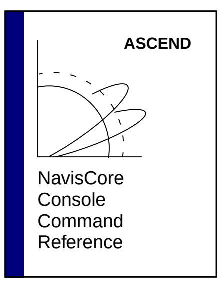


These guides describe how to configure WAN services on the STDX, B-STDX, CBX, and GX switch platforms:

- *NavisCore Frame Relay Configuration Guide*
- *NavisCore ATM Configuration Guide*
- *NavisCore IP Navigator Configuration Guide*
- *NavisCore ISDN Configuration Guide*
- *NavisCore SMDS Configuration Guide*



This guide describes how to diagnose and troubleshoot your NavisCore switch network.



This reference lists and describes the NavisCore switch console commands.

How to Use This Guide

The following table highlights the chapters in this guide:

Read	To Learn About
Chapter 1	General features of Ascend switch platforms and their respective modules.
Chapter 2	Overview of STDX 6000 modules.
Chapter 3	Overview of B-STDX 8000/9000 modules.
Chapter 4	Overview of CBX 500 modules.
Chapter 5	Overview of GX 550 modules.
Chapter 6	Configuring processor modules.
Chapter 7	Configuring I/O modules, including: – STDX 3000/6000 I/O modules – B-STDX 8000/9000 IOP modules – CBX 500 IOM modules – GX 550 BIO modules
Chapter 8	Configuring STDX/B-STDX physical ports.
Chapter 9	Configuring CBX/GX physical ports.
Chapter 10	Configuring optical card redundancy.
Appendix A	Configuring performance monitoring thresholds.
Appendix B	Implementing flow-control processor features on the CBX 500.
Appendix C	MCR class parameters.

What's New in This Release?

The following lists the new product features in this release.

New Features	Enables You To ...	Described in ...
GX 550 switch hardware	This release of NavisCore supports the GX 550 switch hardware platform, which includes the following hardware components: • Node Processor Card (NP) and NP Adapter (NPA). • Switch Fabric Module (SF). • Timing Module (TM). • 4-Thread 16-Port Base Input/Output (BIO) Module supporting a mix of 4-port OC3/STM1, 1-port OC12/STM4, and 1-port OC48/STM16 physical interface modules.	Chapter 5 Chapter 6 Chapter 7 Chapter 9
CBX 500 6-port DS3 Frame module	This new module supports high-speed frame relay access at DS3 rates.	Chapter 4 Chapter 9
CBX 500 SP30 and SP40 modules	These new modules provide additional memory for future protocol support.	Chapter 6

New Features	Enables You To ...	Described in ...
VP Shaping	VP shaping provides the ability to shape OPTimum trunk connections at a specified peak cell rate (PCR) while preserving QoS integrity. This feature is useful when multiple OPTimum trunk logical ports exist on one physical port and each trunk must traverse a VP of a fixed PCR. This new feature ensures that the maximum rate of the OPTimum trunk traffic does not exceed the specified PCR. You can enable VP shaping on the B-STDX only if the host IOP is equipped with one of the following cards: • ATM CS • ATM IWU For a CBX 500, you can enable VP shaping only if the host IOM is equipped with an FCP module. You can configure the FCP to either enable flow control or VP shaping; it does not support both functions at the same time.	Chapter 7 Chapter 8
OC3/STM-1 Automatic Protection Switching (APS) (CBX Only)	This feature provides the same Bellcore GR-253-CORE compliant intra-card APS capabilities that were provided for OC12/STM4 interfaces in prior CBX 500 releases.	Chapter 9 Chapter 10
APS Resilient UNI	This feature automates the existing Resilient UNI feature through the use of Automatic Protection Switching (APS). With the combination of these two features, it is possible to define and associate a backup logical port with a primary logical port. In the event a physical port failure occurs on the primary port, the APS function will automatically switch traffic to the backup port.	Chapter 9 Chapter 10

New Features	Enables You To ...	Described in ...
APS Trunk Backup	This feature automates the new Trunk Backup feature through the use of Automatic Protection Switching (APS). With the combination of these two features, it is possible to define and associate a backup trunk with a primary trunk. In the event a physical port failure occurs on the primary trunk, the APS function will automatically switch traffic to the backup trunk.	Chapter 9 Chapter 10
B-STDX 2-port and CBX 500 4-port Ethernet I/O module	This module provides Ethernet LAN connections at rates of either 10 or 100 Mbps. This module also supports IP routing services that enable the CBX 500 to support IP switching.	Chapter 3 Chapter 4 Chapter 8 Chapter 9
B-STDX 1-port Channelized DS3-1-0 I/O module	This module is a high speed core IOPB card that enables B-STDX switches to provide 28 T1 connections at variable data rate.	Chapter 3 Chapter 8

Conventions

This guide uses the following conventions to emphasize certain information, such as user input, screen options and output, and menu selections. For example:

Convention	Indicates	Example
`Courier Bold`	User input on a separate line.	**`eject cdrom`**
[*bold italics*]	Variable parameters to enter.	**[*your IP address*]**
`Courier Regular`	Output from a program.	`Please wait...`
Boldface	User input in text.	Type **cd install** and...
Menu => Option	Select an option from the menu.	NavisCore => Logon
Italics	Book titles, new terms, and emphasized text.	*Network Management Station Installation Guide*
Boxes around text	Notes, warnings, cautions.	See examples below.

> Notes provide helpful suggestions or reference to material not contained in this manual.

> Cautions notify the reader to proceed carefully in order to avoid damaging equipment or losing data.

> Warnings notify the reader to proceed carefully in order to avoid personal harm.

Related Documents

This section lists the related Ascend documentation that may be useful to read.

Ascend

- *STDX 6000 Hardware Installation Guide* (80006)
- *B-STDX 8000/9000 Hardware Installation Guide* (80005)
- *CBX 500 Hardware Installation Guide* (80011)
- *GX 550 Hardware Installation Guide* (80077)
- *NavisCore NMS Getting Started Guide* (80070)
- *NavisCore Frame Relay Configuration Guide* (80071)
- *NavisCore IP Navigator Configuration Guide* (80056)
- *NavisCore ATM Configuration Guide* (80072)
- *NavisCore Diagnostic and Troubleshooting Guide* (80074)
- *Network Management Station Installation Guide* (80014)
- *NavisCore Console Command User's Guide* (80075)

Customer Comments

Customer comments are welcome. Please respond in one of the following ways:

- Fill out the Customer Comment Form located at the back of this guide and return it to us.
- E-mail your comments to cspubs@ascend.com
- FAX your comments to 978-692-1510, attention Techpubs.
- Open a case in CaseView for documentation.

Customer Support

To obtain release notes, technical tips, or support, access the Ascend FTP Server or contact the Technical Assistance Center at:

- 1-800-DIAL-WAN (U.S. and Canada)
- 0-800-96-2229 (U.K.)
- 1-978-952-7299 (all other areas)

1

Overview

This chapter provides an overview of the information in this guide, which includes:

- I/O module descriptions and physical layout
- I/O and processor module configuration
- Flow Control Processor configuration
- Physical-port configuration on all switch platforms
- VP-shaping attributes on B-STDX modules and CBX 500 flow control processor
- Optical-card redundancy
- Performance-monitoring thresholds

The last section of this chapter contains a table that details technical information on all Ascend I/O modules.

Module Description and Physical Layout

The following chapters contain detailed information on the hardware I/O modules available on Ascend platforms:

Chapter 2 — STDX 6000 modules

Chapter 3 — B-STDX 8000/9000 modules

Chapter 4 — CBX 500 modules

Chapter 5 — GX 550 modules

Processor Module Configuration

Chapter 6 describes processor module configuration procedures on the B-STDX, CBX, and GX switch platforms. Processor modules contain control processor modules that provide system-level control and management for the switch. The processor-module naming convention varies according to switch platform:

STDX — Packet Processor (PP) module

B-STDX — Control Processor (CP) module

CBX — Switch Processor (SP) module

GX — Node Processor (NP) module

Module Configuration

Chapter 7 explains how to configure each I/O slot with the appropriate module installed in an STDX 6000, B-STDX 8000/9000, CBX 500, or GX 550 switch. For each module, you can also configure parameters that determine clock source and clock rate.

Flow Control Processor (FCP) Configuration

You configure Flow Control Processor when you configure CBX 500 I/O modules. Chapter 7 describes how to configure the Flow Control Processor on the CBX 500.

The FCP supports ATM traffic management through binary, hop-by-hop, closed-loop flow-control algorithms that move network congestion to the edge of the network. In addition, the CBX 500 ATM Flow Control Processor uses several per-virtual circuit (VC) cell/packet queuing and discarding mechanisms for additional network-congestion control.

Physical Port Configuration

Chapter 8 and Chapter 9 describe how to configure the I/O module's physical port parameters, which determine how a port handles clock source and clock rate.

Detailed Configuration Procedures

Virtual Path (VP) Shaping

Chapter 7 describes how to configure VP-shaping attributes on the Flow Control Processor (CBX 500). Chapter 8 describes how to configure VP shaping attributes on the B-STDX.

VP shaping enables ATM modules to control cell transmission rate in an ATM network.

On B-STDX 9000 switches, VP shaping is supported on the ATM IWU and ATM CS IOMs. The chip in each IOM contains 15 user configurable shapers, each of which is responsible for controlling the transmission rate of cells across the circuits assigned to each shaper.

On CBX 500 switches, VP shaping is supported on the ATM Flow Control Processor. Each shaper on the ATM FCP supports VP shaping only. VP shaping is performed on an aggregate (that is, virtual path) basis for all of the circuits assigned to the shaper.

Each shaped VP has four transmission queues, one for each QoS class:

- Constant Bit Rate (CBR)
- Variable Bit Rate (VBR) Real Time
- Variable Bit Rate Non-Real Time
- Available/Unspecified Bit Rate (ABR/UBR)

Virtual Circuit Connections (VCC) associated with a shaped VP are mapped to the queues according to their QoS class.

> While VP shaping applies to both the B-STDX and CBX platforms, VC shaping applies to B-STDX 9000 switches only and is not supported on the CBX 500.

Optical Card Redundancy

Chapter 10 describes how to configure optical-card redundancy or Automatic Protection Switching APS:

APS 1+1 — Enables you to designate a primary (*working*) port and a backup (*protection*) port. Under normal conditions, traffic passes over the working port. When a line failure condition occurs, traffic automatically transfers to the protection port (*called APS switchover*). An APS switchover also occurs when the working line receives LOF, L-AIS, or LOS defects.

APS Resilient UNI — Enables you to use the APS feature with fault tolerant PVC functionality. If the entire module should go down, this feature enables a physical port on a different module to respond as a backup. Circuits configured on these ports recognize a service name, not a logical port name, as the endpoint. For more information, see the *NavisCore ATM Configuration Guide*.

APS with Trunk Backup — Enables you to configure a standby trunk when a primary trunk fails. Trunk backups become active if trunks time out.

Performance Monitoring

Appendix A describes how to configure Performance Monitoring.

The B-STDX, CBX and GX switches support physical-layer performance monitoring functions, as derived from ANSI 231, for certain physical port types. These performance monitoring functions enable you to detect performance degradation in network elements at the physical layer.

The following I/O modules support performance monitoring:

Table 1-1. PM Threshold I/O Module Support

Switch Platform	I/O Module
B-STDX	1-port Channelized DS3 I/O module
B-STDX	1-port Channelized DS3-1-0 I/O module
B-STDX	Channelized T1 I/O module
B-STDX	ATM CS DS3/E3 I/O modules
B-STDX	ATM IWU/OC3 I/O modules
CBX	ATM DS3/E3 I/O modules
CBX/GX	OC3/STM-1 and OC-12c/STM-4 modules
GX	OC48/STM-16 module
CBX	ATM T1/E1 I/O module

Module Overview

Table 1-2 summarizes the following I/O module information:

- Module names and descriptions
- Number of ports
- Switch platform supported
- Network service supported
- Where to go for configuration information

Table 1-2. Module Overview

Module Descriptions	Number of Ports	Platform	Services	To Set the Card's Attributes	To Define the Card's Physical Ports
STDX modules: See "6-Port Universal I/O Module" on page 2-2, or "Channelized T1 I/O Module" on page 2-6. B-STDX modules: See "8-Port Universal IOP Module" on page 3-3.	6, 8, and 18	STDX, B-STDX	Frame Relay, SMDS, ATM, IP	STDX modules: See "Configuring STDX I/O Modules" on page 7-2. B-STDX modules: See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining V.35 or Universal I/O Physical Ports" on page 8-3.
See "6-Port V.35 I/O Module" on page 2-5.	6	STDX	Frame Relay, SMDS	See "Configuring STDX I/O Modules" on page 7-2.	See "Defining V.35 or Universal I/O Physical Ports" on page 8-3.
STDX modules: See "Channelized T1 I/O Module" on page 2-6. B-STDX modules: See "4-Port T1 IOP Module" on page 3-5.	4	STDX, B-STDX	Frame Relay, SMDS, ATM, IP	STDX modules: See "Configuring STDX I/O Modules" on page 7-2. B-STDX modules: See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining T1 and E1 Physical Ports" on page 8-10.

Table 1-2. Module Overview (Continued)

Module Descriptions	Number of Ports	Platform	Services	To Set the Card's Attributes	To Define the Card's Physical Ports
STDX modules: See "Channelized E1 I/O Module" on page 2-7. B-STDX modules: See "4-Port E1 IOP Module" on page 3-7.	4	STDX, B-STDX	Frame Relay, SMDS, ATM, IP	STDX modules: See "Configuring STDX I/O Modules" on page 7-2. B-STDX modules: See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining T1 and E1 Physical Ports" on page 8-10.
See "12-Port Unchannelized E1 I/O Module" on page 3-9.	2	B-STDX	Frame Relay, SMDS, ATM, IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining HSSI Physical Ports" on page 8-44.
See "10-Port DSX-1 IOP Module" on page 3-13.	10	B-STDX	Frame Relay, SMDS, ATM, IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining 10-port DSX-1 Physical Ports" on page 8-37.
See "1-Port ATM UNI IOP Module" on page 3-15.	1	B-STDX	ATM, IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining ATM UNI DS3/E3 Physical Ports" on page 8-58.
See "ATM UNI CS E3 I/O Module" on page 3-17.	4	B-STDX	ISDN	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining T1 and E1 Physical Ports" on page 8-10.
See "4-Port E1 ISDN PRI IOP Module" on page 3-21.	4	B-STDX	ISDN	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining T1 and E1 Physical Ports" on page 8-10.
See "1-Port Channelized DS3 IOP Module" on page 3-24.	1	B-STDX	Frame Relay, SMDS, ATM, IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining Channelized DS3 and DS3-1-0 Physical Ports and Channels" on page 8-20.

Table 1-2. Module Overview (Continued)

Module Descriptions	Number of Ports	Platform	Services	To Set the Card's Attributes	To Define the Card's Physical Ports
See "1-Port Channelized DS3-1-0 I/O Module" on page 3-34.	1	B-STDX	Frame Relay, ATM	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining Channelized DS3 and DS3-1-0 Physical Ports and Channels" on page 8-20.
See "1-Port ATM CS DS3/E3 IOP Module" on page 3-27.	1	B-STDX	ATM, IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining ATM Cell Switching (CS) Physical Ports" on page 8-70.
See "1-Port ATM IWU OC3c/STM-1 IOP Module" on page 3-29.	1	B-STDX	ATM, IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining ATM Interworking Unit (IWU) Physical Ports" on page 8-63.
See ""12-Port Unchannelized E1 I/O Module" on page 3-9.	12	B-STDX	Frame Relay, ATM, SMDS	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining T1 and E1 Physical Ports" on page 8-10.
See ""2-Port Ethernet 10/100 Base-T I/O Module" on page 3-31 or "4-Port Ethernet Module" on page 4-17.	2, 4	B-STDX, CBX	IP	See "Configuring B-STDX I/O Modules" on page 7-4.	See "Defining Ethernet Physical Ports" on page 8-79 or "Defining Ethernet Physical Ports (CBX)" on page 9-31.
See "8-Port T1 and E1 Modules" on page 4-2.	8	CBX	ATM	See "Configuring CBX 500 IOMs" on page 7-13.	See "Defining ATM DS3/E3 Physical Ports (CBX 500)" on page 9-3.

Table 1-2. Module Overview (Continued)

Module Descriptions	Number of Ports	Platform	Services	To Set the Card's Attributes	To Define the Card's Physical Ports
See "1-Port OC-12c/STM-4 Module" on page 4-14.	4	CBX	ATM	See "Configuring CBX 500 IOMs" on page 7-13.	See "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.
See "1-Port OC-12c/STM-4 Module" on page 4-14.	1	CBX	ATM	See "Configuring CBX 500 IOMs" on page 7-13.	See "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.
See "4-Port Ethernet Module" on page 4-17.	8	CBX	ATM	See "Configuring CBX 500 IOMs" on page 7-13.	See "Defining T1/E1 Physical Ports (CBX 500)" on page 9-19.
See "6-Port DS3 Frame/IP Module" on page 4-8.	6	CBX	ATM, Frame Relay, IP	See "Configuring CBX 500 IOMs" on page 7-13.	See "Configuring 6-Port Frame DS3 Physical Ports" on page 9-26.
See "OC3c/STM-1 Phy Module" on page 5-2.	4	GX	ATM	See "Configuring GX BIO Cards" on page 7-29.	See "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.
See "OC12c/STM4 Phy Module" on page 5-4.	1	GX	ATM	See "Configuring GX BIO Cards" on page 7-29.	See "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.

Table 1-2. Module Overview (Continued)

Module Descriptions	Number of Ports	Platform	Services	To Set the Card's Attributes	To Define the Card's Physical Ports
See "OC48/STM16 Phy Module" on page 5-6.	1	GX	ATM	See "Configuring GX BIO Cards" on page 7-29.	See "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.

2

STDX Modules

This chapter describes the following I/O modules, which are currently available on STDX switches:

- 6-Port Universal I/O Module
- Channelized T1 I/O Module
- 6-Port V.35 I/O Module
- Channelized T1 I/O Module
- Channelized E1 I/O Module

6-Port Universal I/O Module

The 6-port Universal (UIO) module is a base module for the STDX 6000. It supports connections to a variety of popular synchronous interfaces. The module contains six universal ports that operate with data rates from 19.2 Kbps to 4.096 Mbps. It provides redundancy for six serial ports and allows US and international serial interfaces. There are three panel types, all of which support redundancy.

Users can individually configure each of the physical ports on the 6-port Universal I/O module as DCE or DTE to provide any frame-based logical port function. Individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device.

For user devices, the connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX assembles the data links into Frame Relay format.

Features

The STDX 6-port UIO module:

- Supports redundant-node configurations
- Uses standard interfaces to existing network products without modifications, including international serial interfaces
- Provides high port-density configurations
- Allows customization of connector types through external I/O assembly

Physical Layout

Figure 2-1 shows the physical layout of a UIO I/O module that uses V.35 interfaces.

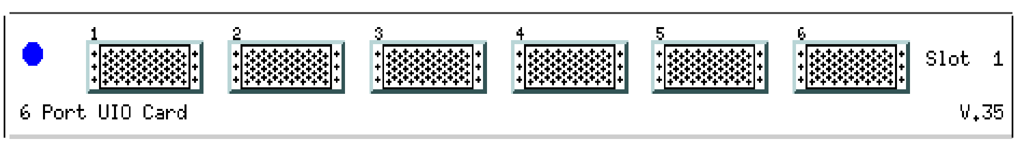


Figure 2-1. UIO I/O Module Back Panel

8- and 18-Port Universal I/O Modules (X.21/V.24)

The UIO module is available in 8-port (UIO-8) and 18-port (UIO-18) models which support X.21 or V.24 communication. Users can configure pairs of the X.21 or V.24, using one of the two external cable types, as DCE or DTE for any Frame-based logical port functions.

You can make individual connections into user devices, such as a router, bridge, or cluster controller. You can also make individual connections into a network trunk via a DSU/CSU device. For user devices, you can make the connections either Frame Relay or non-Frame Relay. If the connections are not Frame Relay, the STDX assembles the data links into Frame Relay format.

The UIO module enables STDX switches to provide increased concentration of the outer tier of a network. The UIO module allows aggregation of low-speed connection (2.4 Kbps - 128 Kbps, with 9.6 Kbps being the most common) into an STDX that can provide local Frame Relay switching and channel traffic to backbone network sites via T1 or E1 circuits. The UIO module is capable of saturating all 8 or 18 physical ports at 128 Kbps full duplex. Each port is individually configurable at 2.4, 4.8, 8, 9.6, 12, 16, 24, 32, 38.4, 48, 56, 64, 96, 112, or 128.

The UIO module is specially suited for STDX switches located in private networks, but is also applicable to public networks. The 8- or 18-port density makes the UIO module cost effective for concentrating multiple sites (branch offices, retail stores, banking machines).

Features

The STDX 6000 8- and 18-port UIO modules:

- Provide PVC rate monitoring for usage statistics
- Allow ports to be a user or trunk interface for flexibility
- Support Frame Relay and SMDS DXI
- Allow flexibility with non-Frame Relay services via direct FRAD and translated FRAD (PPP to RFC 1490)
- Allow X.21 or V.24 pair configuration via external cable
- Provide high port-density configuration

Physical Layout

Figure 2-2 shows the physical layout of an 18-port UIO I/O module that uses V.24 interfaces.

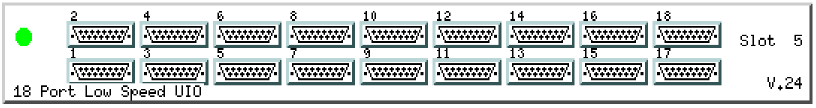


Figure 2-2. 18-port UIO I/O Module Back Panel

6-Port V.35 I/O Module

The 6-port V.35 I/O module contains six V.35 ports, each of which is capable of data rates from 19.2 Kbps to 4.096 Mbps. Users can individually configure each of the V.35 ports as DCE or DTE for any Frame-based logical port functions. The individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device.

For user devices, the connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX assembles the data links into Frame Relay format.

Features

The STDX 6-port V.35 I/O module:

- Provides PVC rate monitoring for usage statistics
- Allows ports to be a user or trunk interface
- Reduces per-port costs of Frame Relay services
- Provides high port-density configurations
- Allows for configuration flexibility

Physical Layout

Figure 2-3 shows the physical layout of the V.35 I/O module.

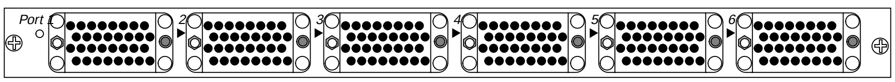


Figure 2-3. V.35 I/O Module Back Panel

Channelized T1 I/O Module

The channelized T1 I/O module provides a built-in T1 CSU interface and standard multiplexing D4 channels (DS0). Users can map the DS0 channels on the T1 interface to a maximum of 24 HDLC data links. Contiguous or non-contiguous n x DS0 channels compose each HDLC data link. This enables an interface to multiple customer sites over a single T1 connection.

Users can configure each of the n x DS0 data-link channels on the channelized T1 module as DCE or DTE for any Frame-based logical port function.

Individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device. The connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX assembles the data links into Frame Relay format.

Features

The STDX 6000 channelized T1 I/O module:

- Provides PVC rate monitoring for usage statistics
- Provides up to 24 individual HDLC data links on a single T1
- Supports contiguous or non-contiguous DS0 channels
- Allows ports to be a user or trunk interface
- Allows users to configure DTE, DCE, and NNI Frame Relay interfaces
- Contains an integral T1 CSU/DSU
- Has T1 and Fractional T1 interfaces
- Provides for high port density
- Provides configuration flexibility

Physical Layout

Figure 2-4 shows the physical layout of the channelized T1 I/O module.

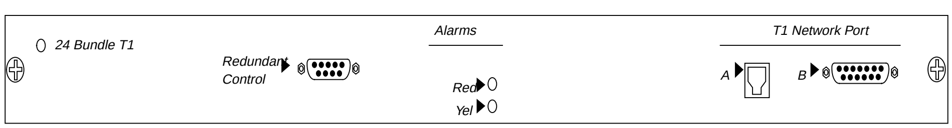


Figure 2-4. Channelized T1 I/O Module Back Panel

Channelized E1 I/O Module

The channelized E1 I/O module provides standard multiplexing G.704 channels (64 Kbps). Users can map the 64 Kbps channels on the E1 interface to a maximum of 30 HDLC data links or 1.984 Mbps. Contiguous or non-contiguous n x 64 Kbps channels compose each HDLC data link.

Users can configure each of the n x 64 Kbps data link channels on the channelized E1 module as DCE or DTE to provide any Frame-based logical port function. Through any of these channels, network managers can make connections to a user device such as a router, bridge, or cluster controller. Connections can also be made to a network trunk.

For user devices, connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX assembles the data links into Frame Relay format.

Features

The STDX 6000 channelized E1 I/O module:

- Provides PVC rate monitoring for usage statistics
- Provides up to 30 individual HDLC data links on a single T1
- Supports contiguous or non-contiguous G.704 channels
- Allows ports to be a user or trunk interface
- Allows users to configure DTE, DCE, and NNI Frame Relay interfaces
- Contains an integral E1 CSU/DSU
- Has E1 and Fractional E1 interfaces
- Provides high port density
- Provides configuration flexibility

Physical Layout

Figure 2-5 shows the physical layout of the channelized E1 I/O module.

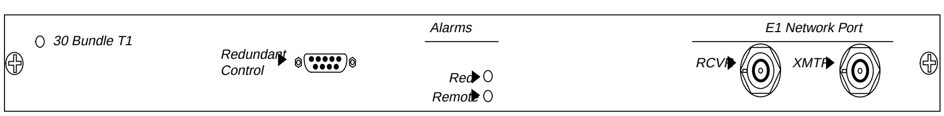


Figure 2-5. Channelized E1 I/O Module Back Panel

3

B-STDX Modules

This chapter contains technical information about each of the hardware IOP modules that are currently available from Ascend Communications for the B-STDX switches. The following modules are described:

- 8-Port Universal IOP Module
- 4-Port T1 IOP Module
- 4-Port E1 IOP Module
- 12-Port Unchannelized E1 I/O Module
- 2-Port HSSI IOP Module
- 10-Port DSX-1 IOP Module
- 1-Port ATM UNI IOP Module
- ATM UNI CS E3 I/O Module
- 4-Port T1 ISDN PRI IOP Module
- 4-Port E1 ISDN PRI IOP Module

- 1-Port Channelized DS3 IOP Module
- 1-Port ATM CS DS3/E3 IOP Module
- 1-Port ATM IWU OC3c/STM-1 IOP Module
- 2-Port Ethernet 10/100 Base-T I/O Module
- 1-Port Channelized DS3-1-0 I/O Module

8-Port Universal IOP Module

The 8-port Universal IOP module for the B-STDX supports connections to a variety of popular synchronous interface connections, including modem international serial interfaces. The B-STDX symmetrical architecture gives any port on the Universal IOP module the flexibility to act as either network (DCE), user port (DTE), inter-switch trunks, or inter-network link (NNI). As a trunk connection, this module supports the ATM DXI, SMDS DXI, and Ascend OPTimum interfaces. For user devices, the connections can be frame relay UNI or SMDS DTE. This module also supports connections from X.25, HDLC, or TCP/IP PPP connections, and will assemble the data links into the appropriate format for switching in a frame relay, SMDS, or ATM network.

The 8-port Universal IOP module offers high network availability through a redundancy option. The redundancy option switches the line interface over to an optional redundant IOP module, operating in the same B-STDX switch.

This module is available in both 8-MB and 16-MB versions.

Features

The 8-port Universal IOP module:

- Provides PVC rate monitoring for usage statistics
- Allows ports to be user or trunk interface for flexibility
- Provides cell and frame relay trunking
- Is managed by SNMP
- Supports any combination of frame relay DLCIs or ATM VCCs with an aggregate total of 1,000
- Supports clocking per port up to 8 Mbps
- Supports accounting and IP switching (16-MB version only)

Physical Layout

Figure 3-1 shows the UIO front panel, as well as the non-redundant V.35 and X.21 connector panels. The redundant connector panels are double-wide versions of the non-redundant panels.

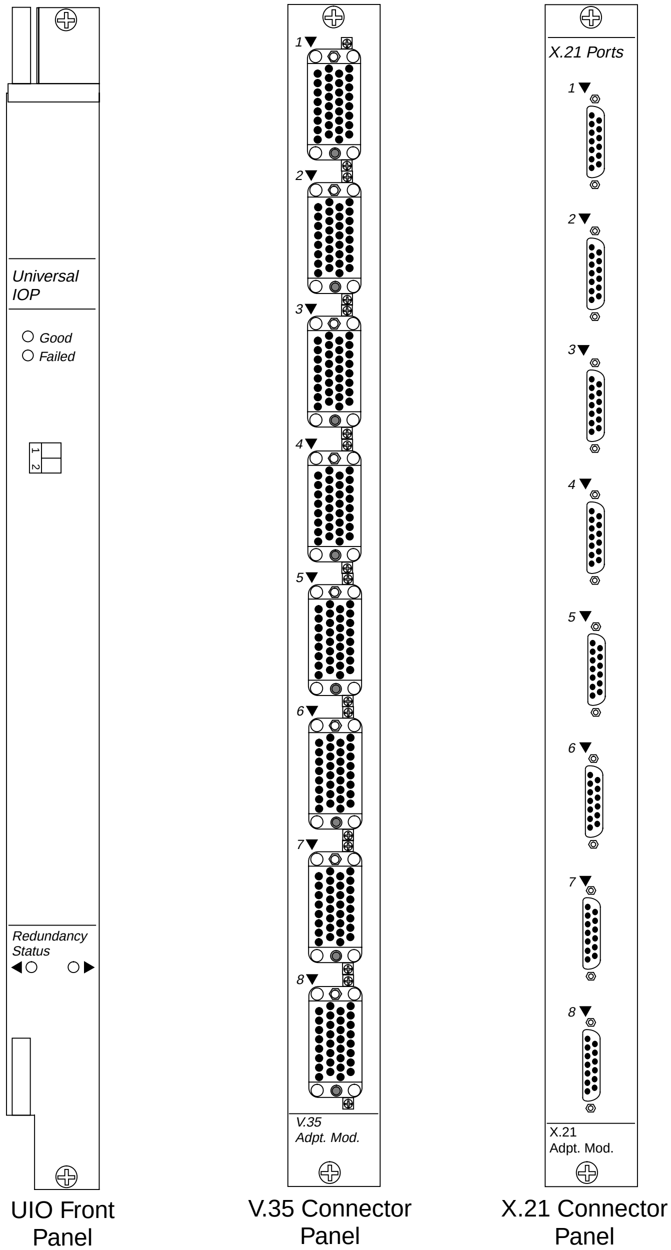


Figure 3-1. 8-Port UIO Module, V.35 Panel, and X.21 Panel

4-Port T1 IOP Module

The Ascend 4-port 24-bundle T1 IOP module contains four integral T1 CSU/DSUs, and provides a D4 or ESF channel format T1 interface. This makes it economical and easy to interface to multiple sites over a single T1 connection, eliminating the need for numerous cables in “groom and fill” operations. Users can leave traffic in its original D4 or ESF channel format, eliminating expensive equipment for extra data handling and improving reliability by reducing the introduction of errors. The B-STDX symmetrical architecture allows any n x DS0 data link channel on the 4-port 24-bundle T1 IOP module the flexibility to function as a network, a user port, or as inter-switch trunks.

Users can map the DS0 channels on each of the T1 ports to a maximum of 24 HDLC data links. Contiguous or non-contiguous n x DS0 channels compose each HDLC data link. Users can configure each of the n x DS0 data link channels on the 24-bundle T1 IOP module as DCE or DTE to provide a variety of logical port functions.

This module is available in both 8-MB and 16-MB versions.

Features

The 4-port T1 IOP module:

- Provides PVC rate monitoring for usage statistics
- Provides up to 24 individual HDLC data links on a single T1 connection (96 HDLC data links per IOP module)
- Supports either contiguous or non-contiguous DS0 channels
- Allows ports to be network, user port, or inter-switch trunks for flexibility
- Contains four integral T1 CSU/DSUs supporting D4 Super Frame or Extended Super Frame (ESF)
- Provides both T1 and Fractional T1 interfaces
- Supports full T1 line and payload loopbacks and DS0 level channel loopbacks
- Supports external, looped time, or internal clock input (external clock input is T1 via RJ-48 connector)
- Supports up to 1,000 Frame Relay DLCIs
- Supports accounting and IP switching (16-MB version only)

Physical Layout

Figure 3-2 shows the channelized T1 IOP and IOAs. The redundant module is identical, except that it is double-wide.

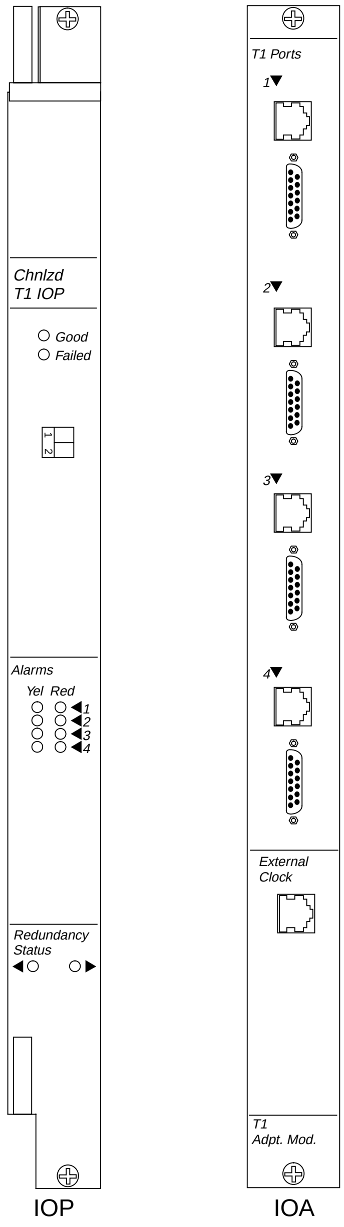


Figure 3-2. Channelized T1 IOP and IOA

4-Port E1 IOP Module

The 4-port E1 IOP module contains four integral E1 CSU/DSUs, and provides a CRC4 channel format E1 interface. This makes it easy and economical to interface to multiple sites over a single E1 connection, eliminating the need for numerous chassis cables in groom-and-fill operations. Users can leave traffic in its original CRC4 channel format, eliminating expensive equipment for extra data handling and improving reliability by reducing the introduction of errors. The B-STDX symmetrical architecture allows any n x 64 Kbps data link channels on the 4-port 31-bundle E1 module the flexibility to function as a network, a user port, or as inter-switch trunks.

Users can map the 64 Kbps channels on the E1 interface to a maximum of 30 HDLC data links. Contiguous or non-contiguous n x 64 Kbps channels compose each HDLC data link. Users can configure each of the n x 64 Kbps data link channels on the 4-port 31-bundle E1 module as DCE or DTE to provide a variety of logical port functions.

This module is available in both 8-MB and 16-MB versions.

Features

The 4-port E1 IOP module:

- Provides PVC rate monitoring for usage statistics
- Provides up to 30 individual HDLC data links on a single E1 connection (120 HDLC data links per IOP module)
- Supports either contiguous or non-contiguous 64 Kbps channels
- Allows ports to be network user port, or inter-switch trunks for flexibility
- Contains four integral E1 CSU/DSUs, supporting CRC4 frame format
- Provides both E1 and Fractional E1 interfaces
- Supports full E1 line and payload loopbacks, and DS0 level channel loopbacks
- Supports external, looped time, or internal clock input (external clock input is E1 with 75-ohm BNC connector)
- Supports up to 1,000 Frame Relay DLCIs
- Supports accounting and IP switching (16-MB version only).

Physical Layout

Figure 3-3 shows the unchannelized E1 IOP and IOA panels. Both the 75-ohm and 120-ohm are shown. The redundant modules are the same, except that they are double-wide.

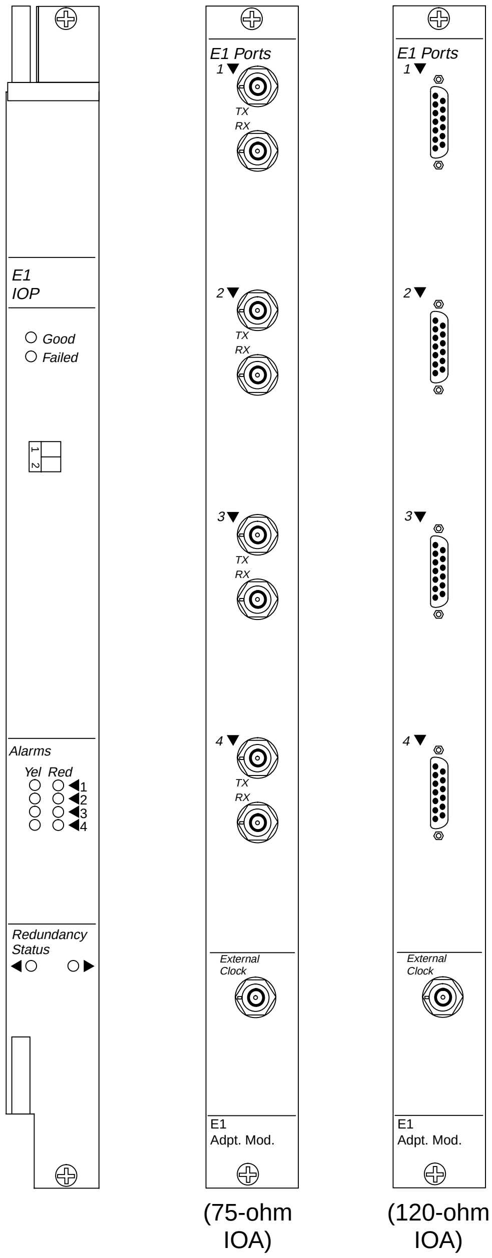


Figure 3-3. Unchannelized E1 IOP and IOA

12-Port Unchannelized E1 I/O Module

The 12-port unchannelized E1 I/O module (12-port E1 I/O module) is a high-speed core IOPB card that enables B-STDX switches to provide up to 31 TS0 connections per port at a variable data rate (for example, 64 Kbps through 2.048 Mbps). The module supports an unchannelized E1 interface with up to 12 individual E1 connections for frame-based traffic. It supports TS0 and E1 line loopback, diagnostic loopback, and Bit Error Rate Test (BERT) capabilities. It also provides link monitoring for accumulating statistics and generating reports. You can individually configure each of the Lports as DCE or DTE to provide any Frame Relay logical port function.

> The 12-port E1 I/O module supports Frame Relay only. Multiservice will be supported in a future release.

The 12 independent HDLC controllers on the 12-port E1 I/O module provide high density and use approximately 35 watts per card. You can configure up to 14 E1 I/O modules in a B-STDX switch to support 168 E1 connections. This feature provides the highest density Frame Relay solution in the industry, at the lowest E1 cost per port.

Features

The 12-port E1 I/O module:

- Supports maximum throughput 24.5Mbps/port/module (256 byte frame size)
- Provides 12 E1 connections for frame-based traffic
- Supports Fractional E1 connections
- Supports 938 maximum originating Permanent Virtual Circuits (PVCs)
- Supports Structured or Unstructured E1
- Supports 4000 PVC
- Operates on -48 VDC in a central office environment
- Allows user or trunk interface port configuration
- Allows flexibility with DTE, DCE, and Network Interface (NI) Frame Relay interfaces
- Supports OPTimum Trunking
- Adheres to all Frame Relay standards
- Supports Multilink PPP connections

Physical Layout

Figure 3-4 shows the IOP and IOA panels for the 12-port E1 I/O module.

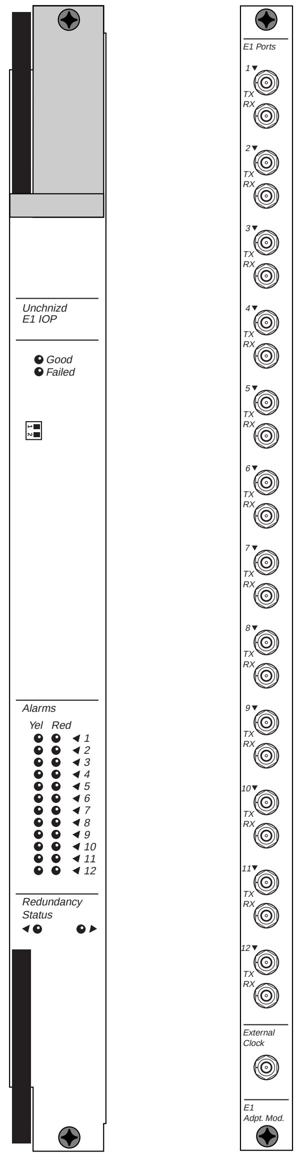


Figure 3-4. 12-port E1 IOP and IOA

2-Port HSSI IOP Module

The 2-port HSSI IOP module enables B-STDX switches to provide connections at data rates up to 45 Mbps. The HSSI IOP module's two physical ports can each be configured at speeds that increment from 1.54 Mbps to 45 Mbps to support DTE connections in excess of 8 Mbps, as well as Ascend trunking over fully saturated T3/E3 circuits. The total throughput of the IOP module is 45 Mbps.

Users can individually configure each of the two physical ports as DCE or DTE to provide any frame relay logical port functions, as well as ATM DXI and SMDS DXI.

The HSSI IOP module enables the B-STDX to connect routers to the network at LAN speeds. It also enables the B-STDX to function as a high-speed trunk between Ascend switches or as a feeder link into a backbone central office class switch. This flexibility makes the HSSI IOP module a cost-effective solution for supporting the high-speed connection requirements of both public and private networks.

This module is available in 8-MB and 16-MB versions.

Features

The 2-port HSSI IOP module:

- Allows flexibility with DTE, DCE, and NNI Frame Relay interfaces
- Supports both ATM and SMDS DXI
- Adheres to all frame relay standards
- Allows flexibility with non-frame relay services via direct FRAD and translated FRAD (PPP to RFC 1490)
- Minimizes upgrade and repair time with hot swap and live insertion of all cards
- Supports management by any industry-standard SNMP-based management tool
- Supports any combination of frame relay DLCIs or ATM VCCs, with an aggregate total of 1,000
- Supports accounting and IP switching (16-MB version only)

Physical Layout

Figure 3-5 shows the HSSI module IOP and IOA panels. The redundant module is the same, except that it is double-wide.

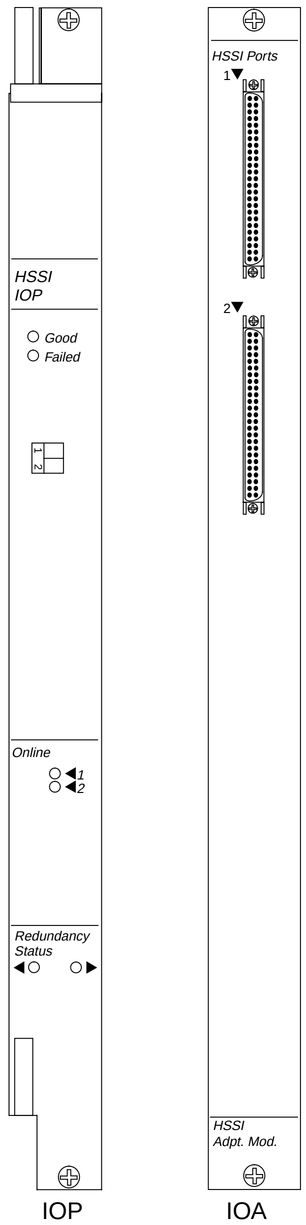


Figure 3-5. HSSI Module IOP and IOA

10-Port DSX-1 IOP Module

The 10-port DSX-1 IOP module enables B-STDX switches to provide a Fractional T1 connection at a variable data rate (for example, 56 Kbps, 64 Kbps, 128 Kbps, …, 1.54 Mbps) that is directly wired into central office equipment without use of CSU/DSUs. Users can individually configure each of the 10 DSX-1 ports as DCE or DTE to provide any Frame Relay logical port function, as well as ATM DXI and SMDS DXI.

The DSX-1 IOP module is intended for a B-STDX switch located in a central office. The support for unchannelized T1 connections reduces unnecessary expense that network providers incur when using channelized T1 equipment to carry unchannelized data. The 10-port density of the unchannelized T1 connections makes the DSX-1 IOP module extremely cost effective for concentrating multiple circuits.

A typical configuration for a B-STDX switch equipped with DSX-1 would be in a central office in a major metropolitan area that concentrates multiple T1 connections (possibly connecting to remote STDX switches in suburban/rural areas with a V.35 connection). The central office B-STDX in turn connects to another major metropolitan area via a HSSI-derived or ATM UNI 45 Mbps connection. Although the DSX-1 IOP module is primarily intended for public networks, it is also applicable to large private networks that have leased floor space for equipment within central offices.

This module is available in both 8-MB and 16-MB versions.

Features

The 10-port DSX-1 IOP module:

- Provides Fractional T1 connections
- Supports full T1 line and payload loopbacks
- Allows flexibility with DTE, DCE, and NNI frame relay interfaces
- Supports both ATM and SMDS DXI
- Adheres to all frame relay standards
- Allows flexibility with non-frame relay services via direct FRAD and translated FRAD (PPP to RFC 1490)
- Supports any combination of frame relay DLCIs or ATM VCCs, with a combined total of 1,000
- Supports external (DSX-1), looped time, or internal clock input
- Supports accounting and IP switching (16-MB version only)

Physical Layout

Figure 3-6 shows the DSX-1 IOP and IOA. The redundant module is the same, except that it is double-wide.

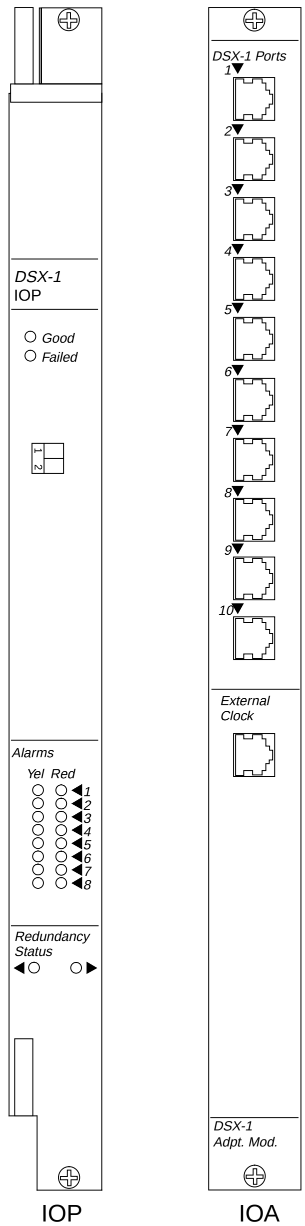


Figure 3-6. 10-Port DSX-1 Module IOP and IOA

1-Port ATM UNI IOP Module

The most common configuration for a B-STDX switch equipped with an ATM UNI IOP module is as a user-to-network interface (UNI) between two switches. It provides high-performance trunk access to an ATM backbone network at T3 rates.

Features

The 1-port ATM UNI IOP module:

- Provides speeds of up to 45Mbps (DS3/E3 line speeds)
- Contains an 8K port buffer for high-speed network communications
- Provides ATM access for multiple protocols (WAN, bridge, and routing)
- Provides E3 and T3 interfaces
- Supports up to 4096 virtual circuits per module
- Provides a maximum CSPS-PDU size of 8192 bytes
- Provides interworking between frame and cell-based traffic
- Provides the most cost effective means to aggregate frame-based traffic into an ATM network
- Provides significant traffic shaping features using transmit queues and buffers
- Integrates Frame Relay, SMDS, ISDN, and ATM on a single comprehensive switching platform
- Supports accounting and IP switching (16-MB version only)

Physical Layout

Figure 3-7 shows the ATM UNI IOP and IOA.

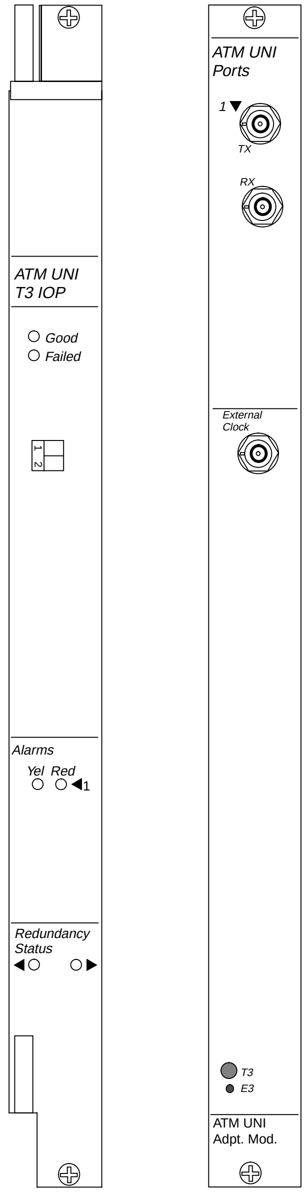


Figure 3-7. ATM UNI IOP and IOA

ATM UNI CS E3 I/O Module

The ATM UNI Cell Switching (CS) E3 I/O module (ATM CS E3 I/O module) is a one-port E3 module that supports ATM services on the B-STDX switch. The CS module can saturate the E3 line when exclusively performing cell switching, regardless of packet size. The module supports E3 line loopback and payload loopback. It also provides link monitoring for accumulating statistics and generating reports.

Features

The ATM UNI CS E3 I/O module:

- Provides one physical port that is capable of operating full duplex at the E3 rate
- Provides a high-performance trunk to an AMT backbone network using standard E3 interfaces
- Supports up to 938 Frame Relay/ATM service interworking PVCs
- Supports up to 4,000 PVCs when configured to provide either an ATM network-to-network interface (ATM NNI) or Ascend OPTimum trunk (open packet trunking)
- Supports frame-to-cell conversion with dynamic DE/CLP bit mapping
- Supports cell switching at wire speed, independent of packet size
- Provides reliable and predictable network Quality of Service (QoS) parameters

Physical Layout

Figure 3-8 shows the ATM CS E3 I/O module.

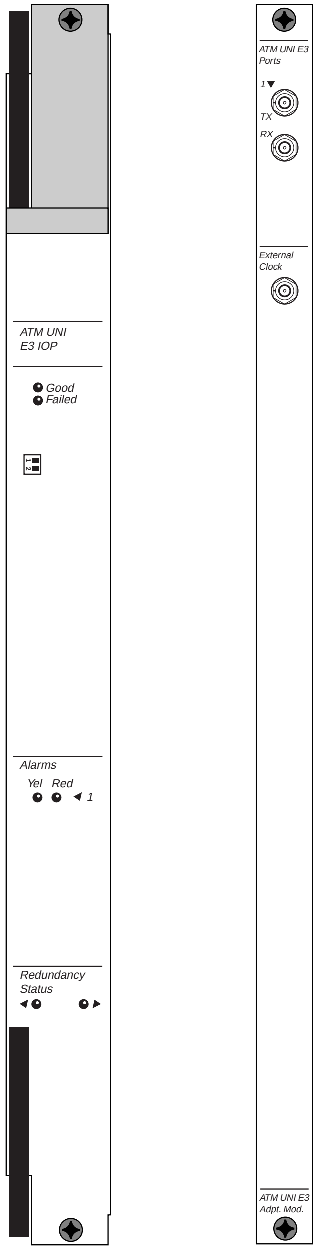


Figure 3-8. ATM CS E3 I/O Module

4-Port T1 ISDN PRI IOP Module

The 4-port 24 channel T1 ISDN PRI IOP supports the Primary Rate Interface (PRI). This interface is specified as 23D. That means the module has 23 B channels of data and one additional channel, the "D" channel, assigned as a management channel.

ISDN is a low-cost alternative to leased lines as a means of accessing the STDX switch. A typical application is for user devices to access the ISDN via a Basic Rate Interface (BRI) and, using the D channel for signalling, establish a connection between one of the user device B channels and a B channel on the STDX PRI. Once the connection is established, the user device communicates with remote users using standard Frame Relay protocol over the B channel.

Features

The 4-port ISDN PRI IOP module:

- Supports mixing the four ports as either ISDN PRI or Channelized T1
- Provides 23 B channels for traffic and one D channel for management
- Supports channelized T1 capabilities
- Also supports, in addition to core ISDN functionality, B channel polling and Caller ID Authentication
- Supports AT&T 4ESS, AT&T 5ESS, and Northern telecom DMS-100
- Has a switch type that is dynamically configurable from the NMS

Physical Layout

Figure 3-9 shows the 4-port ISDN PRI IOP and IOA panels.

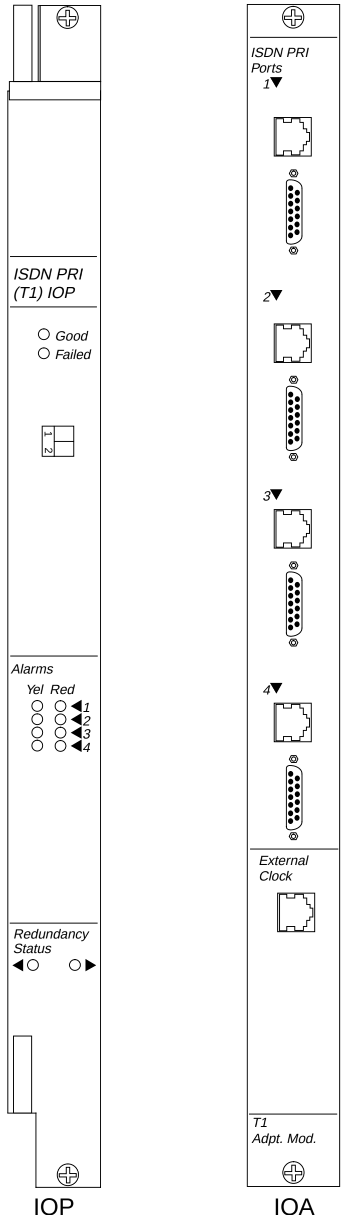


Figure 3-9. T1 ISDN PRI Module IOP and IOA

4-Port E1 ISDN PRI IOP Module

The 4-port 31-bundle E1 ISDN PRI module provides E1 (2.048 Mbps) and ISDN (30 B-channel and one D-channel) interface support for B-STDX switches. The ISDN module and associated remote access software make the B-STDX the only platform to fully integrate ISDN remote access with Frame Relay, SMDS, and ATM WAN switching, enabling the delivery of public remote access services. Each port can be configured individually to support channelized E1 or primary rate ISDN. Each port can support either 30 ISDN B-channels and one ISDN D-channel, or up to 31 x 64 Kbps E1 time slots. Each IOP module uses a RISC processor for high performance, and Flash memory for easy field installation of new capabilities.

The E1 ISDN module contains four integral E1 Network Terminating Units (NTUs). It provides a CRC4 channel format E1 interface, which makes it easy and economical to interface to multiple sites over a single E1 connection. This saves space, cost, and cabling of an external NTU, while increasing performance. Traffic can remain in its original CRC4 channel format from an NTU, eliminating expensive equipment for extra data handling and improving reliability by reducing the introduction of errors.

When operating as an E1 interface, the 64 Kbps channels can be mapped to a maximum of 31 HDLC data links. Contiguous or non-contiguous n x 64 Kbps channels compose each HDLC data link. Each of the n x 64-Kbps data link channels can be configured as DCE or DTE, providing a variety of logical port functions.

When configured for ISDN, each module offers four primary rate ISDN ports. A fully loaded B-STDX 9000 offers the highest-density remote access solution supporting 1,440 ISDN B-channels.

Features

The 4-Port E1 ISDN PRI IOP module:

- Allows each port to be configured independently to support ISDN or channelized E1
- Provides PVC rate monitoring for usage statistics
- Provides up to 31 individual HDLC data links on a single E1 connection (120 HDLC data links per IOP)
- Provides four primary rate ISDN ports with a total of 120 B-channels and 4 D-channels
- Offers the highest desnity ISDN solution with 1,440 B-channels in a fully loaded B-STDX 9000
- Supports either contiguous or non-contiguous 64 Kbps channels (E1 use only)
- Allows ports to be user or trunk interfaces for flexibility
- Contains four integral E1 NTUs supporting CRC4 frame format
- Supports full E1 line and payload loopback
- Supports external, looped-time, and internal clock input
- Is fully managed by NavisCore/UX integrated network management
- Supports SNMP management
- Minimizes upgrade and network downtime with hot swap and live insertion capability
- Supports maximum throughput or 2 Mbps per port, 8 Mbps per module

Physical Layout

Figure 3-10 shows the 4-port E1 ISDN PRI IOP and IOA panels.

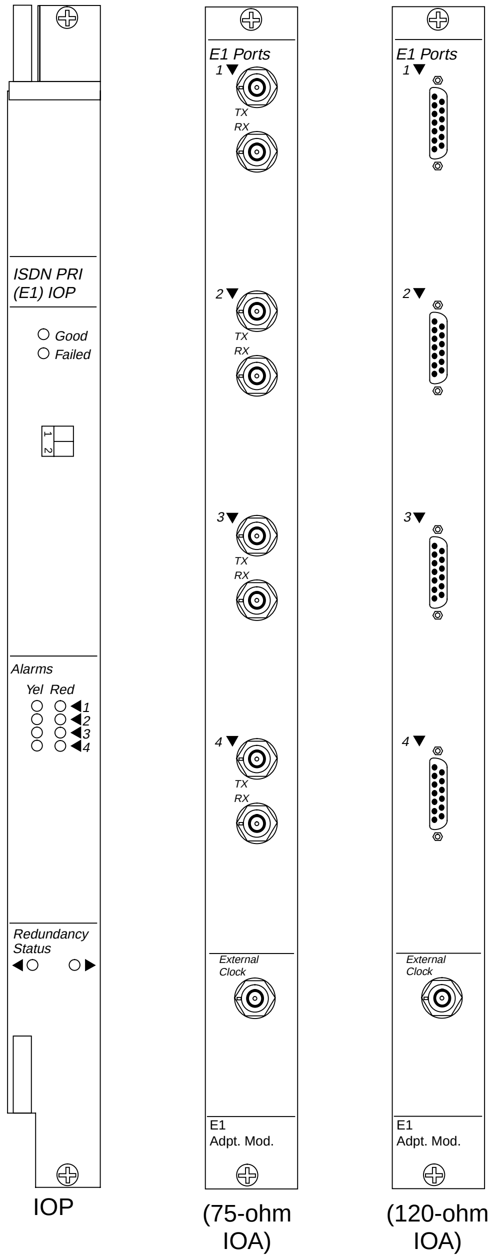


Figure 3-10. E1 ISDN PRI Module IOP and IOA

1-Port Channelized DS3 IOP Module

The 1-port channelized DS3 I/O module (channelized DS3 module) is a high-speed core IOP card that enables B-STDX switches to provide 28 T1 connections at a variable data rate (for example, 56 Kbps through 1.54 Mbps). The channelized DS3 module carries 28 independent DS1 channels on a single DS3 port. The module supports a channelized T3 interface with up to 28 individual T1 connections for frame-based traffic. It supports DS1 and DS3 line loopback, diagnostic loopback, and Bit Error Rate Test (BERT) capabilities. It also provides link monitoring for accumulating statistics and generating reports. You can individually configure each of the DS1 channels as DCE or DTE to provide any Frame Relay logical port function.

► The channelized DS3 module supports Frame Relay only. Multiservice will be supported as of release 4.2 of the switch firmware.

The 28 independent HDLC controllers on the channelized DS3 module provide high density and use low power consumption. You can configure up to 14 channelized DS3 modules in a B-STDX switch to support 392 T1 connections. This feature provides the highest density Frame Relay solution in the industry, at the lowest T1 cost per port.

The channelized DS3 module uses the Module Identification Memory (MIM) device. This device allows Ascend to remotely access your card by issuing a console command to determine card type, hardware revision, serial number, manufacturing part number, and product code. For more information on MIM, contact the Ascend Technical Assistance Center.

This module is available in both 8-MB and 16-MB versions.

Typical Application

The channelized DS3 module is intended for installation in a B-STDX 8000/9000 switch located in a central office in a major metropolitan area. In this configuration, the switch concentrates multiple T1 connections (possibly connecting to remote B-STDX switches in suburban/rural areas with a V.35 connection). The central office B-STDX in turn connects to another major metropolitan area via a HSSI-derived or ATM UNI 45-Mbps connection. Although the channelized DS3 module is primarily intended for public networks, it also accommodates large private networks with leased floor space for equipment within a central office.

Features

In addition, the channelized DS3 module:

- Supports maximum throughput of 45 Mbps/port/module (256-byte frame size)
- Provides 28 T1 connections for frame-based traffic
- Supports Fractional T1 connections
- Supports 938 maximum originating Permanent Virtual Circuits (PVC)
- Supports 4000 PVC
- Allows user or trunk interface port configuration
- Allows flexibility with DTE, DCE, and Network Interface (NI) Frame Relay interfaces
- Supports OPTimum Trunking
- Adheres to all Frame Relay standards
- Allows flexibility with non-Frame Relay services via direct FRAD and translated FRAD (PPP to RFC 1490)
- Supports external (T1 clock source), loop timed, or internal clocking
- Allows live insertion capability
- Supports optional redundancy
- Supports accounting and IP switching (16-MB version only)
- Supports Multilink PPP connections

Physical Layout

Figure 3-11 shows the DS3 module IOP and IOA.

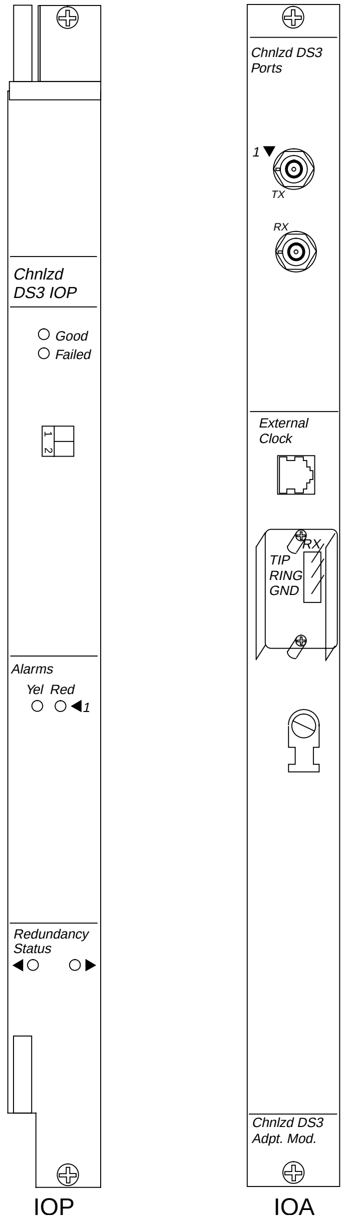


Figure 3-11. Channelized DS3 Module IOP and IOA

1-Port ATM CS DS3/E3 IOP Module

The 1-port ATM CS (cell-switching) DS3/E3 IOP module is a one-port DS3/E3 module that supports ATM services on the B-STDX platform. The CS represents Ascend's next generation of B-STDX ATM technology. It extends the bounds of the B-STDX by adding native cell-switching capability.

Features

The 1-port ATM CS DS3/E3 IOP module provides or supports:

- Frame Relay/ATM network interworking per FRF.5
- Frame Relay/ATM service interworking per FRF.8
- Ascend ATM OPTimum trunking
- Integration with the CBX 500 and Virtual Network Navigator (VNN)
- Frame-to-cell conversion with dynamic DE/CLP bit mapping
- Cell switching at wire speed, independent of packet size
- Segmentation and Reassembly (SAR) function per AAL-5
- ATM UNI DCE and DTE logical port types
- Redundancy (optional)
- Frame Relay, SMDS, ISDN, and ATM services in a single switch
- Multiservice interworking for ease of migration
- Reliable and predictable network quality of service (QoS)
- Network management with industry-standard HP OpenView platform
- Accounting and IP switching (16-MB version only)

Physical Layout

Figure 3-12 shows the ATM UNI CS DS3/E3 IOP and IOA.

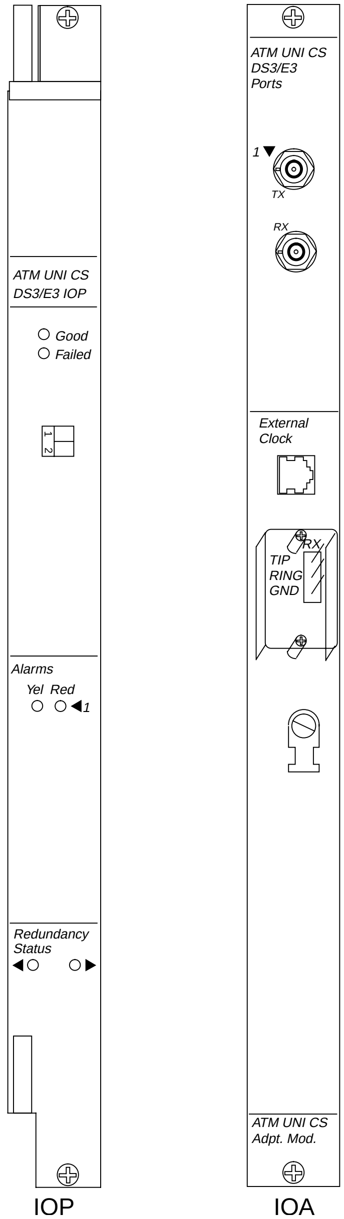


Figure 3-12. ATM UNI CS DS3/E3

1-Port ATM IWU OC3c/STM-1 IOP Module

The 1-port ATM IWU (interworking unit) OC3c/STM-1 IOP module supports ATM services on the B-STDX platform. The IWU module represents a major extension in trunking and Frame Relay – ATM internetworking capacity for the B-STDX platform. Customer operations and service provisioning are simplified through the support of a native cell trunking interface to the CBX 500, providing full integration and state-of-the-art virtual circuit routing with Virtual Network Navigator (VNN).

Features

The 1-port ATM IWU OC3c/STM-1 IOP module:

- Provides Frame Relay/ATM network interworking per FRF.5
- Provides Frame Relay/ATM service interworking per FRF.8
- Supports Ascend ATM OPTimum trunking
- Supports integration with the CBX 500 and Virtual Network Navigator
- Supports frame-to-cell conversion with dynamic DE/CLP bit mapping
- Provides cell switching at wire speed, independent of packet size
- Supports Segmentation and Reassembly (SAR) per AAL-5
- Supports ATM UNI DCE and DTE logical port types
- Provides a redundancy option
- Provides Frame Relay, SMDS, ISDN, and ATM services in a single switch
- Supports multiservice interworking for ease of migration
- Provides reliable and predictable network quality of service (QoS)
- Supports network management via industry-standard HP OpenView platform
- Supports accounting and IP switching

Physical Layout

Figure 3-13 shows the IOP and IOA panels for the ATM IWU IOP module.

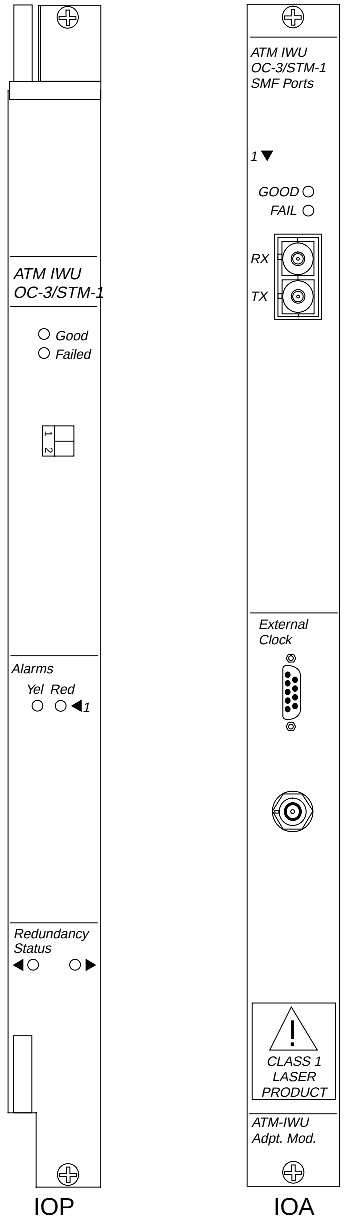


Figure 3-13. ATM IWU OC-3c/STM-1 IOP Module

2-Port Ethernet 10/100 Base-T I/O Module

The Ethernet 10/100 Base-T I/O module provides high-speed 100Mbps connections to help reduce bottlenecks to dial access equipment and improve network performance. When using IP Navigator while operating as a standard IP routing interface, the 10/100 Processor provides users with a high-speed interface to Ascend's IP Switch (GRF) and MAX TNT products, in addition to high-speed links to local Internet/Intranet hosting servers.

The 10/100 Ethernet I/O module enables service providers to easily offer both Internet hosting services and value-added IP routing services that are inherent in IP Navigator. IP traffic received from the Ethernet module is fowarded over a Multipoint-to-Point Tunnel (MPT) built by IP Navigator, or over a regular Permanent Virtual Circuit (PVC). In a similar manner, traffic received from the network is forwarded from the MPT or circuit to the appropirate Ethernet segment and address.

> Please contact your Sales Representative regarding the availability of the 2-port Ethernet module.

Features

In addition, the 2-Port 10/100Base-T I/O Ethernet module:

- Supports maximum throughput of 540k pps per module (128 byte packets)
- Supports IP Qos, MOSPF, IGMP, DVMRP, and PIM traffic and route filters
- Includes management support for RFC 1398 Ethernet MIB and RFC 1213 TCP/IP-based Internets MIB

The following protocols are also supported:

- TCP
- UDP
- ICMP
- ARP
- INARP
- SNMP
- RIP
- BGP4
- OSPF
- RIP2
- Static Routing
- Telnet, TFTP, FTP

Physical Layout

Figure 3-14 shows the IOP and IOA panels for the Ethernet 10/100 Base-T I/O module.

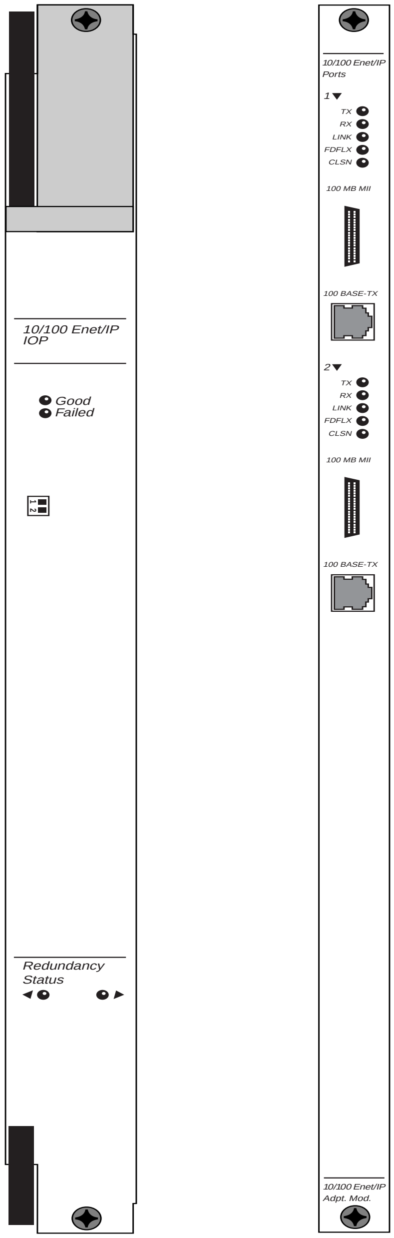


Figure 3-14. Ethernet 10/100 Base-T I/O module

1-Port Channelized DS3-1-0 I/O Module

The channelized DS3-1-0 I/O module is a high speed core IOPB card that enables B-STDX switches to provide 28 T1 connections at a variable data rate (for example, 56 Kbps through 1.54 Mbps). The module supports a channelized T3 interface with up to 28 individual T1 and 24 DS0 connections per T1 for frame-based traffic. It supports DS0, DS1, and DS3 line loopback, diagnostic loopback, and Bit Error Rate Test (BERT) capabilities. It also provides link monitoring for accumulating statistics and generating reports. You can individually configure each of the DS0 or DS1 channels to provide any Frame Relay logical port function.

The 28 independent HDLC controllers on the DS3-1-0 module provide high density and use low power consumption. You can configure up to 14 DS3-1-0 modules in a B-STDX switch. Each module supports up 128 DS0 connections. This feature provides the highest density Frame Relay solution in the industry, at the lowest T1 cost per port.

The DS3-1-0 module uses the Module Identification Memory (MIM) device. This device allows Ascend to determine the card type, hardware revision, serial number, manufacturing part number, and product code.

Features

The DS3-1-0 module has the following features:

- Provides 28 T1 connections for frame-based traffic
- Supports up to 128 DS0s per module
- Supports Fractional T1 connections
- Supports 1024 Permanent Virtual Circuits (PVC) per module
- Operates on -48 VDC in a central office environment
- Allows user or trunk interface port configuration
- Allows flexibility with DTE, DCE, and Network Interface (NI) Frame Relay interfaces
- Adheres to all Frame Relay standards
- Allows flexibility with non-Frame Relay services via direct FRAD and translated FRAD (PPP to RFC 1490)
- Allows live insertion capability
- Optional redundancy

Physical Layout

Figure 3-15 shows the 1-port channelized DS3-1-0 I/O module.

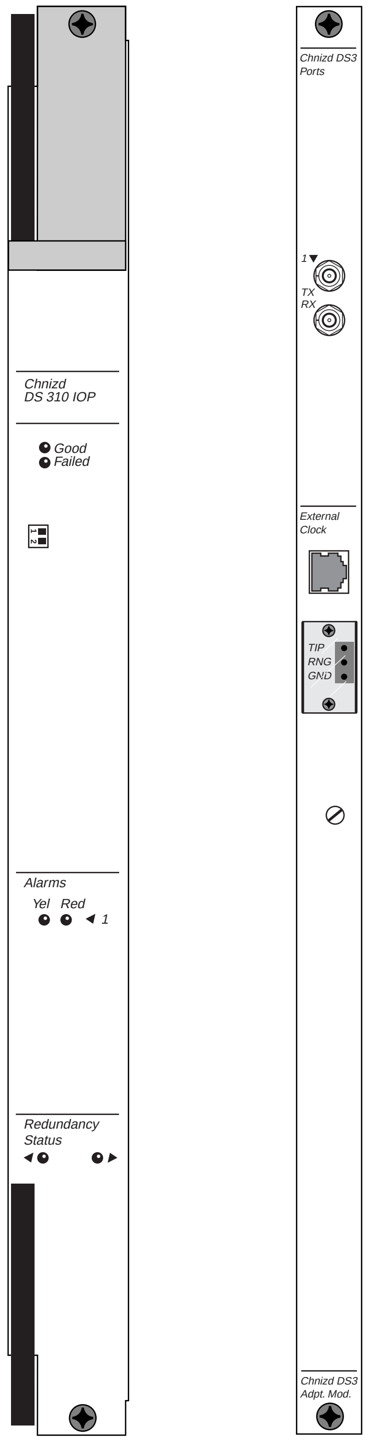


Figure 3-15. Channelized DS3-1-0 Front and Back Panel

4

CBX Modules

This chapter provides technical information and specifications for the following CBX 500 IOP modules:

- 8-Port T1 and E1 Modules
- 8-Port DS3 and E3 ATM UNI Modules
- 6-Port DS3 Frame/IP Module
- 4-Port ATM UNI OC-3c/STM-1 Module
- 1-Port OC-12c/STM-4 Module
- 4-Port Ethernet Module

8-Port T1 and E1 Modules

In the CBX 500 switch, the 8-port T1 and E1 IOP modules provide user connections at data rates of 1.544 Mbps (T1) or 2.048 Mbps (E1) on each of the eight ports. You can configure each port individually as a User-to-Network Interface (UNI). With a 16-slot modular architecture, the CBX 500 can support 112 T1/ E1 ports per switch.

Each module has 8K cell buffers per port. The port buffers, combined with the 128K cell buffers provided for the CBX 500's quad-plane architecture, give the T1 and E1 modules the flexibility, performance, and data integrity required in today's networks.

Features

The 8-port T1 and E1 IOP modules:

- Provide eight T1 or E1 ATM connections at wire speed
- Support 8,000 cell buffers per port
- Support ATM UNI 3.0/3.1, IISP, and Ascend trunking
- Support the CBR, VBR-RT, VBR-NRT, and UBR Quality of Service (QoS) classes
- Supports UNI 3.0/3.1 signalling, with high signalling throughput via an i960 signal processor
- Supports up to 16,000 virtual circuits (combined VCCs and VPCs) per module
- Supports Path switching based on virtual path (VP)
- Supports up to 16,000 multicast source connections per module
- Provides extensive Operations and Maintenance support: OAM cell processing (F4, F5 flows, and fault management)
- Supports wide range of MIB support: ILMI, AToM and T1 MIBs
- Supports ingress usage parameter control (UPC) for cell policing based on UNI 3.0/3.1 GCRA algorithm
- Supports available bit rate (ABR) processing subsystem hosting
- Supports statistics collection on ATM and physical layers
- Supports transmit clocking options for loop-timed, port recovered, and internal/external reference
- Provides ESF data link (FDL) support compliant to ANSI T1.403
- Provides DS1 physical layer performance-monitoring support compliant with ANSI T1.231

Physical Layout

Figure 4-1 shows the T1 IOP and IOA, as well as the E1 IOP and 75-ohm and 120-ohm E1 IOA modules.

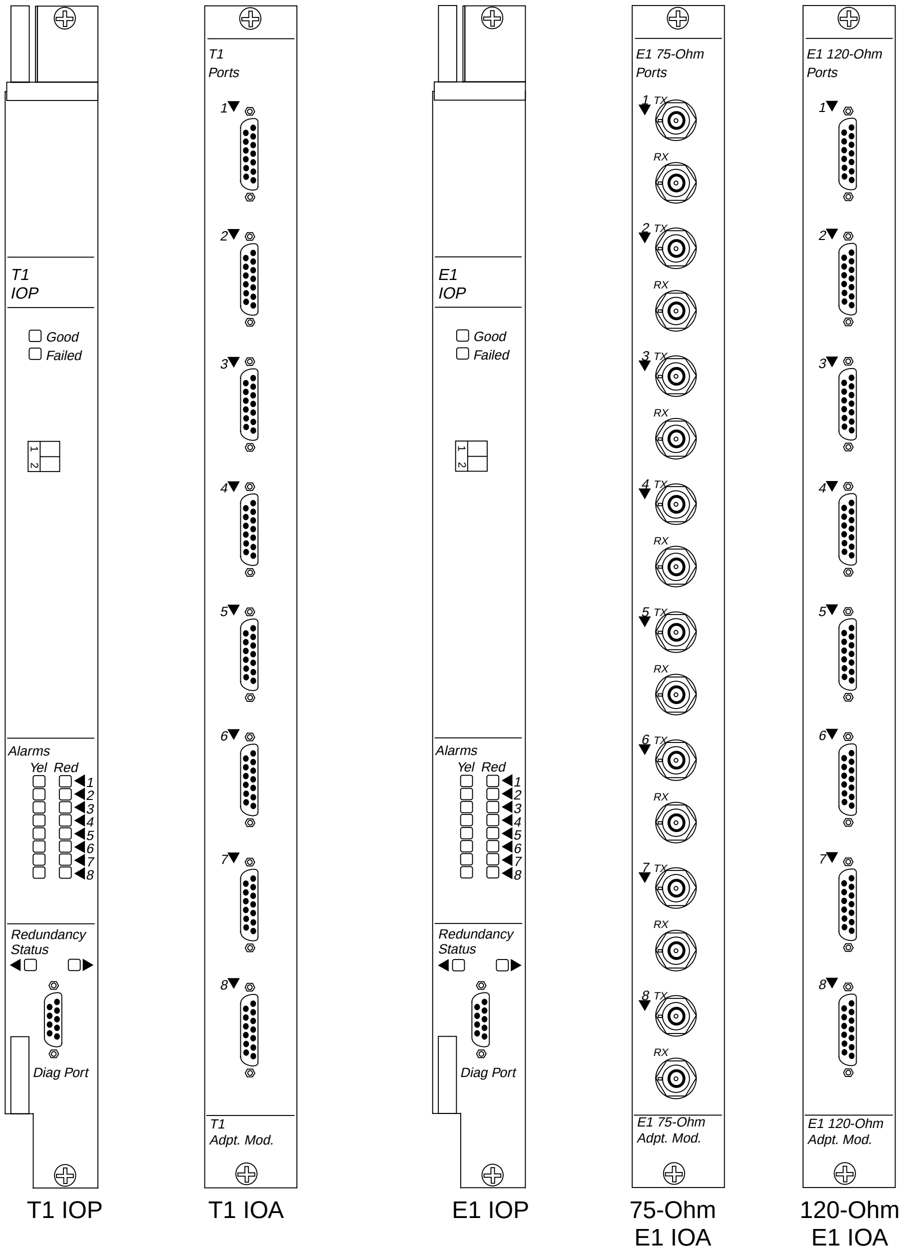


Figure 4-1. T1/E1 IOP and IOA Modules

8-Port DS3 and E3 ATM UNI Modules

The 8-port DS3 and E3 ATM UNI IOP modules enable the CBX 500 to provide trunk or user connections at data rates of 44.738 Mbps (DS3) and 34.368 Mbps (E3) at each of the eight ports. You can configure each port as one of the following:

- User-to-Network Interface (UNI)
- Interim Inter-Switch Signalling Protocol (IISP) connection
- Direct trunk
- OPTimum cell trunk

The 16-slot CBX 500 switch provides a maximum of 112 DS3 or E3 ports per switch. The port buffers (8K each), combined with the 128K programmable cell buffers in the switch processor (SP) quad-plane architecture, give the DS3/E3 module the flexibility, performance, and data integrity required for high-speed networking.

Features

The DS3/E3 ATM UNI IOP modules:

- Provides eight DS3 or E3 ATM connections at wire speed
- Supports ATM UNI 3.0/3.1 and ATM IISP 3.1 (also known as P-NNI Phase 0), Ascend direct trunking, and Ascend OPTimum cell trunking
- Supports all four ATM classes of service: constant bit rate (CBR), variable bit rate – real-time (VBR-RT), variable bit rate – non-real time (VBR-NRT), and available bit rate (ABR)
- Provides a programmable QoS scheduler
- Supports UNI 3.0/3.1 signalling, with high signalling throughput via an i960 signal processor
- Provides UNI 3.0/3.1 cell-bearing DS3 physical interfaces that support PLCP and direct (HEC) mapping modes of operation
- Supports 16,000 multicast source connections (global to switch)
- Supports 16,000 unicast connections (combined VCCs and VPCs) per module, with 2,000 connections per port
- Provides an 8K output cell buffer per port
- Supports path switching based on virtual path only

- Supports Extensive Operation and Maintenance (OAM) cell processing (F4, F5 flows, and fault management)
- Provides a wide range of MIB support (ILMI, AToM, and DS3)
- Provides ingress usage parameter control (UPC) for cell policing based on UNI 3.0/3.1 GCRA algorithm
- Provides guaranteed availability via 1 for 1 redundancy
- Supports egress traffic shaping
- Provides statistics collection on ATM and physical layers
- Provides internal, loop-timed, and system-timing transmit-clocking options
- Provides performance monitoring and reporting on a single unicast connection per port

Physical Layout

Figure 4-2 shows the DS3 and E3 IOP and IOA modules.

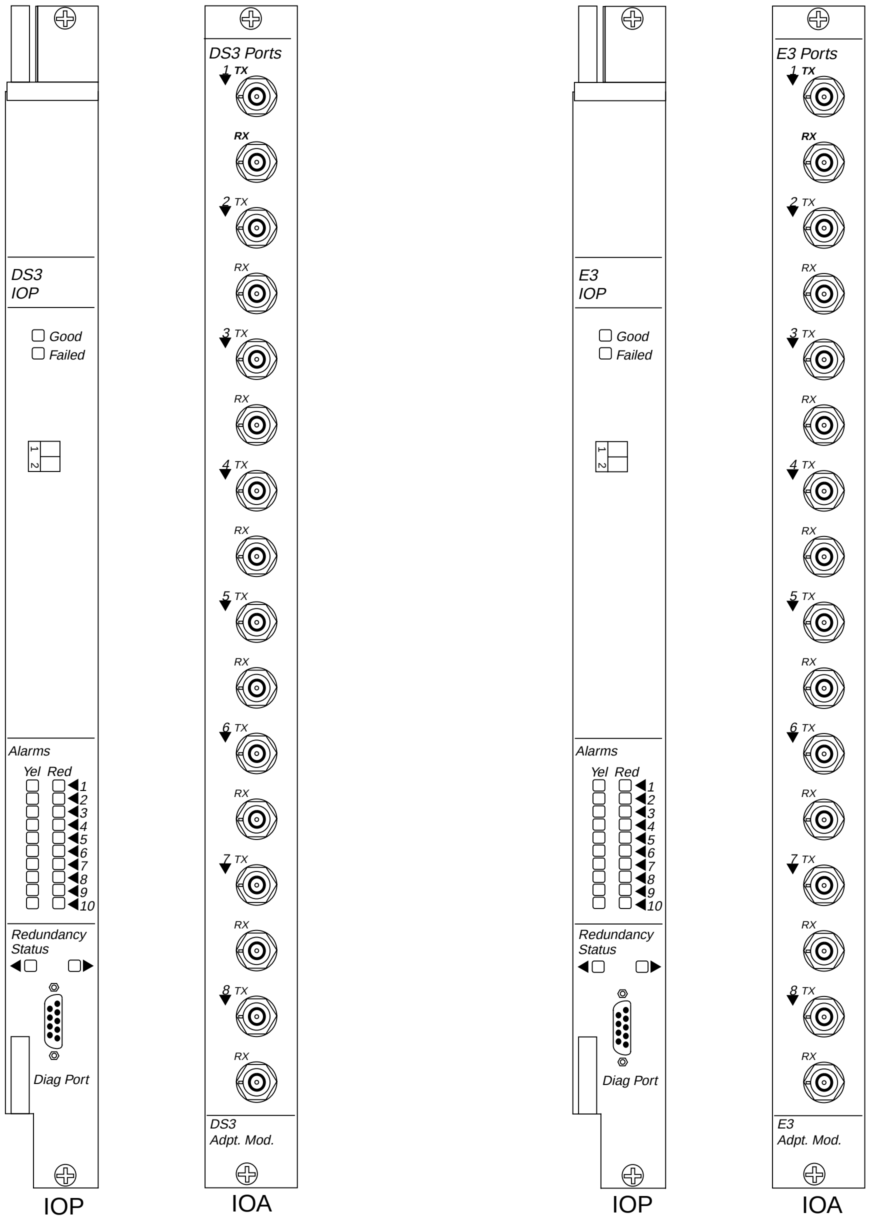


Figure 4-2. DS3/E3 IOP and IOA Modules

6-Port DS3 Frame/IP Module

The 6-port DS3 Frame/IP module enables the CBX 500 to operate as a multiservice switch by providing IP routing for cell-based IP traffic, Frame Relay switching, and Frame Relay-to-ATM interworking. In addition, the module works with IP Navigator™ to provide routing for the entire CBX 500 switch through a local IP forwarding engine on the module.

The DS3 Frame/IP module enables the CBX 500 to accept Frame Relay traffic at 44.736 Mbps at each port and provides line-speed packets at 128-byte frames. The CBX 500 16-slot modular architecture can support up to 84 DS3 Frame Relay ports per switch.

You can configure the following trunk interfaces on the 6-port DS3 Frame/IP module:

- Frame Relay UNI
- Frame Relay NNI
- IP
- ATM FUNI
- Ascend Direct or OPTimum trunk

Features

The DS3 Frame/IP IOP module:

- Provides clear channel DS3 Frame Relay switching and Frame Relay-to-ATM interworking (FRF.5 and FRF.8)
- Provides high-speed Frame Relay and IP services
- Provides C-bit parity format
- Provides support for Ascend's IP Navigator™, Priority Frame™, OPTimum trunking, virtual private networks (VPNs), and direct trunks to CBX 500 and B-STDX 9000 switches
- Provides support for Frame Relay Forum standards
- Provides integral CSU/DSU
- Provides extensive diagnostics including performance monitoring, link statistics, line, load, and diagnostic loopbacks

Physical Layout

Figure 4-3 shows the DS3 Frame/IP IOP and IOA modules.

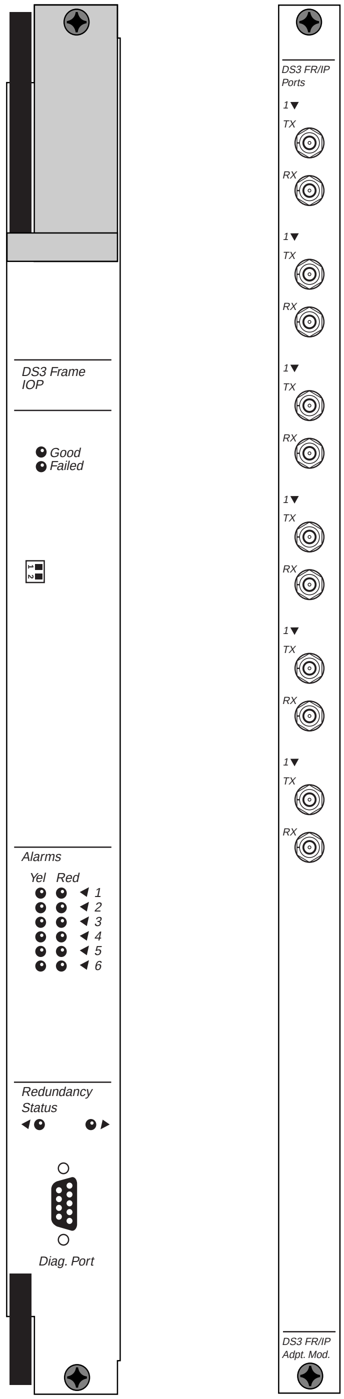


Figure 4-3. 6-Port Frame DS3 IOP and IOA Modules

4-Port ATM UNI OC-3c/STM-1 Module

The 4-port ATM UNI OC-3c/STM-1 IOP module provides four 155.52 Mbps interfaces for both optical and electrical connections. You can configure each port as one of the following:

- User-to-Network Interface (UNI)
- Interim Inter-switch Signalling Protocol (IISP) port
- Ascend direct trunk
- OPTimum cell trunk

The CBX 500 16-slot, modular architecture provides 56 OC-3c/STM-1 ports per switch. The OC-3c/STM-1 module comes with 24K cell buffers per port, enabling you to customize your network for specific traffic needs. The port buffers and the 128K cell buffers on the SP are based on the CBX 500 switch quad-plane architecture.

Features

The 4-port OC-3c/STM-1 IOP module:

- Provides four OC-3c/STM-1 ATM interfaces at 155.52 Mbps
- Supports automatic protection switching (APS) intracard port redundancy
- Provides 24K cell buffers per port
- Supports ATM UNI 3.0/3.1, IISP 3.1, Ascend direct trunks, and OPTimum cell trunks
- Supports the CBR, VBR-RT, VBR-NRT, and UBR Quality of Service (QoS) classes
- Supports UNI 3.0/3.1 signalling, with high-signalling throughput via state-of-the-art hardware switching
- Supports up to 16,000 virtual circuits (combined VCCs and VPCs) per IOP module
- Supports path switching based on virtual paths
- Supports up to 16,000 point-to-multipoint source connections per IOP module
- Supports extensive Operations and Management (OAM) cell processing (F4, F5 flows, and fault management)
- Provides a wide range of MIB support (ILMI, AToM, and SONET MIBs)

- Supports RFC 1595 provisioning and monitoring
- Provides ingress usage parameter control (UPC) for cell policing based on the UNI 3.0/3.1 generic cell rate algorithm (GCRA)
- Provides egress encapsulated forward congestion indicator (EFCI) marking
- Supports ITU G.703 interface with coded mark inversion (CMI) encoding/decoding (STM-1 electrical)
- Supports single-mode (medium- and long-reach) and multimode fiber-optic transceivers (optical)
- Supports diagnostics: internal, external, and line loopback

Physical Layout

Figure 4-4 shows the OC-3c/STM-1 IOP and IOA modules.

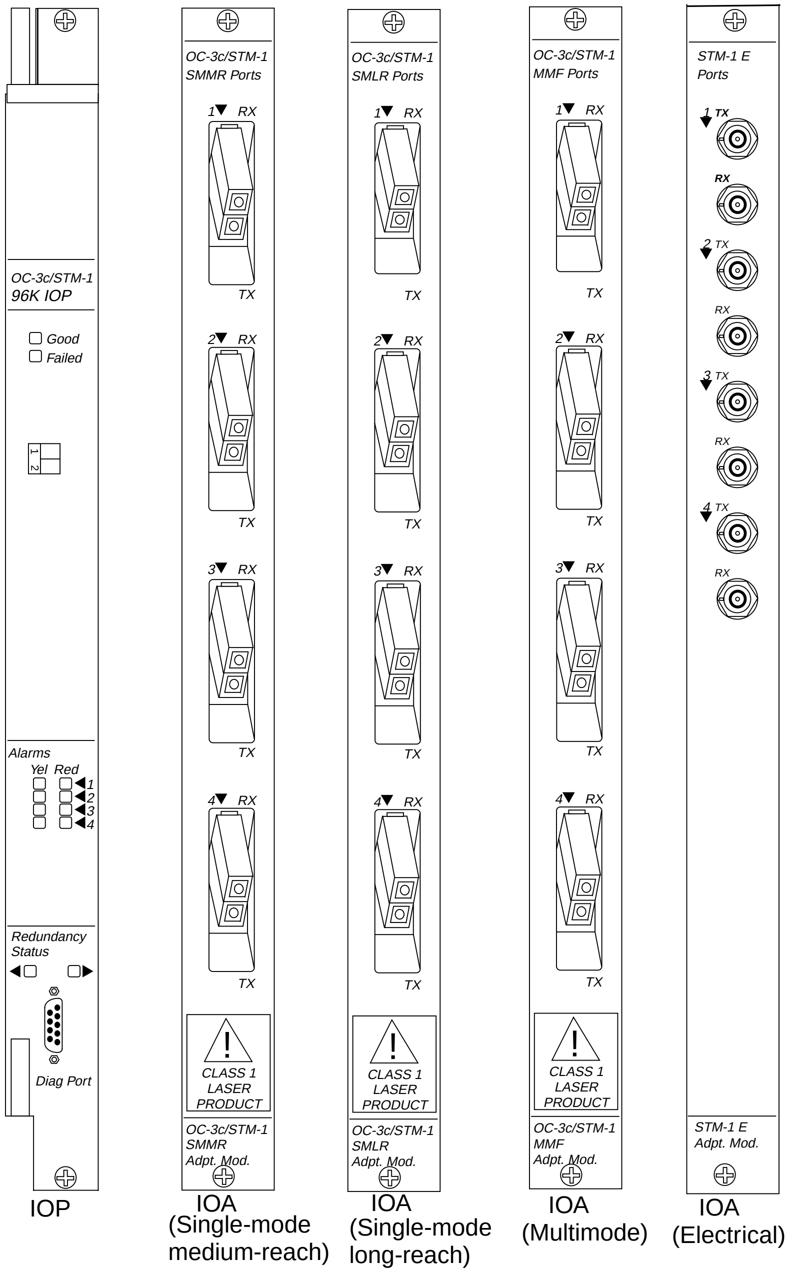


Figure 4-4. OC-3c/STM-1 IOP and IOA Modules

1-Port OC-12c/STM-4 Module

The 1-port OC-12c/STM-4 IOP module provides a high speed 622 Mbps interface for the CBX 500 switch. The port can be configured as a User-to-Network Interface (UNI), Interim Inter-switch Signalling Protocol (IISP) trunk, or Ascend trunk. With the CBX 500's 16-slot modular architecture, the CBX 500 can support up to 14 OC-12c/STM-4 ports per switch, with up to eight ports configured for full bandwidth.

The OC-12c/STM-4 IOP module has 12K cell buffers, enabling you to customize your network to specific traffic requirements. The port buffers and 128K cell buffers in the switch firmware are based on the CBX 500 quad-plane architecture.

Features

The 1-port OC-12c/STM-4 IOP module:

- Provides the OC-12c/STM-4 ATM interface at 622 Mbps
- Supports automatic protection switching (APS) intracard port redundancy
- Supports 12,000 cell buffers per module
- Supports ATM UNI 3.0/3.1, IISP, and Ascend trunks
- Supports the CBR, VBR-RT, VBR-NRT, and UBR Quality of Service (QoS) classes
- Provides UNI 3.0/3.1 signalling, with high signalling throughput via i960 signal processor
- Supports 16,000 virtual circuits (combined VCCs and VPCs) per IOP module
- Supports path switching based on virtual path
- Supports up to 16,000 multicast source connections per IOP module
- Supports extensive Operations and Management (OAM) cell processing (F4, F5 flows, and fault management)
- Provides a wide range of MIB support (ILMI, AToM, and SONET MIBs)
- Supports RFC 1595 performance monitoring
- Provides ingress usage parameter control (UPC) for cell policing based on the UNI 3.0/3.1 generic cell rate algorithm (GCRA)
- Supports FIFO threshold to handle ATMizer and high QoS traffic
- Provides egress encapsulated forward congestion indicator (EFCI) marking

- Provides available bit rate (ABR) processing subsystem hosting
- Provides single-mode, medium-reach fiber-optic transceiver
- Provides single-mode, long-reach fiber-optic transceiver (OC-12c)

Physical Layout

Figure 4-5 shows the OC-12c/STM-4 IOP and IOA Modules.

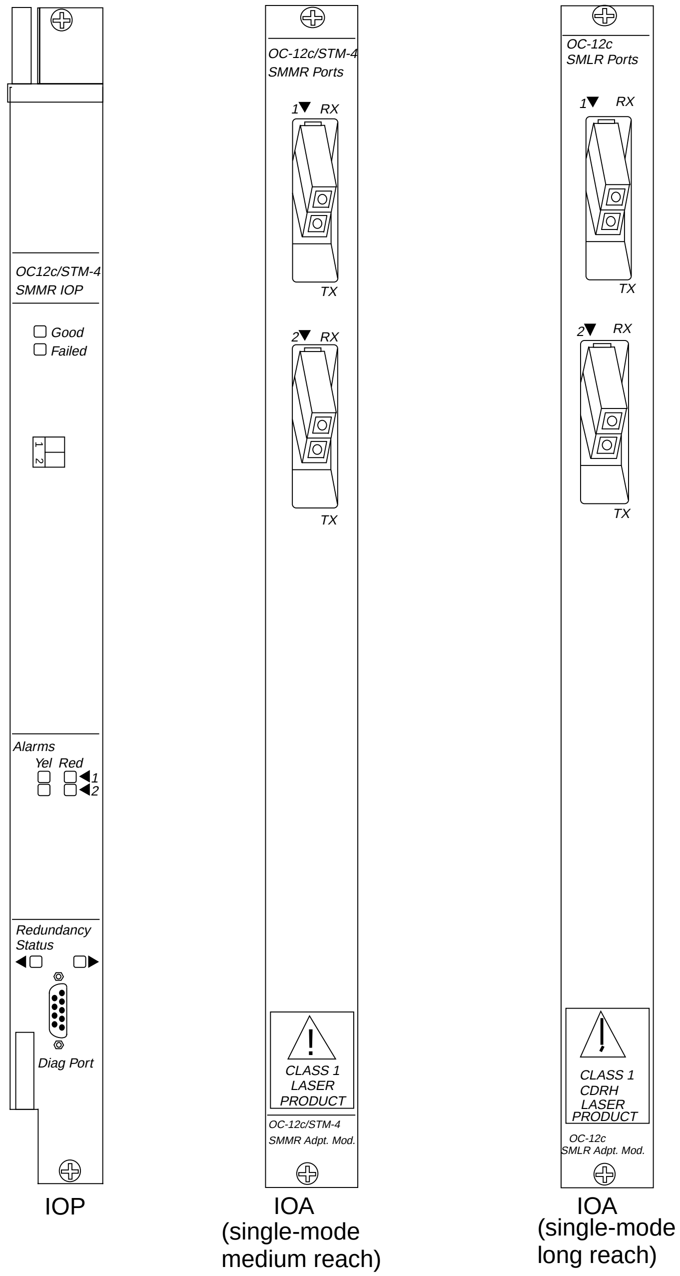


Figure 4-5. OC-12c/STM-4 IOP and IOA Modules

4-Port Ethernet Module

The 4-port Ethernet module provides high-speed Ethernet access to Ascend's switching platforms. When using IP Navigator software, the 10/100-Mbps Ethernet module provides IP forwarding and routing decisions for IP traffic arriving from common Ethernet ports on the same module, from any ATM port(s) on the same switch, or from any ATM Multipoint-to-Point Tunnel (MPT) in the network. CBX 500 IP routing tables are distributed to all modules performing IP routing. The Ethernet module also provides high-speed links to local Internet/Intranet hosting servers.

Features

The 4-port Ethernet I/O processor module provides or supports the following protocols:

- TCP
- UDP
- ICMP
- ARP
- INARP
- Telnet, TFTP, FTP
- SNMP
- OSPF
- RIP
- RIP 2
- BGP4
- Static routing
- Traffic and route filters
- IP QoS
- DVMRP
- MOSPF
- PIM
- IGMP

Physical Layout

Figure 4-6 shows the 4-port Ethernet IOP and IOA modules.

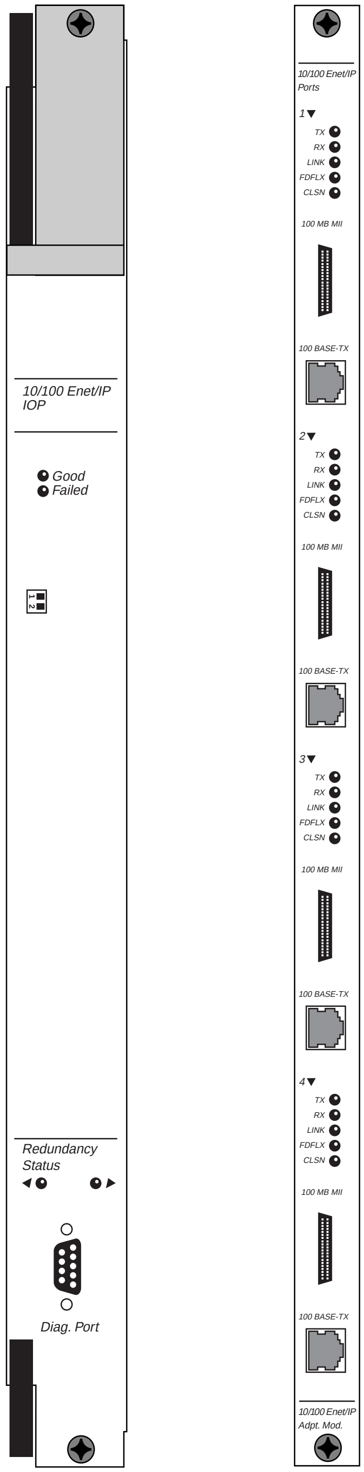


Figure 4-6. 4-Port Ethernet IOP and IOA Modules

5

GX Modules

This chapter describes the following modules, which are currently available for the GX 550 switch:

- OC3c/STM-1 Phy Module
- OC12c/STM4 Phy Module
- OC48/STM16 Phy Module

OC3c/STM-1 Phy Module

The OC-3c/STM-1 Phy Module provides the OC-3 physical interconnection of the GX 550 and the network, and provides the physical layer functions for SONET/SDH ATM applications.

In general, the Phy Module provides the physical media dependent (PMD) and Transmission Convergence (TC) sublayer functionality prior to the ATM layer processing performed by the BIO.

Features

The OC-3c/STM-1 Phy module:

- Provides ATM Transmission Convergence Layer support
- Provides physical layer alarms
- Provides timing sub-system, clock (and data) recovery and synthesis
- Provides our ports of OC-3c/STM-1 (155.52 Mbps) traffic
- Supports SONET/SDH framing (SONET (Bellcore GR-253-CORE) framing for OC-3c, SDH (ITU G.707) for STM-1)
- Provides optic options for Multimode (LED) transceivers for up to 2km
- Optic options for Singlemode (Laser, 1310nm) transceivers for 15km and 40km
- Supports SC-type optical connectors
- Provides IEC825 and FDA Class 1 Laser Safe Optics (Lasers)
- Supports APS Linear 1+1 redundancy
- Supports SONET/SDH Physical Level Performance Monitoring support based on ANSI T1.231
- Supports SONET/SDH payload scrambling
- Provides ATM Physical level support from ATM MIB
- Provides complete conformance to ATM Forum's ATM UNI v3.1 for OC-3 UNI
- Provides system (External, Port, Internal), Local, and Loop Timing modes
- Provides hot insert capability

Physical Layout

Figure 5-1 shows the physical layout of the OC3c/STM1 Phy module.

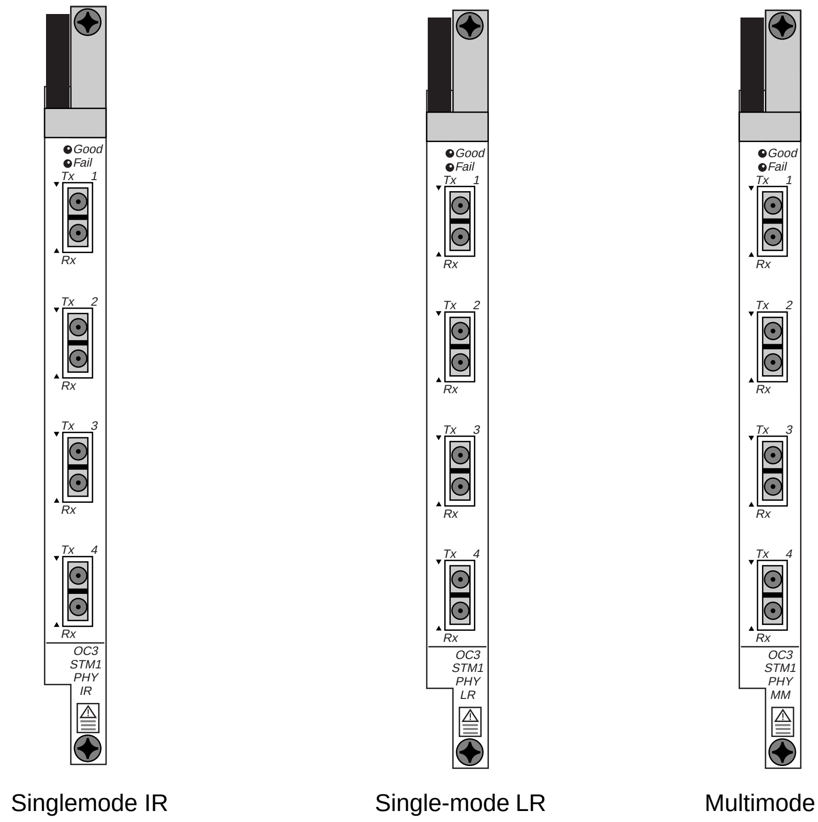


Figure 5-1. OC3c/STM1 Phy Module

OC12c/STM4 Phy Module

The OC-12c/STM-4 Phy Module provides the OC-12 physical interconnection of the GX 550 and the network, and provides the physical layer functions for SONET/SDH ATM applications.

In general, the Phy Module provides the PMD and TC sublayer functionality prior to the ATM layer processing performed by the BIO.

Features

The OC-12c/STM-4 Phy module:

- Provides ATM Transmission Convergence Layer support
- Supports physical layer alarms
- Single port of OC-12c/STM-4 (622.08 Mbps) traffic
- Supports SONET/SDH framing (SONET (Bellcore GR-253) framing for OC-12c, SDH (ITU G.707) for STM-4)
- Provides optic options for multimode (LED) transceivers for up to 500m
- Provides optic options for singlemode (Laser, 1310nm) transceivers for 15km and 40 km
- Provides SC-type optical connectors
- Provides IEC825 and FDA Class 1 Laser Safe Optics (Lasers)
- Supports APS Linear 1+1 redundancy
- Provides SONET/SDH Physical Level Performance Monitoring support based on ANSI T1.231
- Supports SONET/SDH scrambling
- Provides ATM Physical level support from ATM MIB
- Provides complete conformance to ATM Forum's ATM UNI v3.1 for OC-12 UNI
- Provides system (External, Port, Internal), Local, and Loop Timing modes
- Supports facility and diagnostic loopbacks
- Supports hot insert capability

Physical Layout

Figure 5-2 shows the physical layout of the OC12c/STM4 Phy module.

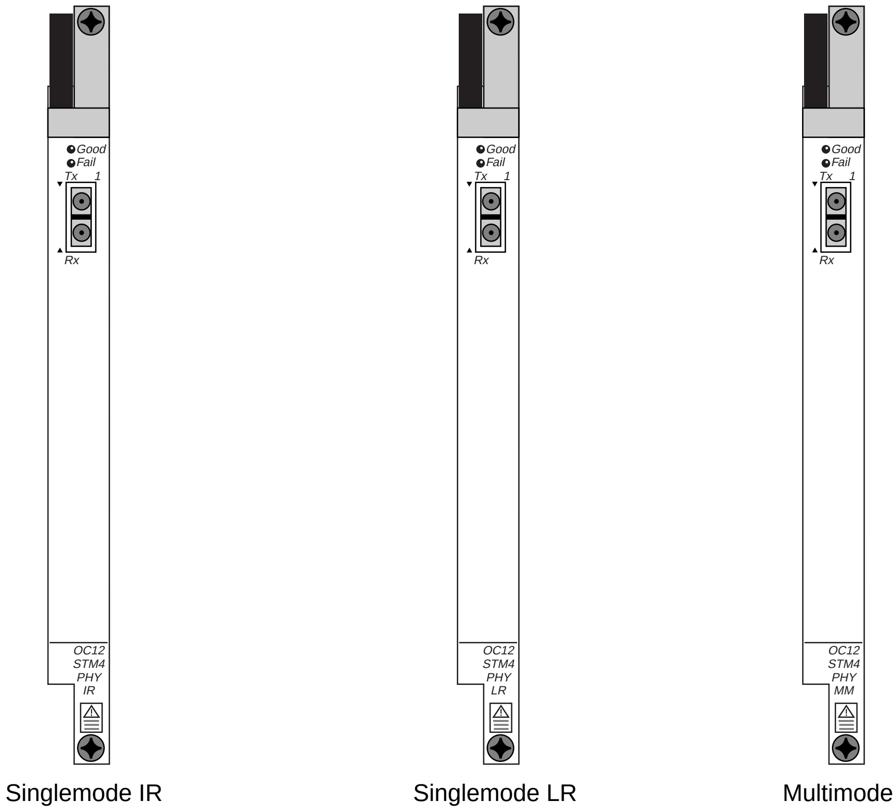


Figure 5-2. OC12c/STM4 Phy Module

OC48/STM16 Phy Module

> Please contact your Sales Representative regarding the availability of the OC48 Phy module.

The OC-48/STM-16 Phy Module provides the OC-48 physical interconnection of the GX 550 and the network, and provides the physical layer functions for SONET/SDH ATM applications.

In general, the Phy Module provides the PMD and TC sublayer functionality prior to the ATM layer processing performed by the BIO.

Features

The OC-48/STM-16 Phy module:

- Provides PMD Lasers (Optics)
- Supports SONET/SDH framing
- Provides SONET/SDH 2.488 Gbps compliant interface for multiplexed OC-12c/STM-4 ATM
- Provides ATM Transmission Convergence Layer
- Supports physical layer alarms and Performance monitoring
- Provides single port of OC-48/STM-16 (2.488 Gbps) traffic
- Supports SONET (Bellcore GR-253) framing for OC-48, SDH (ITU G.707) for STM-16
- Supports SONET/SDH section processing
- Supports SONET Intermediate-level multiplexing/demultiplexing for OC-12c/STM-4 ATM into a STS48/STM-16 data stream
- Provides optic options for singlemode (Laser, 1310nm) transceivers for 15km
- Provides SC-type optical connectors
- Provides IEC825 and FDA Class 1 Laser Safe Optics (Lasers)
- Supports APS Linear 1+1 redundancy
- Provides SONET/SDH Physical Level Performance Monitoring support based on ANSI T1.231

- Supports SONET/SDH scrambling
- Provides ATM Physical level support from ATM MIB for individual 622Mb/s tributaries
- Provides complete conformance to ATM Forum's ATM UNI v3.1 for UNI for STS12c
- Provides system (External, Port, Internal), Local, and Loop Timing modes
- Supports facility and diagnostic loopbacks
- Supports hot insert capability

Physical Layout

Figure 5-3 shows the physical layout of the OC48/STM16 Phy module.

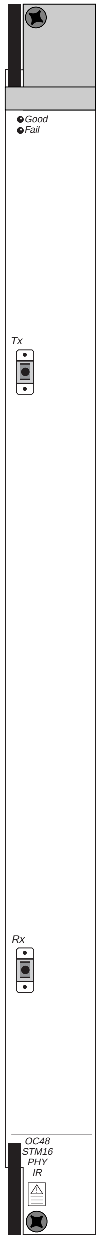


Figure 5-3. OC48/STM16 Phy Module

6

Configuring Processor Modules

This chapter describes how to configure processor modules and set their associated card attributes. Processor modules provide system-level control and management functions for the switch. Table 6-1 lists the processor modules by switch platform.

Table 6-1. Processor Modules by Switch Platform

Switch Type	Processor Module
STDX 6000	Packet Processor (PP) ***Note****: You do not configure PP modules.*
B-STDX 8000/9000	Control Processor (CP)
CBX 500	Switch Processor (SP)
GX 550	Node Processor (NP)

For configuration instructions, see the following sections:

- “Configuring CP Modules” on page 6-2
- “Configuring SP Modules” on page 6-5
- “Configuring NP Modules” on page 6-9

Configuring CP Modules

When you first install a B-STDX 8000/9000 switch, you must configure the CP module in NavisCore.

To configure the CP module:

1. On the network map, select the switch object.

> If you are not logged on, select a switch object and select NavisCore ⇒ Logon from the Misc menu. Enter your operator password.

2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box (Figure 6-1) appears, showing the back panel of the selected switch.

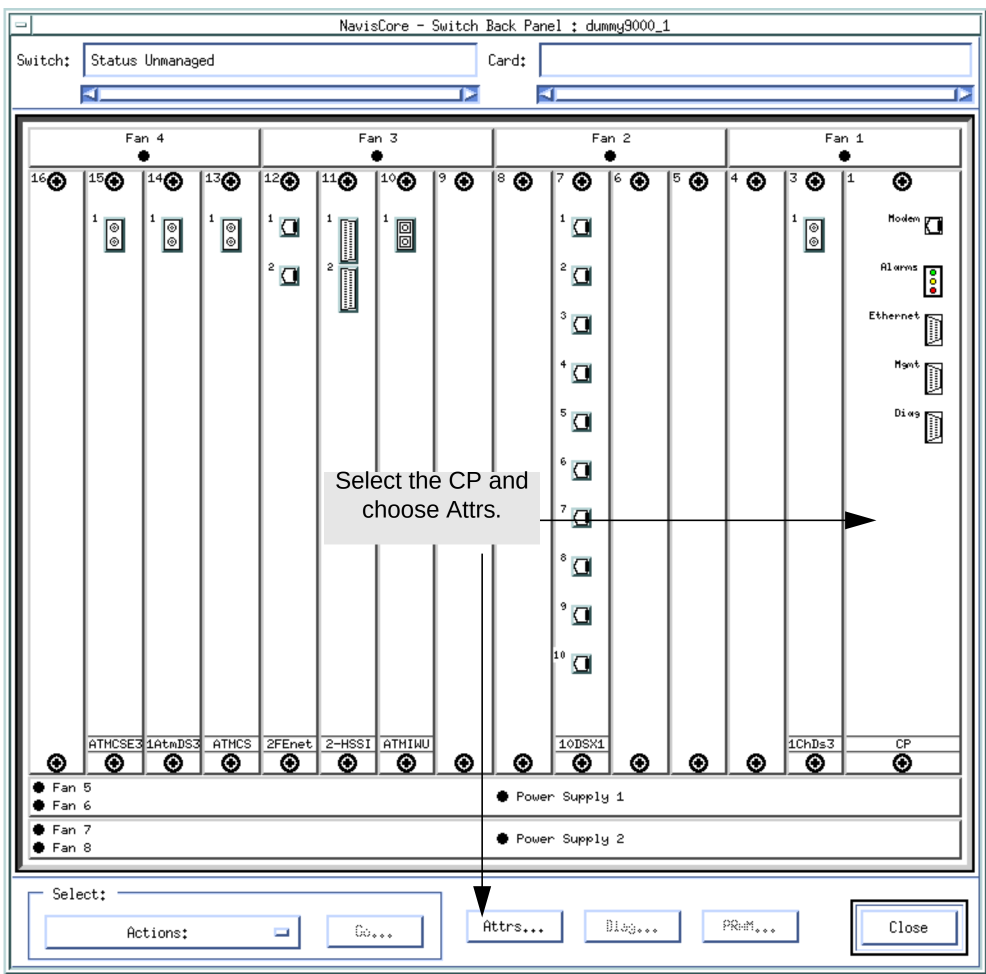


Figure 6-1. Switch Back Panel Dialog Box (B-STDX)

> ▶ Slots 1 and 2 are reserved for the main control processor (CP) module and the optional redundant CP. Slot 1 is always configured with the main CP module.

3. Select the CP module (slot) you want to configure and choose Attrs. The Set Card Attributes dialog box appears as shown in Figure 6-2.

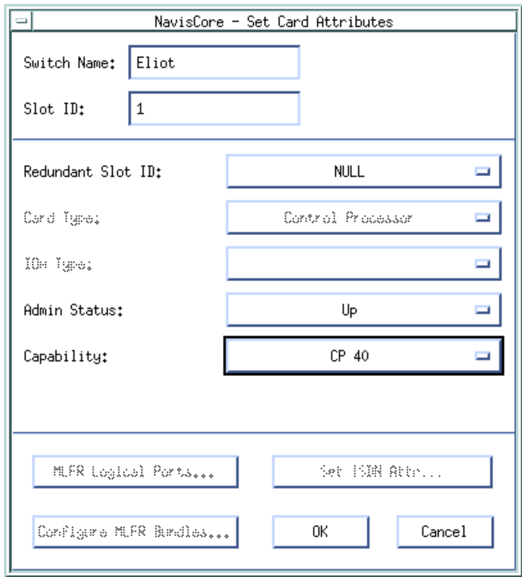


Figure 6-2. Set Card Attributes Dialog Box

4. Complete the required dialog box fields described in Table 6-2.

Table 6-2. Set Card (CP Card) Attributes Fields and Buttons

Field	Action/Description
Redundant Slot ID (*Optional*)	Select the Redundant Slot ID 2. You must always configure the main CP in Slot 1. The default, NULL, indicates there is no redundant CP module installed. ***Note:*** *To switch to a redundant CP, see "Switching to a Redundant Unit" on page 7-34.*
Card Type	This read-only field automatically defaults to Control Processor.

Table 6-2. Set Card (CP Card) Attributes Fields and Buttons (Continued)

Field	Action/Description
Admin Status	Set this field as follows: *Up (default)* – This CP becomes fully operational when you start the switch. *Down* – This CP does not come online when you start the switch. This setting saves the configuration in the database but does not download it to the switch. Use this option when you run foreground diagnostics.
Capability	Set this field as follows: *CP Basic* – This CP module has a black dip switch located on the front panel. It is often used in both the B-STDX 8000 and 9000 models. *CP Plus* – This CP module has a red dip switch located on the front panel. It has more memory than the CP Basic and can be used in either B-STDX model. This CP type is required for the SMDS Billing application. ***Note****: If you do not know the CP type and cannot physically view it, you can use the* **`show card`** *or* **`show system`** *console commands to retrieve this information. See the* NavisCore Console Command Reference Guide *for a list of console commands.* The CP 30, 40, and 50 use a 260 or 520 MB internal disk, and each CP supports a different amount of memory. For switch code versions 4.2 and higher, set this field as follows. For more information on installing these CP cards, see the *B-STDX 8000/9000 Hardware Installation Guide*. *CP 30* – This CP module replaces the CP Basic and has 16 MB IRAM. *CP 40* – This CP module replaces the CP Plus and has 64 MB memory for IP switching. *CP 50* – This CP module replaces the CP Plus and has 128 MB memory for IP routing.

5. Choose OK. The Switch Back Panel dialog box reappears, displaying the configured CP module.

If you selected a redundant configuration, the two slots appear as a single configuration that occupies the space of two slots. (To determine which is the active module, click on the slot ID; the status line at the top of the dialog box indicates the active module.)

Configuring SP Modules

When you configure an SP module, you specify the following attributes:

- Redundant or non-redundant SP configuration
- The model type: SP10, SP20, SP30, SP40. These modules differ according to memory and timing module specifications.
- SP admin status
- System-timing parameters

To configure SP attributes:

1. On the network map, select a CBX 500 switch object.

2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters to access the Switch Back Panel dialog box.

The Switch Back Panel dialog box (Figure 6-3) appears, showing the back panel of the selected switch.

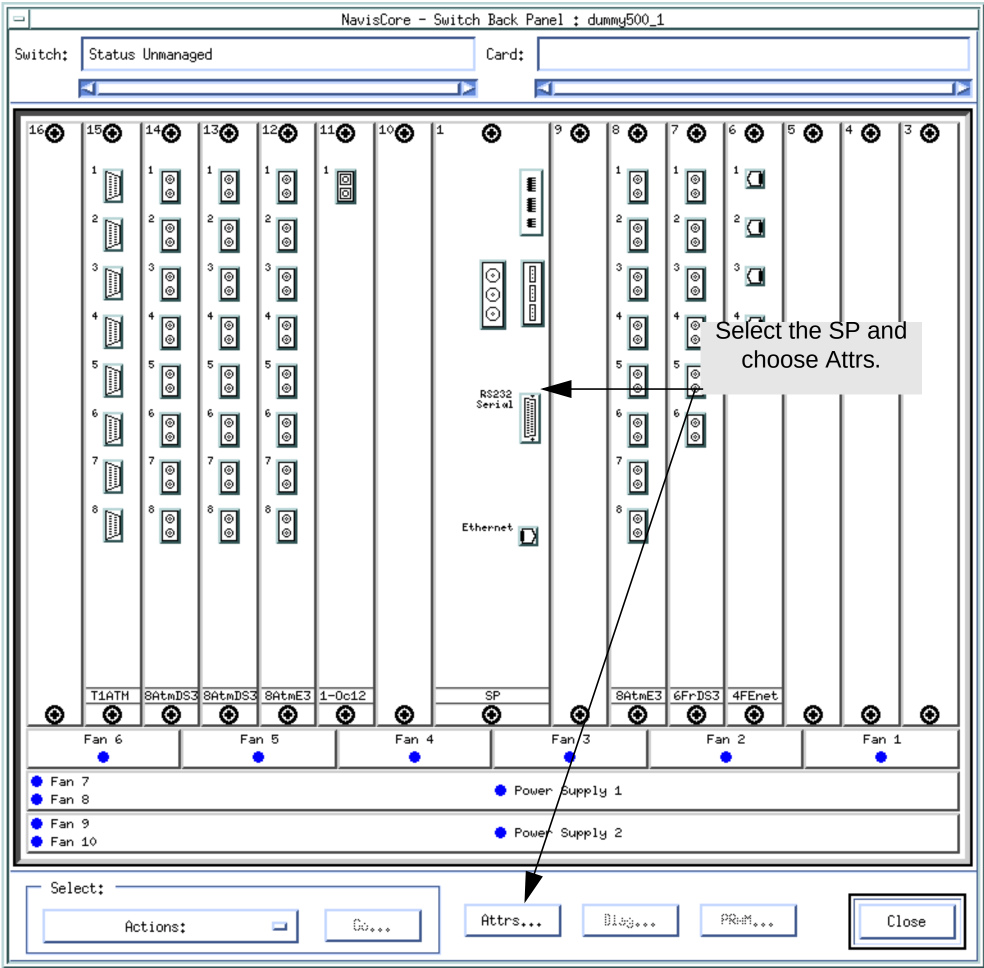


Figure 6-3. Switch Backpanel (CBX)

3. Select the SP module (middle slot) and choose Attrs.

The Set Card Attributes dialog box (Figure 6-4) appears.

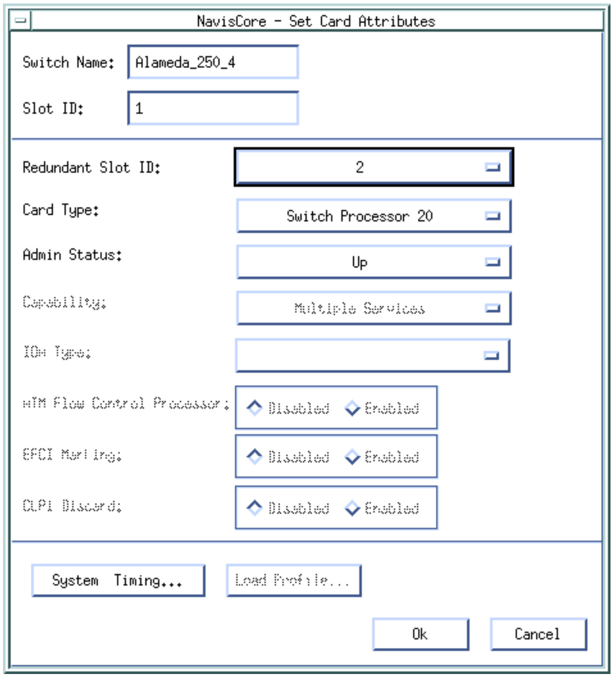


Figure 6-4. Set Card [SP] Attributes Dialog Box

4. Complete the dialog box fields as described in Table 6-3.

Table 6-3. Set Card [SP] Attributes Fields and Buttons

Field	Action/Description
Redundant Slot ID	Select NULL if you have a non-redundant SP configuration. Select 2 if you have a redundant SP installed in the switch.
Card Type	Select one of the following: *Switch Processor 10* – Model 10 *Switch Processor 20* – Model 20 *Switch Processor 30* – Model 30 has Stratum 3 holdover capability. *Switch Processor 40* – Model 40 has Stratum 3 holdover capability and 128 MB memory for IP switching. ***Note**: The Stratum 3 holdover capability enables the switch to continue to provide system timing even after a selected timing source fails.*
Admin Status	Select one of the following: *Up (Default)* – The SP module becomes fully operational when you start the switch. To become operational, the module gets its application code from the PCMCIA hard drive card, which resides in the SPA module. *Down* – The SP module does not come on-line when you start the switch. The configuration is saved in the switch configuration table, but is not downloaded to the switch. Use this option when running foreground diagnostics. *Maintenance* – The SP module does not receive the application code when you start the switch. A module in this state runs only from boot code. This setting enables you to reset PRAM for a module that is failing to boot due to invalid PRAM. You can also use this option to troubleshoot a possible hardware problem.

5. After you set the SP module attributes, define the clock source:
   - To use either of the external clock sources or the internal clock as the switch clock source, define the switch clock sources and clock source priorities now. See "Defining System Timing" on page 6-13 for more information.
   - To use an I/O module's clock source as the switch clock source, you must configure one of the IOM's physical ports as a clock source for the switch. See the section in Chapter 9 that corresponds to the physical port type you are using.

Configuring NP Modules

When you configure an NP module, you specify the following:

- Redundancy for the node processor (NP), switching fabric (SF), and timing modules (TM)
- The NP administrative status
- The operational status of the switching fabric and timing modules

To configure NP attributes:

1. On the network map, select a GX 550 switch object.
2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters to access the Switch Back Panel dialog box (Figure 6-5).

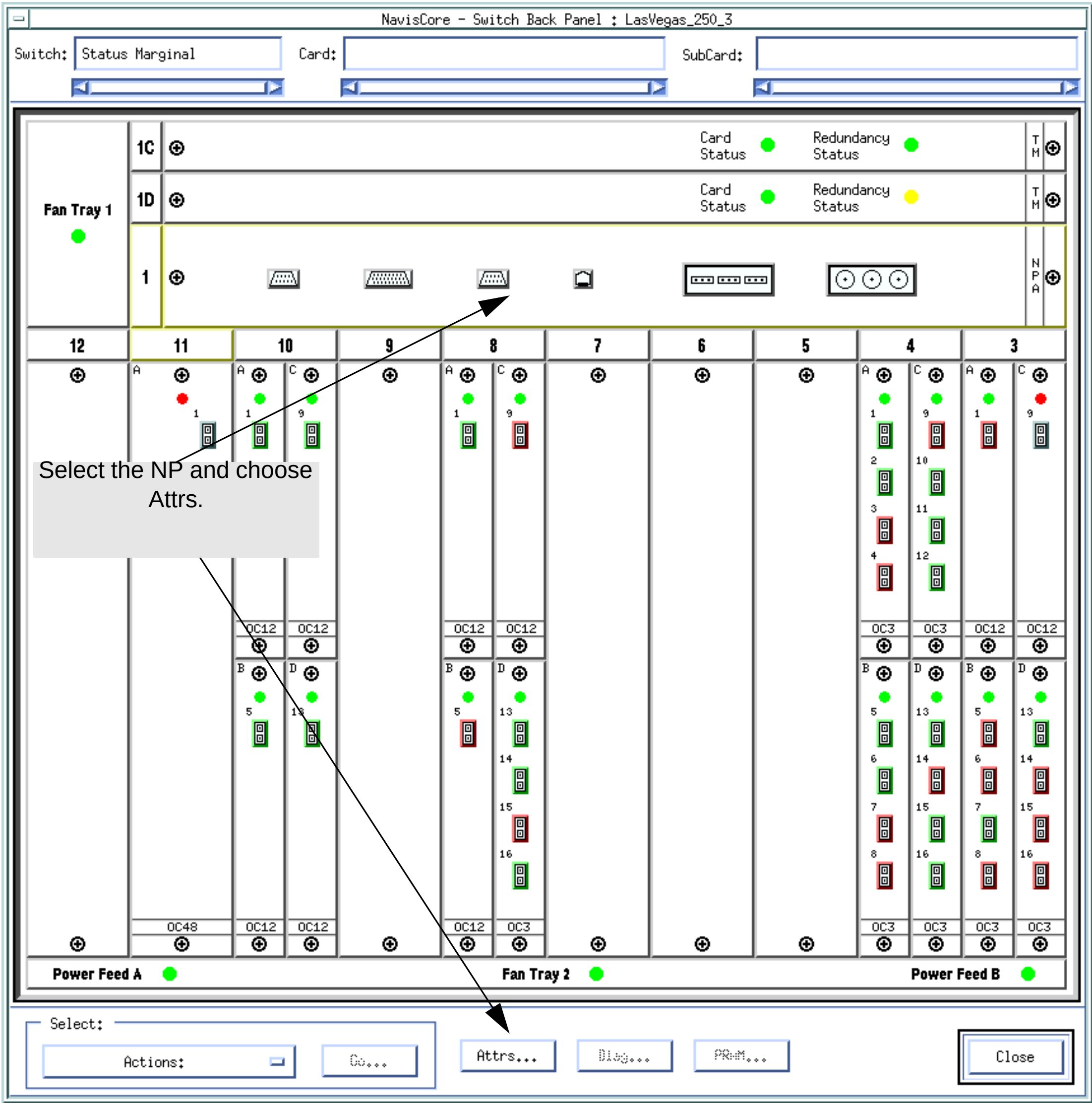


Figure 6-5. GX 550 Switch Back Panel Dialog Box

3. Select the NP module and choose Attrs. The Set Card Attributes dialog box (Figure 6-6)appears.

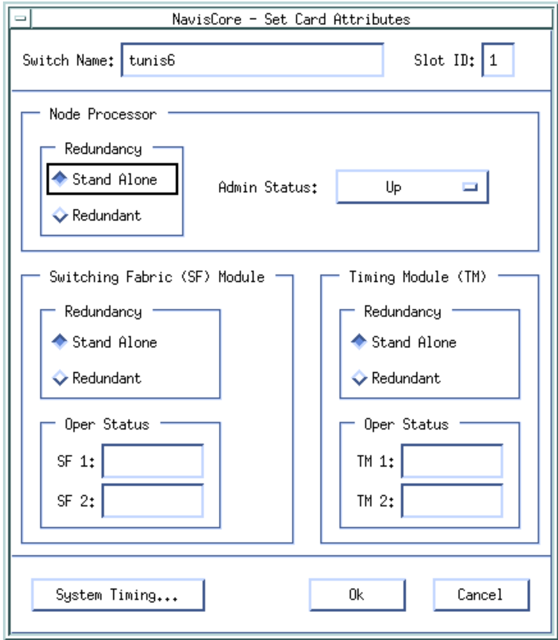


Figure 6-6. Set Card Attributes (NP)

4. Complete the dialog box fields described in Table 6-3.

Table 6-4. Set Card [NP] Attributes Fields and Buttons

Field	Action/Description
Node Processor	
Redundancy	Select Stand Alone if you have a non-redundant NP configuration. Select Redundant if you have a redundant NP installed in the switch.
Admin Status	Select one of the following: *Up (Default)* – The NP module becomes fully operational when you start the switch. To become operational, the module gets its application code from the NP disk drive. *Down* – The NP module does not come online when you start the switch. The configuration is saved in the switch configuration table, but is not downloaded to the switch. Use this option when running foreground diagnostics. *Maintenance* – The NP module does not receive the application code when you start the switch. A module in this state runs only from boot code. This setting enables you to reset PRAM for a module that is failing to boot due to invalid PRAM. You can also use this option to troubleshoot a possible hardware problem.

Table 6-4. Set Card [NP] Attributes Fields and Buttons (Continued)

Field	Action/Description
Switching Fabric (SF) Module	
Redundancy	Select Stand Alone if you have a non-redundant SF configuration. Select Redundant if you have a redundant SF installed in the switch.
Oper Status	Displays the operational status of each SF module (SF1 and SF2) installed in the GX switch.
Timing Module (TM)	
Redundancy	Select Stand Alone if you have a non-redundant TM configuration. Select Redundant if you have a redundant TM installed in the switch.
Oper Status	Displays the operational status of each TM module (TM1 and TM2) installed in the GX switch.

5. After you set the NP module attributes, define the clock source:

- To use a BIO's clock source as the switch clock source, you must configure one of the BIO's physical ports as a clock source for the switch. Choose OK and see the section in Chapter 9 that corresponds to the selected physical port type you are using as clock source.
- To use either of the external clock sources or the internal clock as the switch clock source, define the switch clock sources and clock source priorities now. See the following section, "Defining System Timing" for information.

Defining System Timing

The SP/NP System Timing function enables you to:

- Specify the primary and secondary clock sources for the switch.
- Specify whether or not the switch clock source reverts from secondary back to primary in situations where the primary clock becomes unavailable, forcing the switch to get its timing from the secondary clock source.
- Enable or disable the external clock output.
- Specify the external line build-out of the external clock output.
- Manually select the active system-timing clock.
- Configure an SP/NP for international use.

To monitor the configured system timing options and operating states, see the *NavisCore Diagnostic and Troubleshooting Guide*.

To define System Timing parameters:

1. From the Set Card Attributes dialog box for the SP/NP module, choose the System Timing button. The Set System Timing dialog box (Figure 6-7) appears .

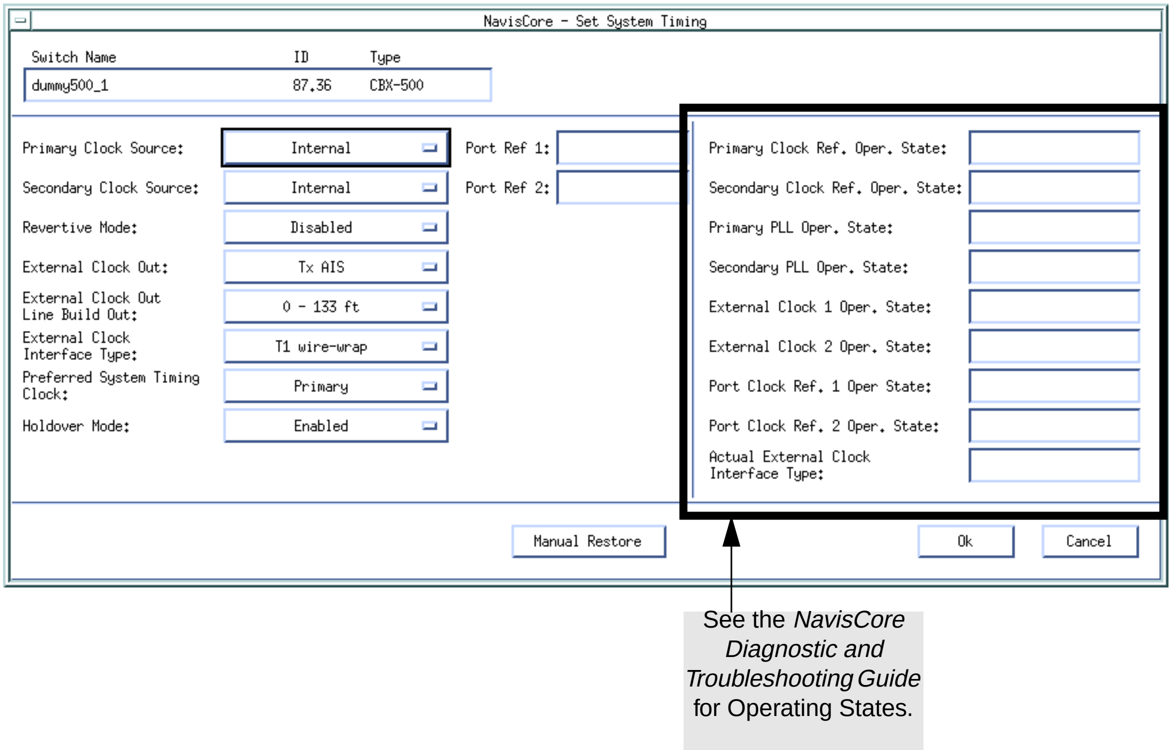


Figure 6-7. Set System Timing Dialog Box

2. Complete the dialog box fields described in Table 6-5. When you finish, choose OK to apply these settings.

Table 6-5. Set System Timing Fields and Buttons

Field	Action/Description
Primary/Secondary Clock Source	Select a different option for both the Primary and Secondary clock sources. If the Primary source becomes unavailable, the Secondary source automatically takes control of system timing. Options include: *Internal* (default) – The switch uses the Stratum 3 clock on the SP/NP module as the primary (or secondary) clock source. *External Clock 1* – To use this option, you must connect an external clock source to the *primary external clock* connection on the SPA/NPA module (see your switch hardware installation guide for connection instructions). This connection is labeled "In 1." The switch uses this external clock as the primary (or secondary) system timing source. *External Clock 2* – To use this option, you must connect an external clock source to the *secondary external clock* connection on the SPA/NPA module (see your switch hardware installation guide for connection instructions). This connection is labeled "In 2." The switch uses this external clock as the primary (or secondary) system timing source. *Port Reference 1* – To use this option, first configure one of the physical ports on the switch as the Primary System Clock Source (see Table 9-3 on page 9-6). The switch uses the incoming clock signal on the selected physical port as the primary (or secondary) system timing source. *Port Reference 2* – To use this option, first configure one of the physical ports on the switch as the Secondary System Clock Source (see Table 9-3 on page 9-6). The switch uses the incoming clock signal on the selected physical port as the primary (or secondary) system timing source.
Revertive Mode	Select one of the following options: *Enabled* – If the switch loses the primary clock source, causing the secondary clock source to take over system timing, the system automatically reverts back to the primary clock source when it becomes available. *Disabled* (default) – If the switch loses the primary clock source, the secondary clock source takes over system timing. However, the system will not automatically revert back to the primary clock source once it is restored. ***Note:*** *If you disable Revertive Mode, use the Manual Restore command on the Set System Timing dialog box to revert back to the primary clock source.*

Table 6-5. Set System Timing Fields and Buttons (Continued)

Field	Action/Description
External Clock Out	Select one of the following options: *Tx AIS* (default) – In the event of system clock loss, the external clock output transmits an AIS signal. *Primary* – The external clock output references the clock that the switch uses as the primary source. *Secondary (SP10 and SP20 only)*– The external clock output references the clock that the switch uses as the secondary source. *Loopback ext1* – The clock that is wired to the external clock input #1 on the SPA/NPA module is fed directly to the external clock output jack.
External Clock Out Line Build Out	If the External Clock Interface Type is T1 wire-wrap, select a value for the External Clock Out Line Build Out field that matches the distance from the external clocking device. The default is 0 – 133 ft.
External Clock Interface Type	Select one of the following options: *T1 wire-wrap* (default) – The SP/NP accepts T1 timing inputs and provides T1 timing outputs. The signalling is D4 framed. *E1 BNC* – The SP/NP accepts E1 timing inputs and provides E1 timing outputs.
Preferred System Timing Clock	Select one of the following options: *Primary* – The switch uses the clock source specified in the Primary Clock Source field. *Secondary (SP10 and SP20 only)* – The switch uses the clock source specified in the Secondary Clock Source field. ***Note:*** *If the primary clock source becomes unavailable, the system automatically provides the secondary clock source to the I/O modules.*
Holdover Mode	Enables Stratum 3 system timing support. If you enable holdover mode, the system can continue to synchronize from a failed clock until a valid clock can be re-established. This feature provides an enhanced clock state controller for both primary and secondary clock recovery.
Port Ref. 1/ Port Ref.2	Displays the location of the port reference on the switch (port # and slot ID).

7

Configuring I/O Modules

This chapter describes how to configure each I/O module installed in an STDX, B-STDX, CBX, or GX switch. For each module, you can also configure parameters that determine clock source and clock rate.

See the following sections:

Configuring STDX I/O Modules

To configure I/O modules for an STDX:

1. On the network map, select the switch object and from the Misc menu, select NavisCore ⇒ Logon. Enter your operator password.
2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box (Figure 7-1) appears.

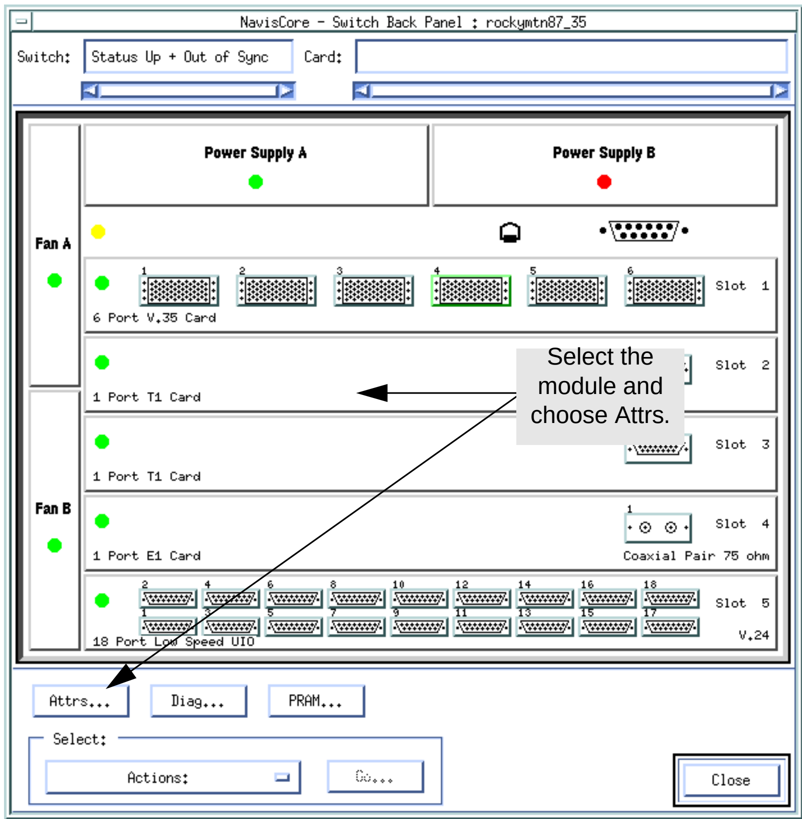


Figure 7-1. STDX Backpanel

3. Select the I/O module you want to configure and choose Attrs. Note that the top slot is reserved for the Packet Processor (PP) module.

The Set Card Attributes dialog box (Figure 7-2) appears, displaying the switch name and slot ID.

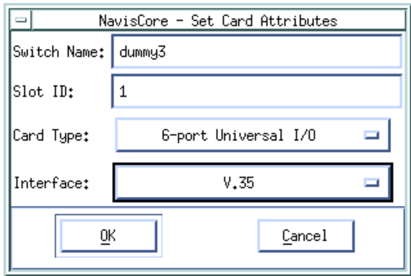


Figure 7-2. Set Card Attributes Dialog Box

4. Complete the dialog box fields described in Table 7-1.

Table 7-1. Set Card Attributes Fields and Buttons (STDX 6000)

Field	Action/Description
Card Type	Select the type of I/O module installed in this slot.
Interface	Select the interface for the module. For 1-port 30 channelized E1 modules — Select either coaxial pair 75 ohm or DB15 120 ohm. For 6-port Universal I/O modules — Select V.35, EIA 449, X.21, EIA 530, or EIA 530A. For 8/18 port Universal I/O modules — Select either V.24 or X.21.

5. Choose OK. The Switch Back Panel dialog box reappears, displaying the configured I/O module.
6. Repeat Step 3 through Step 5 until you have defined all I/O modules for the selected switch.

   After you configure the I/O modules, you can define their physical port parameters. See Chapter 8, "Configuring STDX/B-STDX Physical Ports."

Configuring B-STDX I/O Modules

To configure I/O modules for a B-STDX switch:

1. On the network map, select the switch object and from the Misc menu, select NavisCore ⇒ Logon. Enter your operator password.
2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box (Figure 7-3)appears.

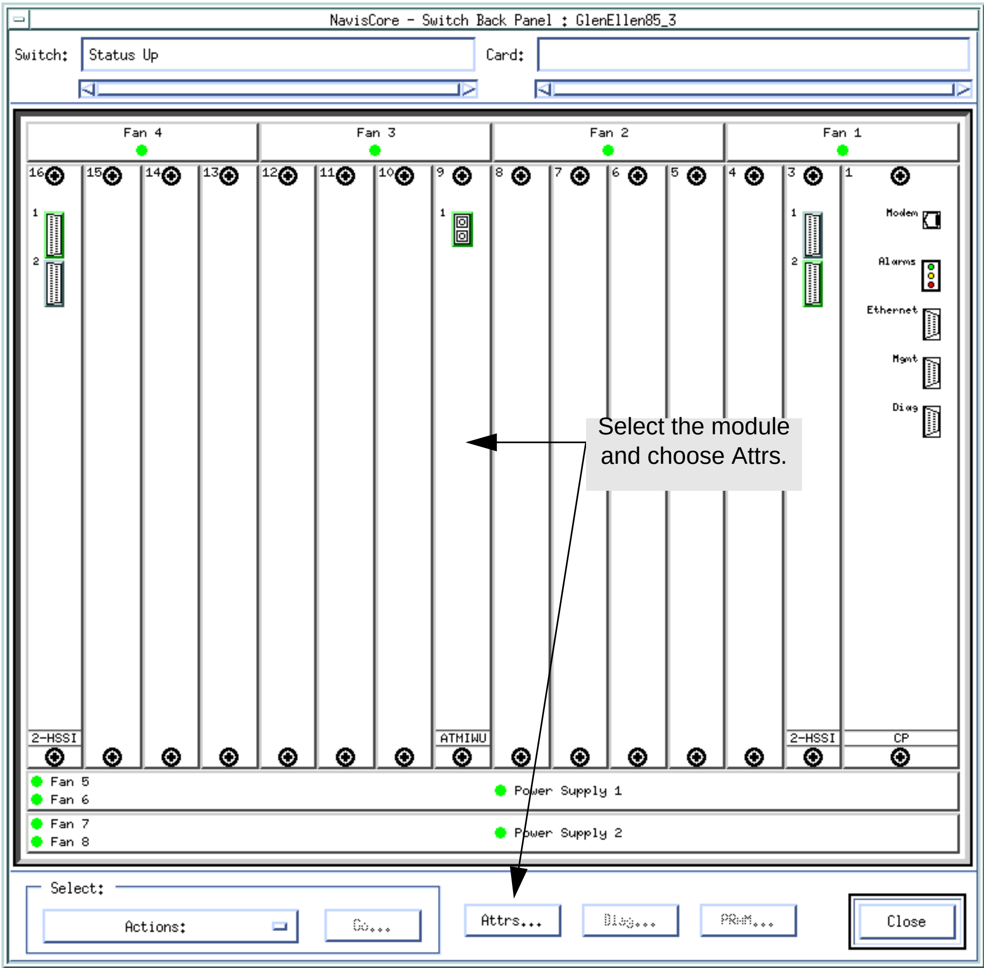


Figure 7-3. Switch Back Panel Dialog Box (B-STDX 9000)

See the *NavisCore NMS Getting Started Guide* for information about functions you can access on this dialog box.

> Slots 1 and 2 are reserved for the main control processor (CP) module and the optional redundant CP. Slot 1 is always configured with the main CP module.

3. Select the I/O module (slot) you want to configure and choose Attrs. The Set Card Attributes dialog box (Figure 7-4) appears .

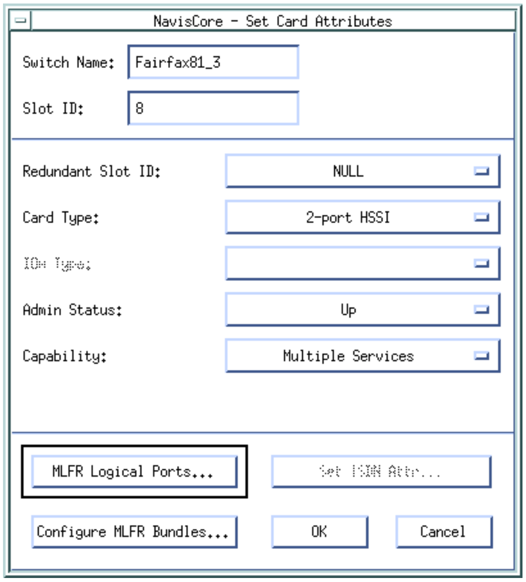


Figure 7-4. Set Card Attributes Dialog Box

4. Complete the required dialog box fields described in Table 7-2. Some fields apply only for specific card types.

Table 7-2. Set Card Attributes Fields and Buttons (B-STDX)

Field/Button	Action/Description
Redundant Slot ID (*Optional*)	Select the redundant slot ID if this I/O module is to have a redundant standby partner installed. You must install and configure the redundant module in the next higher slot (ID) adjacent to the primary module. For example, if the slot ID for this I/O module is 5, the redundant slot ID must be 6. A redundant slot ID of Null indicates no redundancy.
Card Type	Select the type of I/O module you want to configure in this slot.

Table 7-2. Set Card Attributes Fields and Buttons (B-STDX) (Continued)

Field/Button	Action/Description
Admin Status	Set this field as follows: *Up (default)* – The I/O module becomes fully operational when you start the switch. To become operational, the module gets its application code from the CP and loads its drivers. *Down* – The I/O module does not become operational when you start the switch. The configuration is saved in the database but is not downloaded to the switch. Use this option when you run foreground diagnostics. This setting enables you to erase PRAM when a card is out of sync. *Maintenance* – The I/O module does not receive the application software when you start the switch. A module in this state only has boot flash running; application code is not running. Use this setting to: • Reset PRAM for a module that fails to boot due to invalid PRAM. • Troubleshoot a hardware problem.
IOA Type	Select the IOA type for the following modules: • For an 8 port Universal I/O module, select V.35 or X.21. • For a 10-port DSX-1 module, this field defaults to RJ48. • For a 1-port ATM IWU OC-3c/STM-1 module select Sonet or SDH. • For a 4-port 30-channel E1 module, 4-port unchannelized E1 module, and 4-port 32-channel PRI E1 module, select Coaxial Pair 75 ohm or DB 15 120 ohm. • For a 12-port unchannelized E1 module, select Coaxial Pair 75 ohm, DB 15 120 ohm, or RJ48H 120 ohm.

Table 7-2. Set Card Attributes Fields and Buttons (B-STDX) (Continued)

Field/Button	Action/Description
Capability	Select one of the following options: *Frame Relay* – For Frame Relay networking services only. *Multiple Services* – For Frame Relay, ATM, SMDS, or ISDN networks on 8-MB modules *Multi-Service(16)* – For Frame Relay, ATM, SMDS, or ISDN on 16-MB modules. See the *B-STDX 8000/9000 Hardware Installation Guide* about which modules support multiple services or multiple services(16). Multiple Services and Multi-Service(16) are the only available options for the following modules: • 1-port 28 channelized DS3 • 2-port HSSI • 12-port unchannelized E1 Multiple Services is the default and cannot be changed for the following module: • 2-port Fast Ethernet • 1-port channelized DS3-1-0 Multiple Service(16) is the default and cannot be changed for the following modules: • 1-port ATM CS/DS3 • 1-port ATM CS/E3 • 1-port ATM UNI DS3 • 1-port ATM UNI E3 • 1-port ATM IWU OC-3c/STM-1

Table 7-2. Set Card Attributes Fields and Buttons (B-STDX) (Continued)

Field/Button	Action/Description
MLFR Logical Ports	Displays the Set All Logical Ports in Card dialog box and enables you to configure a multilink Frame Relay logical port for this card. See the *Naviscore Frame Relay Configuration Guide* for information. The following modules support MLFR ports: • 1-Port Channelized DS3 • 2-Port HSSI • 4-Port channelized T1/E1 • 4-Port DSX • 4-Port PRI E1/T1 • 8-Port UIO • 10-Port DSX-1 • 12-Port Unchannelized E1 This button is disabled if the card type is not a Multi-Link Frame Relay (MLFR) card type.
Configure MLFR Bundles	Displays the Configure MLFR Trunk Bundle LPorts dialog box and enables you to configure a MLFR trunk bundle logical port. For all “non” MLFR card types, this button is disabled. See the *NavisCore Frame Relay Configuration Guide* for information.
Set ISDN Attr	Enables you to set ISDN I/O module attributes. See “Setting ISDN I/O Module Attributes” on page 7-9.

5. Choose OK. The Switch Back Panel dialog box reappears, displaying the configured I/O module.

   If you selected a redundant configuration, the primary and secondary slots appear as a single configuration and occupy the space of two slots. (To determine which is the active module, click on the slot ID; the status line at the top of the dialog box indicates which is the active module.)

6. Repeat Step 3 through Step 5 until you define all I/O modules for the selected switch.

   When you finish setting card attributes, define the physical port parameters. See Chapter 8, “Configuring STDX/B-STDX Physical Ports.”

Setting ISDN I/O Module Attributes

This section describes how to configure additional ISDN PRI module attributes, which includes:

- Determining the D-channel configuration (page 7-9)
- Configuring additional ISDN I/O module attributes (page 7-10)

> In addition to configuring the Ascend equipment, there are customer premise equipment (CPE) issues and requirements for ISDN access. For example, the CPE contains a third-party ISDN network access card and software that must be configured correctly. For complete information, carefully review the documentation for all network equipment used in this ISDN configuration.

Determining the D-Channel Configuration (T1 Only)

The D channel carries common channel-signaling information to control circuit-switched calls on the associated B channels. The ISDN modules have four PRI ports that connect to ISDN PRI lines. You can configure the D channel as:

- Super D channel
- Four D channels

The next two sections describe how you can configure the D channel. Review these sections before you configure the D channel and the ISDN I/O module. (You must set the number of D channels in the Set ISDN Card Attributes dialog box.)

> Make your choice carefully; it is difficult to reconfigure the switch to enable Super D channel (Non-Facilitated Associated Signaling or NFAS) later.

Super D Channel

A Super D-channel configuration means that you will configure one D channel to handle all of the signaling information for all four ports on the I/O module. This configuration gives you the largest amount of data throughput since it makes use of three additional B channels. This configuration also reduces the amount of signaling overhead. The total channels available with this configuration include one D channel and 95 B channels.

Four D-Channels

A Four-D channel configuration means that you configure one D channel for each PRI port on the I/O module. This configuration reduces data throughput since it reserves four channels for signaling. It does, however, provide more flexibility when provisioning the ISDN service. The total channels for this configuration include four D channels and 92 B-channels.

► It is difficult to reconfigure the switch to enable Super D channel (NFAS) at a later date. Carefully choose the Number of D-channels according to your network needs. If you anticipate needing up to 95 B-channels, select 1 to enable Super D channel. This configuration must match the central office switch configuration.

Configuring Additional ISDN I/O Module Attributes

Before you set additional ISDN I/O module attributes, verify that you have set the IDSN I/O module's general card attributes as described in "Configuring B-STDX I/O Modules" on page 7-4.

1. Access the Set Card Attributes dialog box (Figure 7-4 on page 7-5).
2. Choose the Set ISDN Attr button.

   The Set ISDN Card Attributes dialog box (Figure 7-5) appears. This dialog box enables you to specify the signaling used between the central office and the B-STDX switch.

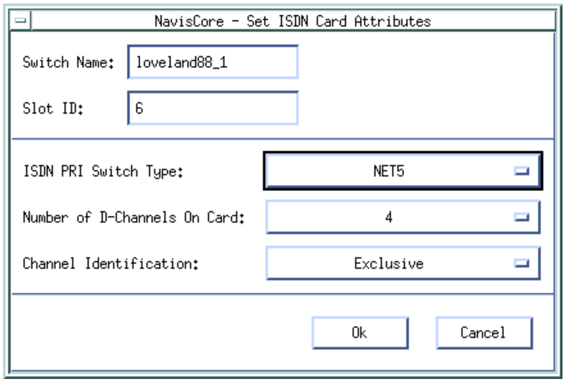


Figure 7-5. Set ISDN Card Attributes Dialog Box

3. Complete the fields described in Table 7-3.

Table 7-3. Set ISDN Card Attributes Fields and Buttons

Field	Action/Description
ISDN PRI Switch Type (*T1 Only*)	Select the type that corresponds to the signaling standard used by the ISDN central office switch. Options include: *AT&T 5ESS (default)* – AT&T's 5ESS central office switch. *AT&T 4ESS* – AT&T's 4ESS central office switch. *NT-DMS-100* – Northern Telecom's central office switch.
ISDN PRI Switch Type (*E1 Only*)	Select the type that corresponds to the signaling standard used by the ISDN central office switch. Options include: *TPH* – Supports Australian ISDN. *NET5 (default)* – Supports European ISDN.
Number of D-Channels On Card *(T1 Only)*	Select the number according to the signaling configuration you plan to use. See "Determining the D-Channel Configuration (T1 Only)" on page 7-9 for more information. Options include: *1* – Configures a *Super D-channel* (NFAS). The Super D channel supports 95 B channels on the module. *4 (default)* – Configure four D channels, one for each of the four physical ports. The switch uses the remaining DS0 channels as B channels, for a total of 92 B channels.
Number of D-Channels On Card *(E1 Only)*	Defaults to 4, which configures one D channel for each of the four physical ports.
Channel Identification	The Channel Identification method defines how the central office will handle the incoming ISDN call. Options include: *Exclusive (default)* – Enables the central-office switch to assign the B channel as soon as the call is received. *This is the standard method of operation.* *Preferred* – Enables the Ascend switch to assign the B channel.

4. Choose OK to return to the Set ISDN Card Attributes dialog box.

5. Choose OK to return to the Switch Back Panel dialog box.

Configuring CBX 500 IOMs

To configure I/O modules for the CBX switch:

1. On the network map, select the switch whose modules you want to configure.
2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box appears.

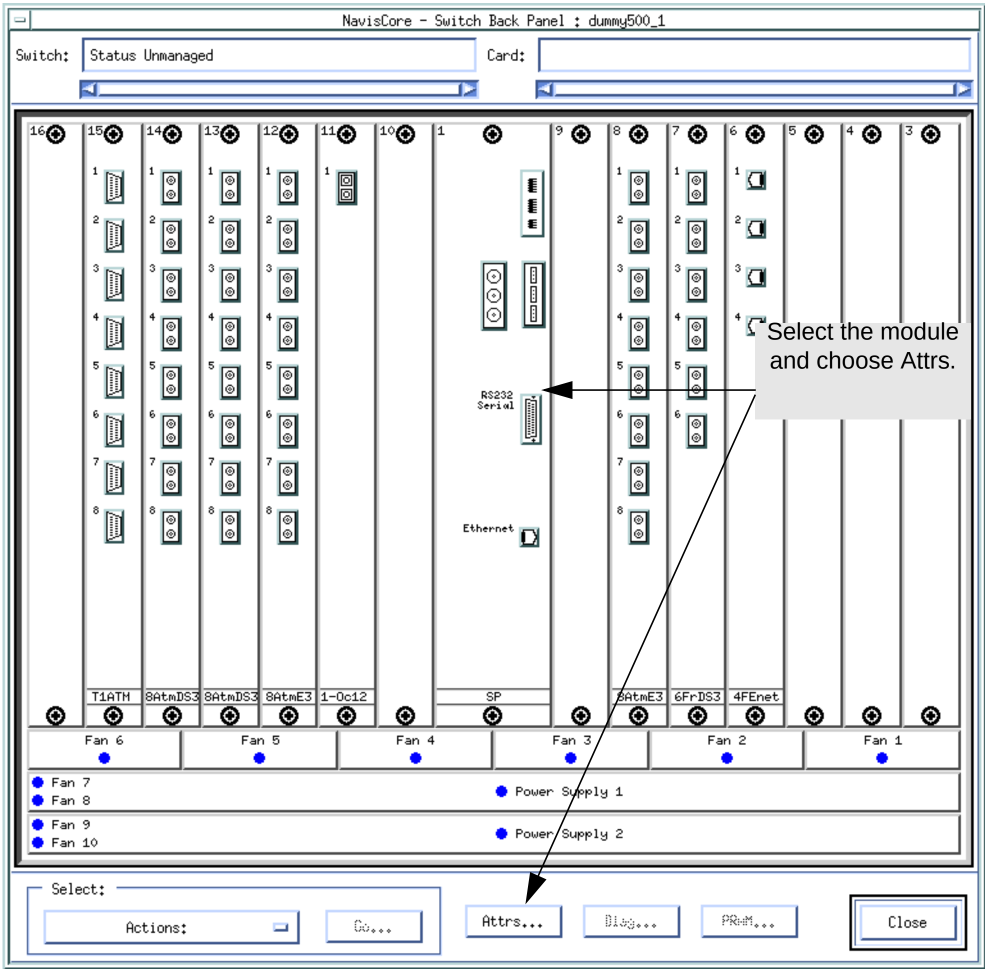


Figure 7-6. Switch Backpanel (CBX)

3. Select the IOM (slot) you want to configure and choose Attrs.

The Set Card Attributes dialog box (Figure 7-7) appears.

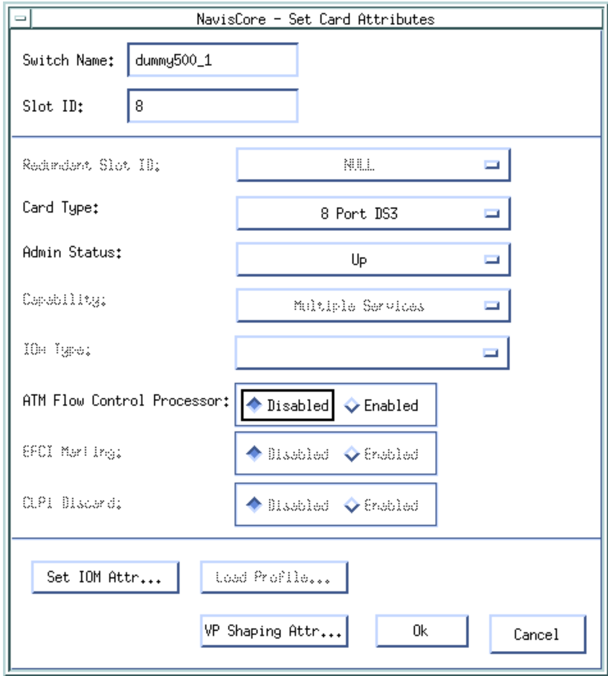


Figure 7-7. Set Card Attributes Dialog Box

4. Complete the dialog box fields as described in Table 7-4.

Table 7-4. Set Card Attributes Fields and Buttons

Field/Button	Action/Description
Redundant Slot ID	This function is currently not supported.
Card Type	Select the type of IOM installed in this slot.
Admin Status	Specify the admin status as follows: *Up* – (Default) Activates this IOM at switch start-up. When activated, the module gets its application code from the SP and loads these drivers. *Down* – Does not activate the IOM when you start the switch. The configuration is saved in the database but is not downloaded to the switch. Use this option when you run foreground diagnostics. *Maintenance* – Sets this IOM to a state where only its boot flash is running; application code is not running. Use this setting to reset the PRAM for a module that cannot boot due to invalid PRAM or to troubleshoot a hardware problem.
IOA Type	Select the IOA type that this IOM uses. If you select the wrong IOA type, the Switch Back Panel dialog box displays the IOM in yellow to indicate the mismatch. For E1 modules: • Coaxial Pair 75 ohm (default) • DB15 120 ohm For OC3/STM-1 and OC12/STM -4 modules: • *Multimode (MMF)* – Uses the multimode fiber-optic IOA (*OC3/STM-1 modules only*). • *Singlemode Medium Reach (SMMR)* – Uses the standard single-mode medium reach fiber-optic IOA. • *Singlemode Long Reach (SMLR)* – Uses the IOA for long-reach single-mode fiber-optic transmission. • *STM1 Copper (STM1-E)* – Uses the STM-1 copper IOA that provides a coaxial cable interface instead of fiber-optic (*OC3/STM-1 modules only*).
ATM Flow Control Processor	When this field is enabled, the dialog box displays the available attributes for the ATM Flow-Control Processor. For more information, see "Configuring the Flow-Control Processor" on page 7-20.
Set IOM Attr	Enables you to specify clocking information for the IOM. See Step 5 on page 7-16.

Table 7-4. Set Card Attributes Fields and Buttons (Continued)

Field/Button	Action/Description
VP Shaping Attr	Enables you to enter/modify VP shaping attributes. See "Configuring the Flow-Control Processor" on page 7-20.

5. Choose the Set IOM Attributes command to specify clocking information for the IOM. The Set IOM Card Attributes dialog box (Figure 7-8) appears.

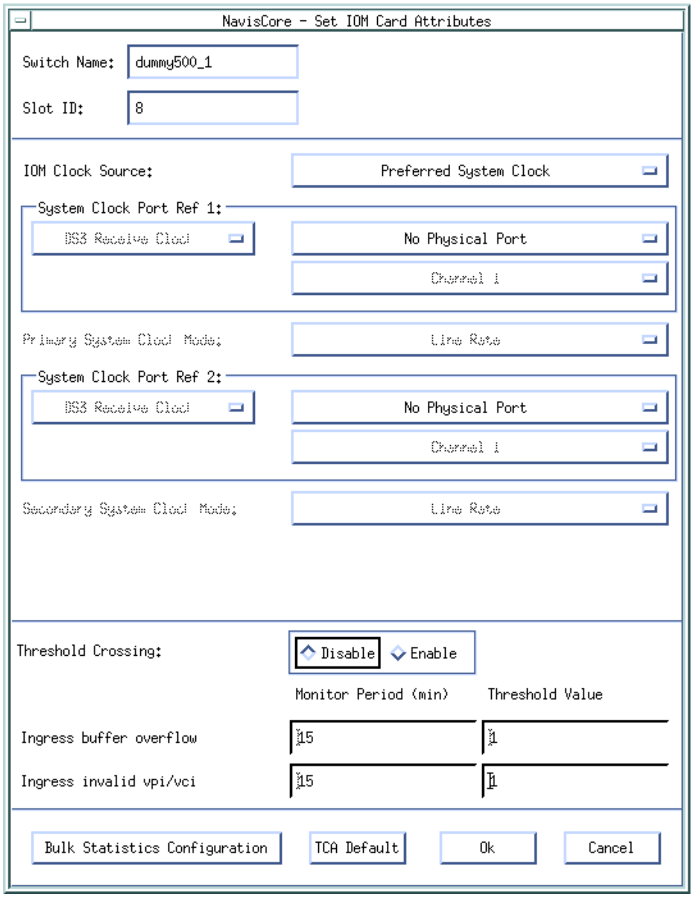


Figure 7-8. Set IOM Card Attributes Dialog Box

6. Complete the dialog box fields as described in Table 7-5.

Table 7-5. Set IOM Card Attributes Fields and Buttons

Field	Action/Description
IOM Clock Source	Select the internal timing source for the IOM. This setting applies only to those physical ports on the IOM whose Xmit Clock Source is set to *Internal* (see page 9-7 for information on this field). It has no effect on physical ports where the Xmit Clock Source field is set to Loop-Timed since the clock for these ports is derived from the non-external clock source coming into the port. Options include: *Preferred System Clock* – (default) The primary or secondary system clock (whichever of the two is currently up). *Local Clock* – The local clock on the IOM. *Primary System Clock Only* – The primary system clock source, which you specify when you set the SP attributes (see “Configuring SP Modules” on page 6-5). *Secondary System Clock Only* – The secondary system clock on the Set System Timing dialog box.
System Clock Port Ref 1	Specify whether the IOM provides the primary system clock source to the SP module. Options include: *No Physical Port* – (Default) Select this option if you do not want the SP to get its primary system clock source from a port on this IOM. *Physical Port* n – Select the physical port that provides the primary system clock source to the SP. When you select this option, the incoming clock signal on the selected port is provided to the SP as the primary system clock source. On a given switch, you can configure a maximum of two physical ports as clock sources (one primary and one secondary).
Primary System Clock Mode (*DS3/E3 only*)	This field is available only if you selected a physical port in the System Clock Port Ref 1 field. Options include: *PLCP* – The module uses a PLCP frame, which transmits 12 ATM cells every 125 µs. *Line Rate* – The module uses the line rate as the clock mode. The DS3 line rate is 44.5 Mbps.
System Clock Port Ref 2	Specify whether or not the IOM provides the secondary system clock source to the SP module. Options include: *No Physical Port* – (Default) Select this option if you do not want the SP to get its secondary system clock source from a port on the IOM. *Physical Port* n – Select the physical port that provides the secondary system clock source to the SP. When you select this option, the SP uses the incoming signal on the selected port as the secondary system clock source. On a given switch, you can configure a maximum of two physical ports as clock sources (one primary and one secondary).

Table 7-5. Set IOM Card Attributes Fields and Buttons (Continued)

Field	Action/Description
Secondary System Clock Mode (*DS3/E3 only*)	This field appears only if you selected a physical port in the Secondary System Clock Source field. Select one of the following options: *PLCP* – The module uses a PLCP frame, which transmits 12 ATM cells every 125 μs. *Line Rate* – The module uses the line rate as the clock mode. The DS3 line rate is 44.5 Mbps.
Threshold Crossing	Enable or disable threshold crossing. When enabled, threshold crossing monitors trap alarms that are generated during ingress buffer overflow or ingress valid vpi/vci conditions. This feature prevents the trap message log from receiving too many duplicate messages. When one of these conditions occurs, a trap message is generated. When you *enable* threshold crossing, a timer is then set to the monitor this condition for the period you specify. No additional trap messages are generated unless this condition reoccurs more than *x* number of times, where *x* equals the threshold value. If you *disable* threshold crossing, a trap message is generated each time one of these conditions occurs.
Monitor Period/Threshold Value If you enable threshold crossing, specify the Monitor Period and Threshold Value for each of the following conditions. If the number of times this condition occurs during this Monitor Period exceeds the Threshold Value you set, an additional trap message is generated.	
Ingress buffer overflow	Enter a value in minutes to monitor the ingress buffer for overflow conditions.
Ingress invalid vpi/vci	Enter a value to monitor ingress invalid vpi/vci conditions.
Bulk Statistics Configuration	Enables you to configure the module for statistics collection. See the *NavisXtend Statistics Server User's Guide* (formerly *Bulk Statistics Collector for CBX 500 User's Guide)* for details. (Statistics will not be collected until you have installed the Statistics Server for CBX 500.)
TCA Default	Resets the threshold crossing values to their default values.

7. When you finish setting card and clocking attributes, choose OK.
8. Choose OK to return to the Switch Back Panel dialog box.

To configure the physical ports on the IOM, see the following sections:

- "Defining ATM DS3/E3 Physical Ports (CBX 500)" on page 9-3
- "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9
- "Defining T1/E1 Physical Ports (CBX 500)" on page 9-19
- "Defining 6-Port Frame DS3 Physical Ports (CBX)" on page 9-26
- "Defining Ethernet Physical Ports (CBX)" on page 9-31

Configuring the Flow-Control Processor

To configure the Flow-Control Processor:

1. Make sure you have set card attributes for this IOM. See "Configuring CBX 500 IOMs" on page 7-13.
2. At the ATM Flow Control Processor field, select Enabled. The FCP attribute fields appear on the lower portion of the Set Card Attributes dialog box (see Figure 7-7).

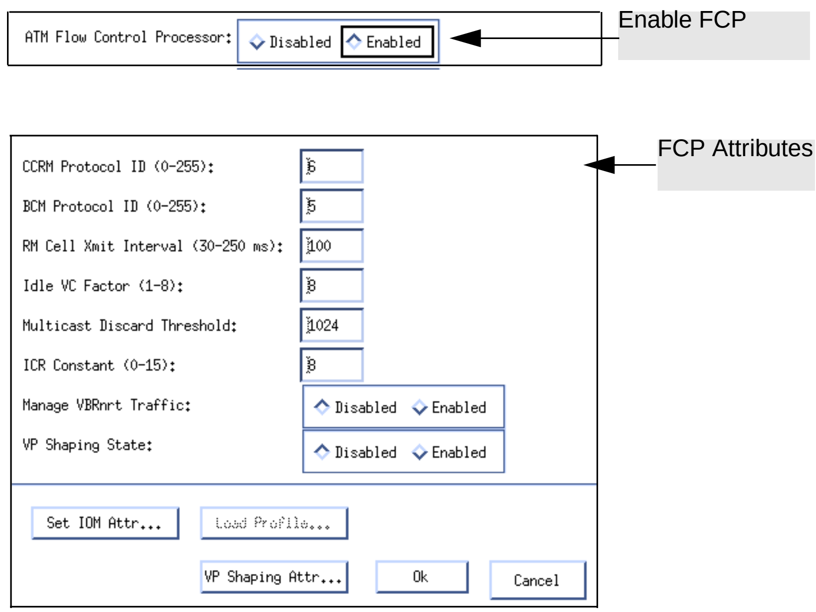


Figure 7-9. Set Card Attributes Dialog Box

> If you change the ATM Flow-Control Processor parameter values (except for the RM Cell Xmit Interval), the switch object and the IOM turn yellow, indicating that the switch is Marginal. If a marginal condition occurs, you must perform a PRAM Sync to synchronize the NMS and switch PRAM. See the *NavisCore NMS Getting Started Guide* for PRAM Sync instructions.

3. Complete the fields described in Table 7-6.

Table 7-6. Set Card (FCP) Fields and Buttons

Field/Button	Action/Description
ATM Flow Control Processor	Set to Enabled. When this field is enabled, the dialog box displays the available attributes for the ATM Flow-Control Processor.
CCRM Protocol ID: (0-255)	Enter the CCRM Protocol ID. The default value is 6. (See "Closed-Loop Flow Control" on page B-3 for information.)
BCM Protocol ID: (0-255)	Enter the BCM Protocol ID. The default value is 5. (See "Closed-Loop Flow Control" on page B-3 for information.)
RM Cell Xmit Interval (30-250 ms)	Enter the RM Cell Xmit Interval. The default value is 100. (See "Generating CCRM Cells" on page B-7 for information.)
Idle VC Factor (1-8)	Enter the Idle VC Factor. The default value is 8. (See "Idle VC Factor" on page B-11 for information.)
Multicast Discard Threshold	Enter the Multicast Discard Threshold. The default value is 1024. (See "Multicast Cells" on page B-16 for information.)
ICR Constant (0-15)	Enter the Initial Cell Rate (ICR) Constant. The default value is 0. (See "Rate Profile Tables" on page B-12 for information.)
Manage VBRnrt Traffic	Set to Enabled. Select the Enabled option if you want Variable Bit Rate-Non Real-Time (VBR-nrt) traffic to be managed by the FCP. (See "Supported ATM Service Classes" on page B-2 for information on VBR-nrt traffic.)
Multicast Rate	The multicast rate parameter determines the rate at which the multicast queue is dequeued on the ATM Flow-Control Processor. The default value is 1/8 (12.5%) of the line rate. You can select the multicast shaping rate as a fraction of the line rate, from 1/15 to 1. The rate is configured per IOM. (See "Multicast Cells" on page B-16 for information.) ***Note:*** *There is only one multicast queue per ATM Flow-Control Processor.*

Table 7-6. Set Card (FCP) Fields and Buttons (Continued)

Field/Button	Action/Description
VP Shaping State	Set to Enabled or Disabled Select Enabled to enable VP shaping. Select disable to disable VP shaping.
Set IOM Attr	Enables you to configure the attributes for this IOM. See page 7-16 for information on the Set IOM Card Attributes dialog box.
Load Profile	Enables you to load the two buffer threshold tables and two rate profile tables into the ATM Flow-Control Processor. ***Note:*** *This function is only available after the IOM attributes have been defined. See "Downloading Buffer Threshold and Rate Profile Tables" on page 7-22 for instructions.*
VP Shaping Attr	Enables you to enter/modify VP shaping attributes. For more information, see "Configuring VP Shaping Attributes" on page 7-25.
OK	Returns you to the CBX 500 back panel display and saves your changes.
Cancel	Closes the Set Card Attributes dialog box without saving any changes and returns you to the CBX 500 back panel display.

Downloading Buffer Threshold and Rate Profile Tables

You can load two buffer threshold tables and two rate profile tables into the ATM FCP. The ATM FCP uses these tables to determine the available bandwidth, the Rate Increase Exponent (RIE), and the Rate Decrease Exponent (RDE) for each VC on a port. Each table must have 256 entries. See the *Networking Services Technology Overview Guide* for information about these tables.

To load the Buffer Threshold and Rate Profile tables:

1. At the ATM Flow Control Processor field, select Enabled. The lower portion of the Set Card Attributes dialog box opens.
2. Choose the Load Profile button. The Load Rate Profile Tables dialog box (Figure 7-10) appears.

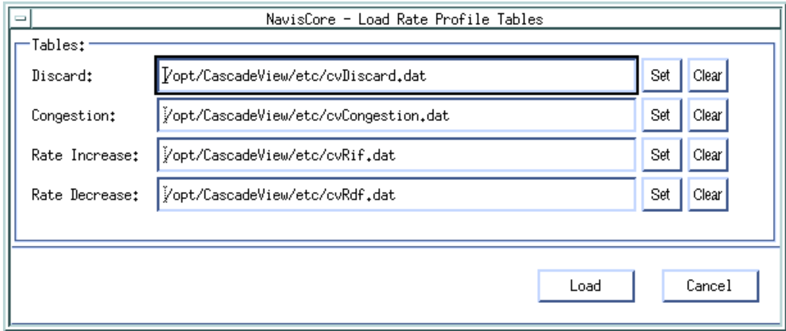


Figure 7-10. Load Rate Profile Tables Dialog Box

See Appendix C, "MCR Class Parameters" for information on the contents of the tables.

> If you change the parameter values in the Load Rate Profile Tables dialog box, the switch object and the IOM turn yellow, indicating that the switch is "Marginal." You must perform a PRAM Sync to synchronize the NMS and switch PRAM. See the *NavisCore NMS Getting Started Guide* for PRAM Sync instructions.

3. For each field, accept the default filenames or select clear to erase and complete the fields described in Table 7-7.

Table 7-7. Load Rate Profile Tables Dialog Box Fields and Buttons

Field/Button	Action/Description
Discard	Accept the default filename or select Clear to erase the filename. If you erase the filename, go to Step 4 on page 7-24. (See the "ATM Flow-Control Discard Mechanisms" on page B-16 for information.)
Congestion	Accept the default filename or select Clear to erase the filename. If you erase the filename, go to Step 4. (See the "ATM Flow-Control Processor Queues" on page B-14 for information.)
Rate Increase	Accept the default filename or select Clear to erase the filename. If you erase the filename, go to Step 4. (See "ATM Flow-Control Processor Queues" on page B-14 for information.)
Rate Decrease	Accept the default filename or select Clear to erase the filename. If you erase the filename, go to Step 4. (See "ATM Flow-Control Processor Queues" on page B-14 for information.)

4. Either enter a new filename and choose the Load button or choose the Set button. The Load Rate Profile Table dialog box (Figure 7-11 on page 7-24) appears.

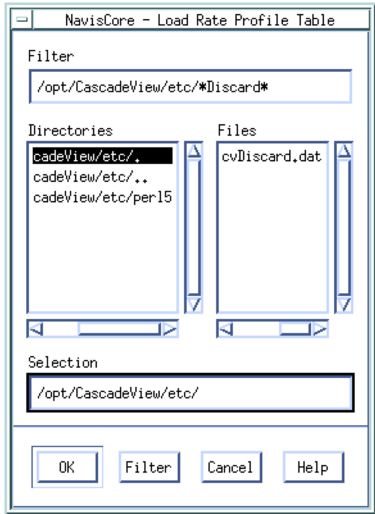


Figure 7-11. Load Rate Profile Table Dialog Box

5. Select the file you want to load into the ATM Flow-Control Processor. The complete pathname is displayed in the Selection text box.

   Choose Filter to display all the files.

6. Choose the OK button. The Load Rate Profile Table dialog box closes and returns you to Load Rate Profile Tables dialog box.

7. Choose the Load button. The file is loaded into the Sybase database. You must then perform a PRAM Sync. See the *NavisCore NMS Getting Started Guide* for PRAM Sync instructions.

Configuring VP Shaping Attributes

You use VP shaping to shape traffic on OPTimum trunks. These OPTimum trunks are used as Virtual Paths (VPs) which logically group virtual circuits connecting two sites. VPs are shaped according to the following Quality of Service (QoS) classes:

- Constant Bit Rate (CBR)
- Variable Bit Rate Real Time (VBR-RT)
- Variable Bit Rate Non-Real Time (VBR-NRT)
- Available/Unspecified Bit Rate (ABR/UBR)

NavisCore provides Cell Loss Priority 1 Discard (CLP1 Discard) and Cell Loss Priority 0+1 (CLP 0+1) threshold defaults for each QoS class. These defaults are automatically downloaded to the database of the CBX switch when you upgrade and PRAM sync the CBX. However, you can modify these values through the Set VP Shaping Thresholds dialog box (Figure 7-12). When you modify these values, you must PRAM sync the switch. For more information on PRAM Sync, see the *NavisCore NMS Getting Started Guide*.

VP Shaping Conditions

The following conditions apply if you modify the default values:

- For all QoS classes, CLP 0+1 values must be greater than CLP1 discard values.
- The sum of all CLP 0+1 threshold values (CBR, VBR-RT, VBR-NRT, and UBR/ABR) multiplied by the number of OPTimum trunks must be less than or equal to the number of buffers configured on the corresponding feeder port (you configure the number of buffers on the feeder port FCP screen).
- All threshold values must be between 1 and 64K.

If these conditions are not satisfied, NavisCore displays an error message.

To configure VP shaping attributes

1. Access the ATM Flow Control Attribute fields as described in "Configuring the Flow-Control Processor" on page 7-20.
2. Choose Set VP Shaping Attr.

   The Set VP Shaping Thresholds dialog box (Figure 7-12) appears.

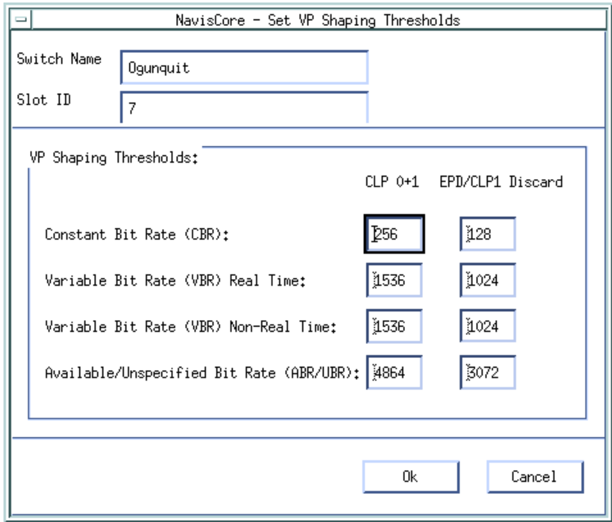


Figure 7-12. Set VP Shaping Thresholds Dialog Box (ATM E3 Module)

3. Accept the defaults (Table 7-8) or modify the values.

> If you modify the default values, abide by the conditions noted in "VP Shaping Conditions."

Default VP shaping values vary according to CBX I/O module type.

Table 7-8. VP Shaping Threshold Values

Field	Description	Module Type		
		T1/E1/E3/DS3 Defaults	**OC3 Defaults**	**OC12 Defaults**
CBR CLP 0+1	The Cell Loss Priority 0+1 threshold for CBR queues in the card. Once the queue length reaches this threshold, all Cell Loss Priority 1 Discard cells are discarded until the queue length falls below this threshold.	256	256	256
CBR EPD/CLP1 Discard	The maximum length of CBR queues in the card. Once the queue length reaches this threshold, all cells are discarded until the queue length falls below this threshold.	128	128	128
VBR-RT CLP0+1	The Cell Loss Priority 0+1 threshold for VBR RT queues in the card. Once the queue length reaches this threshold, all Cell Loss Priority 1 Discard cells are discarded until the queue length falls below this threshold.	1536	1536	1536
VBR-RT EPD/CLP1 Discard	The maximum length of VBR-RT queues in the card. Once the queue length reaches this threshold, all cells are discarded until the queue length falls below this threshold.	1024	1024	1024
VBR-NRT CLP0+1	The Cell Loss Priority 0+1 threshold for VBR NRT queues in the card. Once the queue length reaches this threshold, all CLP1 cells are discarded until the queue length falls below this threshold.	1536	1536	1536
VBR-NRT EPD/CLP1 Discard	The maximum length VBR-NRT queues in the card. Once the queue length reaches this threshold, all cells are discarded until the queue length falls below this threshold.	1024	1024	1024

Table 7-8. VP Shaping Threshold Values (Continued)

Field	Description	Module Type		
ABR/UBR CLP0+1	The Cell Loss Priority 0+1 threshold for ABR/UBR queues in the card. Once the queue length reaches this threshold, all Cell Loss Priority 1 Discard cells are discarded until the queue length falls below this threshold.	4864	13056	62208
ABR/UBR EPD/CLP1 Discard	The maximum length of UBR/ABR queues in the card. Once queue length reaches this threshold, all cells are discarded until the queue length falls below this threshold.	3072	8192	41472

4. Choose OK.
5. PRAM sync the switch. For more information on PRAM sync, see the *NavisCore NMS Getting Started Guide*.

Configuring GX BIO Cards

To configure the base I/O cards (BIO) for the GX:

1. On the network map, select the GX 550 switch whose BIO cards you want to configure.
2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box appears.
3. Select the BIO (slot) you want to configure and choose Attrs. The Set Card Attributes dialog box (Figure 7-13) appears.

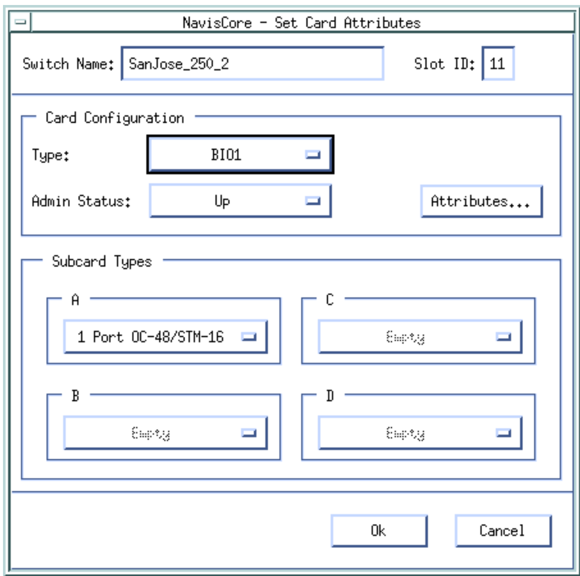


Figure 7-13. Set Card Attributes Dialog Box (BIO Card)

4. Complete the dialog box fields described in Table 7-9

Table 7-9. Set Card Attributes Fields and Buttons (BIO Card)

Field/Button	Action/Description
Card Configuration	
Type	Defaults to BIO1 (base I/O card).
Admin Status	*Up* – (Default) Activates this card at switch start-up. When activated, the module gets its application code from the NP and loads these drivers. *Down* – Does not activate the IOM when you start the switch. The configuration is saved in the database but is not downloaded to the switch. Use this option when you run foreground diagnostics. *Maintenance* – Sets this card to a state where only its boot flash is running; application code is not running. Use this setting to reset the PRAM for a card that cannot boot due to invalid PRAM. You can also use this option to troubleshoot a hardware problem.
Attributes	Choose this button to configure card clock source attributes.
Subcard Types	Configure one of the following subcard types in the corresponding slot (A - D): *4 Port OC-3c/STM-1* – You can configure this card type in any slot, A - D. *1 Port OC-12c/STM-4* – You can configure this card type in any slot, A - D. *1 Port OC-48/STM-16* – If you are configuring this card, select this subcard type in slot A. Slots B-D are disabled. ***Note**: Please contact you Sales Representative for information regarding availability of the OC48 Phy module.* ***Note**: You cannot configure the OC-48/STM-16 card in slot 12 of the GX 550 chassis. The Set Card Attributes dialog box subcard type D for this slot is set to empty and cannot be modified.*

5. Choose Attributes to configure clock source and circuit capacity. The Set Additional Card Attributes dialog box (Figure 7-14) appears.

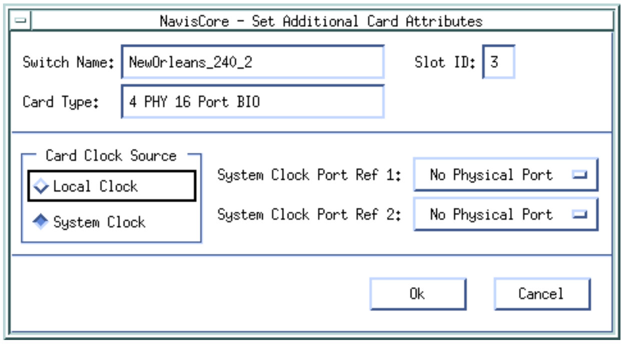


Figure 7-14. Set Additional Card Attributes

6. Complete the dialog box fields described in

Table 7-10. Set Additional Card Attributes Fields and Buttons

Field	Action/Description
Card Clock Source	Options include: *Local Clock* – Select this option if this card receives timing from one of its physical ports. *System Clock* – Select this option if this card uses the system timing module.
System Clock Port Ref 1	Specify whether the BIO card provides the primary system clock source. Options include: *No Physical Port* – (Default) Select this option if you do not want the NP to get its primary system clock source from a port on this card. *Physical Port* n – Select the physical port that provides the primary system clock source. When you select this option, the incoming clock signal on the selected port is provided to the NP as the primary system clock source. On a given switch, you can configure a maximum of two physical ports as clock sources (one primary and one secondary).
System Clock Port Ref 2	Specify whether the BIO card provides the secondary system clock source. Options include: *No Physical Port* – (Default) Select this option if you do not want the NP to get its secondary system clock source from a port on this card. *Physical Port* n – Select the physical port that provides the secondary system clock source. When you select this option, the incoming clock signal on the selected port is provided to the NP as the secondary system clock source. On a given switch, you can configure a maximum of two physical ports as clock sources (one primary and one secondary).

7. When you finish setting card attributes, choose OK to return to the Set Card Attributes dialog box.
8. Choose OK to return to the Switch Back Panel dialog box.

To configure the physical ports on this card, proceed to "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.

Redefining an IOM (CBX 500)

Before you redefine an IOM (e.g., replace a DS3 with an OC3 in the same slot), use the following procedure to redefine an IOM:

1. From the Administer menu, select Ascend Parameters ⇒ Set Parameters to access the Switch Back Panel dialog box.
2. Verify that the IOM is not out-of-sync. The IOM should appear green on the Switch Back Panel dialog box.
3. Select the IOM and choose Attrs. The Set Card Attributes dialog box appears (Figure 7-7 on page 7-14).
4. In the Card Type field, select Empty and choose OK.
5. The following warning message appears:

   ```
   If the IOM is present at the switch, the IOM must not be “out
   of sync” prior to changing it to Empty.
   ```

   Choose OK to acknowledge this message.
6. You can now define a new card type on the Set Card Attributes dialog box. See “If the IOM Is Out-of-Sync” if the IOM is out of sync.

If the IOM Is Out-of-Sync

If you try to redefine IOMs that are installed in the switch but are "*out of sync*," an SNMP error message appears, prompting you to abort or ignore the operation. *Ascend strongly recommends* that you do the following:

1. Choose Abort to halt the undefine IOM procedure.
2. PRAM sync the IOM (see "Using the Synchronize PRAM Command" on page 9-18).
3. Repeat Step 1 through Step 4 on page 7-32 to redefine the IOM.

If you choose to ignore the SNMP error message, the SP is flagged as "out of sync." When this happens, *Ascend strongly recommends* that you complete the following steps to avoid future logical port and IOM configuration rejections at the switch:

1. PRAM synch the SP (see page 9-18).
2. Reboot the "Undefined" card (in its original slot at the switch).
3. After the reboot completes, either latch down the IOM and remove it from the switch or define a new card in its place.

After you define a new IOM, the Switch Back Panel dialog box should display the new IOM slot in yellow to indicate it is out-of-sync. PRAM Sync the IOM (page 9-18). If you install the card in a slot that already contained PRAM, the new card may not display yellow. However, you still need to PRAM Sync the card.

Switching to a Redundant Unit

This section describes how to:

- Switch to a redundant unit on the B-STDX/CBX
- Switch to a redundant unit on the GX

Switching to a Redundant Unit on B-STDX/CBX Switches

If background diagnostics indicate that an IOM, SP, or CP fails, switch to a redundant unit.

To switch to a redundant unit on B-STDX and CBX 500 switches:

1. Select the appropriate switch icon on the network map.

2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box appears.

3. Select the redundant IOM, redundant SP (CBX 500), or redundant CP (B-STDX).

4. Select Actions ⇒ Switch to Redundant Unit.

5. Choose Go.

6. Choose OK to confirm your action.

Switching to a Redundant Unit on GX 550 Switches

If background diagnostics indicate that a Node Processor (NP), Switching Fabric (SF), or Timing Module (TM) fails or you need to remove an active NP/SF/TM from the switch, switch to a redundant unit.

To switch to a redundant NP, SF, and TM on GX 550 switches:

> On GX 550 switches, you cannot select BIO modules as redundant units. You can only select an NP as a redundant unit.

1. Select the appropriate switch icon on the network map.
2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box appears.
3. Select the redundant NP. Keep in mind that selecting an NP also selects the switching fabric module and the timing module.
4. Select Actions ⇒ Switch to Redundant Unit.
5. Select Node Processor, Switching Fabric or Timing Module, as appropriate.
6. Choose Go.
7. Choose OK to confirm your action.

8

Configuring STDX/B-STDX Physical Ports

This chapter describes how to configure the I/O module physical port parameters, which determine how a port handles clock source and clock rate.

Accessing Physical Port Attributes

To access physical port attributes functions and configure the I/O module physical ports:

1. On the network map, select the switch object that contains the physical port.

> If you are not logged on, select a switch and select NavisCore ⇒ Logon from the Misc menu. Enter your operator password.

2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters.
3. Select the port you want to configure and choose Attrs. The Set Physical Port Attributes dialog box appears for the type of I/O module you select (Figure 8-1 displays an example of a UIO I/O module).

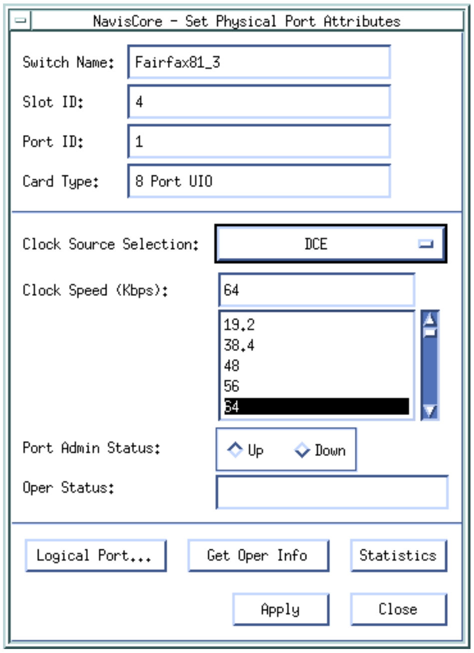


Figure 8-1. 8-Port UIO I/O Module

Parameters vary depending on the type of port. See Table 8-1 to define each B-STDX physical port type:

Table 8-1. B-STDX Physical Port Type

Physical Port Type	See
V.35 or UIO	page 8-3
T1 or E1 (use also for ISDN physical ports)	page 8-10
Channelized DS3 or Channelized DS3-1-0	page 8-20
DSX-1	page 8-37
HSSI	page 8-44
ATM	page 8-47
Ethernet	page 8-79

Defining V.35 or Universal I/O Physical Ports

Before you configure a V.35 physical port, consider the following:

- The absolute maximum aggregate bandwidth for all V.35 ports is 16 Mbps (B-STDX 8000/9000 only).
- If the maximum port speed is 2.048 Mbps or less, you can specify any combination of port speeds. For example, 8 ports at 2.048 Mbps per port is a valid configuration. Although 8 ports configured at 2 Mbps is valid, Ascend recommends that you do not exceed 12 Mbps total throughput for the UIO card.
- If the port speed is greater than 2.048 Mbps, but less than or equal to 4.096 Mbps, some configurations are based on port pairings as follows:
  - Port 1 shares hardware with port 2
  - Port 3 shares hardware with port 4
  - Port 5 shares hardware with port 6
  - Port 7 shares hardware with port 8

  As a result, if either port in any port pair is configured with more than 2 Mbps of bandwidth you cannot use or configure its partner.
- If the port speed is greater than 4.096 Mbps, but less than or equal to 8.192 Mbps, you can only use two, nonadjacent numbered V.35 ports. For example, you can configure ports 1 and 3 at 8.192 Mbps, or port 2 at 8.192 Mbps and port 4 at 2.048 Mbps.

Table 8-2 lists the port speed, port capability, and services supported on each UIO module.

Table 8-2. Universal I/O Module Port Speed and Capacity

Module	Available on	Maximum Port Speed	Port Capability	Frame Relay	SMDS	ATM
8-port	STDX 6000	128 Kbps	V.24 X.21	Yes	No	No
18-port	STDX 6000	128 Kbps	V.24 X.21	Yes	No	No
6-port V.35	STDX 6000	4.096 Mbps	V.35	Yes	No	No
6-port UIO	STDX 6000	4.096 Mbps	V.35 EIA 449 EIA 530 EIA530AX .21	Yes	No	No
8-port	B-STDX 8000/9000	8.192 Mbps	V.35 X.21 RS-449	Yes	Yes	Yes

You can configure an STDX 3000/6000 with up to 60 ports. As a result, you can install a maximum of three 18-port UIO modules in an STDX switch.

About Clock Source

The Clock Source parameter determines how the physical port handles clocking. Table 8-3 describes the UIO clock source selections.

Table 8-3. UIO Clock Source Selections

Clock Source	Configures the Port to...
DCE	Provide clocking at the rate specified by the clock speed selection. Select this option to connect to a DTE where the switch provides both the transmit and receive clock, and a straight-through cable is used. Use a crossover cable to connect to a physical DCE.
Loop-Timed DCE	Provide clocking at the configured speed. Loop-timed DCE provides the same timing as DCE except for the looped clock (transmit clock looped back to external transmit clock). Use this option for high-speed applications and/or where cable length is excessive.
DTE	Receive clocking from an outside source, typically a CSU/DSU. However, you must set the clock speed even though it is not clocking. Clock speed is required for logical port configuration.
Direct Trunk	Connects two Ascend switches via a cross-over cable. This selection is an Ascend-specific clock source that delivers high-speed timing for V.35s running at a high clock rate.

To set up the clock signals for V.35 ports on an Ascend switch, note the following minimum requirements:

- If you configure clock source selection for DTE, verify the following clock signal inputs are received from the DCE:

W Transmit clock (-)	BB Receive clock (-)
U Transmit clock (+)	Z Receive clock (+)

- If you configure clock source selection for DCE, verify the following clock signal inputs are received from the DTE:

AA Transmit clock (-)	X Receive clock (-)
Y Transmit clock (+)	V Receive clock (+)

To define a V.35 or Universal I/O physical port:

1. Access the Set Physical Port Attributes dialog box as described in "Accessing Physical Port Attributes" on page 8-1.

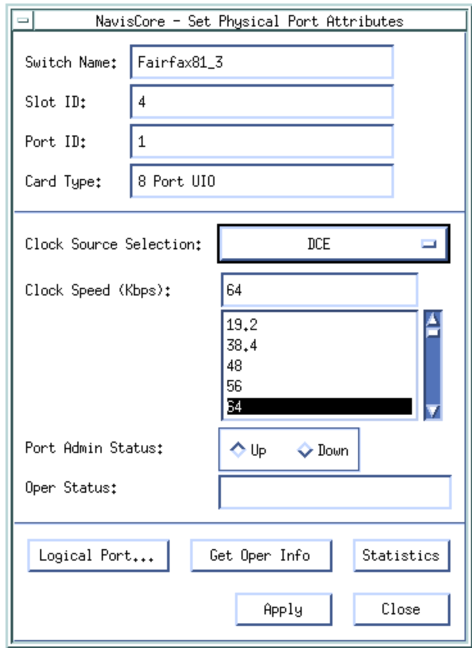


Figure 8-2. Set Physical Port Attributes Dialog Box

Table 8-4 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-4. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Oper Status	The card's current operational status.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the fields described in Table 8-5.

Table 8-5. Set Physical Port Attributes Fields

Field	Action/Description
Clock Source Selection	Select the clock source for this physical port. Options include: *DCE (default)* – Configures the port to provide clocking at the rate specified by the clock speed selection. *Loop-Timed DCE* – Configures the port to provide clocking at the configured speed. *DTE* – Configures the port to receive clocking from an outside source, typically a CSU/DSU. *Direct Trunk* – Connects two Ascend switches via a cross-over cable. This selection is an Ascend-specific clock source that delivers high-speed timing for V.35s running at a high clock rate.

Table 8-5. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
Clock Speed (Kbps)	Select the clock speed to generate clock when the clock source is DCE, Loop-Timed DCE, and Direct Trunk. If the clock source is DTE, the switch ignores this parameter for clocking purposes; however, you should set it for the actual clock rate since the cumulative total of all logical ports configured on the physical port cannot exceed the clock speed setting.
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

3. When you are done setting attributes, choose Apply.

4. Choose Close to exit.

5. Now you can define the logical port parameters for this configuration. See one of the following guides:

- *NavisCore Frame Relay Configuration Guide*
- *NavisCore IP Configuration Guide*
- *NavisCore ATM Configuration Guide*
- *NavisCore SMDS Configuration Guide*
- *NavisCore ISDN Configuration Guide*

Defining T1 and E1 Physical Ports

This section describes the physical port parameters for the following T1 and E1 modules:

- 1-port channelized T1 I/O module (STDX)
- 1-port channelized E1 I/O module (STDX)
- 4-port channelized T1 I/O module (B-STDX)
- 4-port unchannelized T1 I/O module (B-STDX)
- 4-port channelized E1 I/O module (B-STDX)
- 4-port unchannelized E1 I/O module (B-STDX)
- 4-port T1 ISDN PRI module (B-STDX)
- 4-port E1 ISDN PRI module (B-STDX)
- 12-port unchannelized E1 I/O module (B-STDX)

When you set the physical port attributes for a T1 or E1 module, you configure the link-level parameters for a particular T1/E1 interface. The T1/E1 interface must match the parameters of the exterior equipment to which it connects, for example, a DACS or channel bank.

The T1/E1 physical port attributes also dictate how many DS0/TS0 channels the physical port can use. By selecting or deselecting individual DS0/TS0 channels, you can enable or disable the use of that particular DS0/TS0.

About B8Zs Zero Encoding

Using B8Zs zero encoding, you can configure up to 24 DS0 channels, each operating at a rate of 64 Kbps. B8Zs is a T1 encoding scheme where eight consecutive zeros are replaced with the sequence 000-+0+-if the preceding pulse was +, and with the sequence 000-+0+-if the preceding value was -, where + represents a positive pulse, -represents a negative pulse, and 0 represents no pulse. Combined, these channels provide a DS1 signal operating at 1.544 Mbps. Using Jammed Bit zero encoding for T1 modules (with bit stuffing set to on), you can configure up to 24 DS0 channels, each operating at a rate of 56 Kbps for a total of 1.344 Mbps.

About External Clock Backup for T1 and E1 Modules

You can configure physical ports to support either internal or external clocking. You use the Transmit Clock Source parameter to specify clocking. A channelized or unchannelized T1 module supports an external clock speed of up to 1.544 MHz. A channelized or unchannelized E1 module supports an external clock speed of up to 2.048 MHz.

If the physical port loses the external clock source, the External Clock Backup parameter enables the port to automatically revert to either an internal or loop-timed clock source. If the external clock reappears, the switch automatically returns to the external clock source. This feature increases the reliability of customer switched networks that include externally clocked ports.

Configuring T1 and E1 Physical Ports

The T1 and E1 module physical port configuration steps are similar. Special considerations are described in Table 8-7 on page 8-13.

To configure T1 and E1 physical ports, use the following steps:

1. Access the Set Physical Port Attributes dialog box (Figure 8-3) described in "Accessing Physical Port Attributes" on page 8-1.

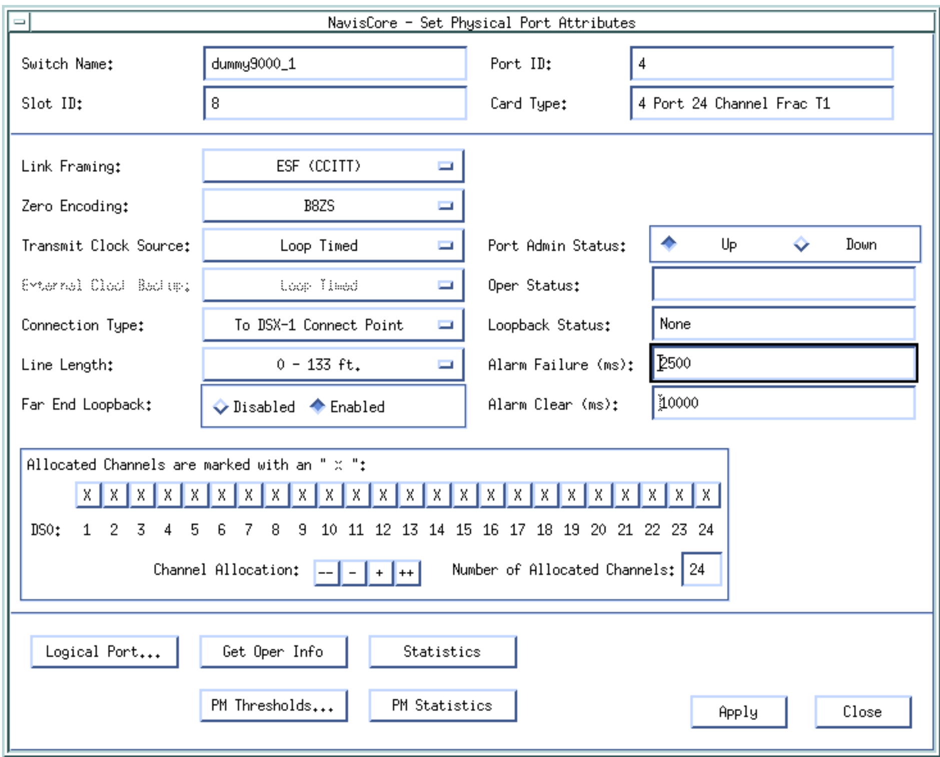


Figure 8-3. Set Physical Port Attributes Dialog Box (Channelized T1)

> If the Loopback Status field does not display None, do not modify any physical port attributes. Choose Close and see the *NavisCore Diagnostic and Troubleshooting Guide* for information about loopback testing.

Table 8-6 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-6. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Oper Status	The card's current operational status.
Loopback Status	Displays the current loopback status of the card.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
G.826 Statistics (*For STDX/B-STDX E1 I/O modules except the B-STDX 12-port E1 I/O module*)	Displays G.826 statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide.*
E1 Statistics (*For the B-STDX 12-port E1 I/O module only*)	Displays E1 Statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide.*
PM Thresholds *(For the B-STDX 4-port channelized T1 I/O module only)*	Enables you to configure Performance Monitoring Thresholds. See "Performance Monitoring on DS1 Channels and Channelized T1 Physical Ports" on page A-7
PM Statistics *(For the B-STDX 4-port channelized T1 I/O module only)*	Access Performance Monitoring Statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the fields described in Table 8-7.

Table 8-7. Set Physical Port Attributes Fields

Field	Action/Description
Link Framing (*For T1 I/O modules*)	Select a framing format. Framing configures the T1/E1 interface for a particular framing specification, enabling you to distinguish between the individual channels. Framing adds one additional bit to each frame. Options include: *ESF (CCITT) (default)* – Extended Superframe. Extends the D4 framing format from 12 frames to 24 frames, and uses modified framing bits to provide a cyclic redundancy check (CRC), secondary channel, and data link. The advantage of ESF framing over D4 framing is that it enables Ascend equipment to monitor and respond to a maintenance message from the network. Facility Data Link (FDL) for CCITT is the European standard. *D4 Framing* – Consists of 12 frames (also called “Superframe”). It provides end-to-end synchronization and signaling associated with a particular channel. *ESF (AT&T)* – AT&T is the US standard for Extended Superframe. *ESF (None)* – No Facility Data Link (FDL) messaging support. ***Note****: The customer premise equipment (CPE) must use the same framing specification as the Ascend physical port.*

Table 8-7. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
Link Framing (*For E1 I/O modules*)	Select an E1 link framing format. TS16 refers to time slot 16. If you enable TS16, then you can use channel 16 to send data. CRC4 performs a cyclic redundancy check when it is enabled. Options include: • TS16 disabled & CRC4 disabled (default) • TS16 enabled & CRC4 enabled • TS16 enabled & CRC4 disabled • TS16 disabled & CRC4 enabled • Unstructured (Indicates no framing. The entire 2.048 Mbps of bandwidth is available for data.) ***Note**: The customer premise equipment (CPE) must use the same framing specification as the Ascend physical port.*
Zero Encoding	Select an encoding format for the T1/E1 interface. Zero encoding specifies the format of the data signal encoding. The signal has three different levels – positive, negative, and ground, which must be referenced from a master clock. ***Note**: Consult your facility service provider for more information about selecting a zero encoding method.* T1 options include: *B8ZS* (*default*) (*Bipolar with 8 zero substitution)* – Refers to the use of a specified pattern of normal bits and bipolar violation that is used to replace a sequence of eight zero bits. With B8ZS, a special code is added and then removed from the pulse stream in substitution for a 0 byte that has been transmitted by the user equipment. See “About B8Zs Zero Encoding” on page 8-10. *Jammed Bit* – Refers to jammed bit zero encoding. Jammed Bit is also known as Alternate Mark Inversion (AMI). Using this method, at least one pulse every 8 bits is implemented by forcing a pulse in bit 8 of each channel. E1 selection is set at *HDB3* (*default*) – Refers to the use of a specified pattern of normal bit and bipolar violation that is used to replace a sequence of three 0 (zero) bits.

Table 8-7. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
Transmit Clock Source	Select the transmit clock source for the T1/E1 module. Options include: *Loop-Timed (default)* – The clock source is derived from the network timing received. *Internal* – The internal T1/E1 timing generator provides the clock source. *External* – An external connection provides the clock source. If you select this option, you should also set External Clock Backup.
External Clock Backup	If the external clock source fails, this option automatically enables either a loop-timed or internal clock source. See page 8-10 for more information about external clock source and backup for a T1/E1 module.
Connection Type (*For T1 I/O modules*)	Specify the connection from the T1 module to the T1 network. *To DSX-1 Connect Point (default)* – The T1 module is connected to a T1 network, for example, a DACS. *To Network* – The T1 module is used as the T1 network interface. ***Note**: This field does not affect the ISDN PRI module.*
Far End Loopback (*For B-STDX T1 I/O modules*)	Enable (default) or disable the switch's ability to respond to loopback commands from far-end equipment. *Enable* – Allows the switch to respond to loopback commands from far-end equipment (loop-up and loop-down), which can put the port into remote loopback. The loopback signaling can be inband commands or FDL loopback commands. *Disable* – Ignores inband and FDL loop-up and loop-down commands.

Table 8-7. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
Line Length (*For T1 I/O modules*)	Select a line length for this connection. If you select To DSX-1 Connect Point as the connection type, the Line Length parameter enables you to specify the distance from the T1 module to the network equipment. Options include: 0 - 133 feet (default) 133 - 266 feet 266 - 399 feet 399 - 533 feet 533 - 655 feet ***Note****: This field does not affect the ISDN PRI module.*
ISDN PRI (*ISDN PRI modules only*)	Enable or disable ISDN PRI services on the selected port. *On* – Sets this T1/E1 physical port to use ISDN PRI services. *Off* – Sets this T1/E1 port to operate as a channelized T1.

Table 8-7. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
ISDN Client IP Base Address (*ISDN PRI modules only*)	Enter a base IP address for this physical port. This enables the switch to maintain a pool of IP addresses for the physical port and dynamically assign a temporary IP address to a remote user. Use the default address of 0.0.0.0 to disable this feature. When this feature is disabled, the IP address of the remote user will be used. The subnet mask is set on the ISDN CPE. *T1 Only:* If you configured the PRI T1 module to use four D channels (see page 7-9), the Ascend switch will maintain a pool of IP addresses for the physical port which range from the base address you enter (x.y.z.n) to (x.y.z.n + 22). This pool provides 23 distinct IP addresses per physical port. If you configured one Super D channel (see page 7-9), the Ascend switch will maintain a pool of IP addresses on the physical ports which do not contain the D-channel, and which range from the base address you enter (x.y.z.n) to (x.y.n + 23). The range of addresses for the physical port that contains the D-channel is (x.y.z.n) to (x.y.z.n + 22). *E1 Only:* The Ascend switch will maintain a pool of IP addresses for the physical port, which range from the base address you enter (x.y.z.n) to (x.y.z.n + 29). This provides 30 distinct IP addresses per physical port.
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

Table 8-7. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
Alarm Failure (ms) (*For the B-STDX 4-port channelized T1 I/O module only*)	Enter a value from 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) indicates the switch “soaks” the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms indicates the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.
Alarm Clear (*For the B-STDX 4-port channelized T1 I/O module only*)	Enter a value from 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) is resolved. The default value of 10000 ms (10 seconds) indicates the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms indicates the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Allocated Channels are marked with a cross	Select the DS0 or TS0 channels for this configuration. If you are configuring a channelized T1/E1 module, edit the DS0 channel selection, if necessary. For unchannelized T1/E1 modules, proceed to Step 3 on page 8-19. To deselect DS0 or TS0 channels, click on the channel to remove the X. You can select/deselect channels by using the following Channel Allocation editing buttons. -- To deselect all channels ++ To select all channels - To deselect a specific channel + To select a specific channel

Table 8-7. Set Physical Port Attributes Fields (Continued)

Field	Action/Description
Number of Allocated Channels	Displays the number of DS0/TS0 channels allocated for use on a channelized T1/E1. This number changes according to the number of DS0 channels you add or remove from the T1/E1. Confirm the number of channels is correct.

► If you configure the PRI T1 module to use four D channels, each DS0 channel 1 through 23 corresponds to a B-channel; the 24th DS0 channel corresponds to the D-channel. However, if you configured the ISDN PRI module to provide only one D channel (Super D channel), you can use DS0 24 as a B channel on physical ports 2, 3, and 4. For more information about configuring the number of D channels, see page 7-9.

3. Choose Apply to save the attributes and send an SNMP Set command to the switch.
4. Choose Close to exit the dialog box.
5. To define the logical port parameters that complete this configuration, see one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Defining Channelized DS3 and DS3-1-0 Physical Ports and Channels

When you configure a 1-port, 28-channel DS3 I/O module or 1-port DS3-1-0 I/O module, you need to define the physical port and channel attributes. The physical-port attributes determine the modules' clock source and clock rate.

About External Clock Backup for Channelized DS3 Modules

You can configure physical ports to support either internal or external clocking. You use the Transmit Clock Source parameter to specify clocking. Both modules support an external clock speed of up to 1.544 MHz.

If the physical port loses the external clock source, the External Clock Backup parameter enables the port to automatically revert to either an internal or loop-timed clock source. This feature increases the reliability of customer switched networks that include externally clocked ports.

About Channels

Channels are located between the physical port and logical port layers as shown in Figure 8-4.

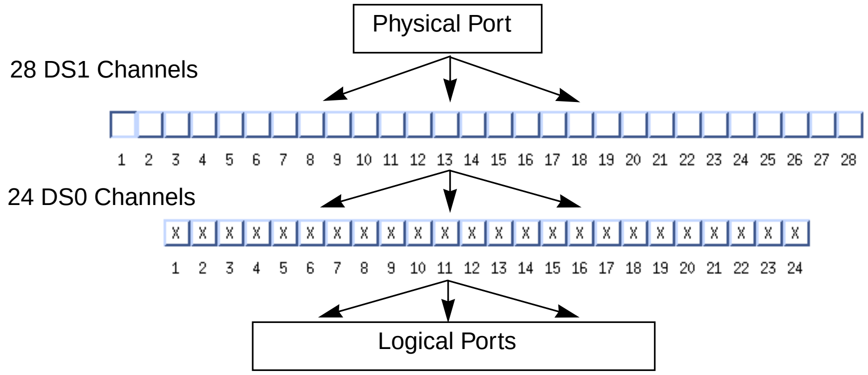


Figure 8-4. Channelized DS3 Channels

The physical port is divided into 28 fractional T1 channels. Each channel supports one user logical port (except for OPTimum trunk logical ports). Each DS1 channel contains 24 DS0 channels. The channelized DS3 channel attributes dictate how many DS0 channels the physical port can use. By selecting or deselecting individual DS0 channels, you can enable or disable the use of that particular DS0. You can configure up to 24 DS0 channels, each operating at a rate of 56 Kbps. Combined, these channels provide a DS1 signal operating at 1.544 Mbps.

About DS3 Signal Application Mode

The DS3 signal is partitioned into M-frames of 4760 bits each. The M-frames are divided into seven M-subframes of 680 bits. The first C-bit in M-subframe 1 is used as an application identification channel (AIC) to identify the specific DS3 M-frame. The AIC determines the mode of operation for a DS3 signal.

Configuring Channelized DS3 and DS3-1-0 Physical Ports

To configure a physical port:

1. Access the Set Physical Port Attributes dialog box (Figure 8-5) as described in "Accessing Physical Port Attributes" on page 8-1.

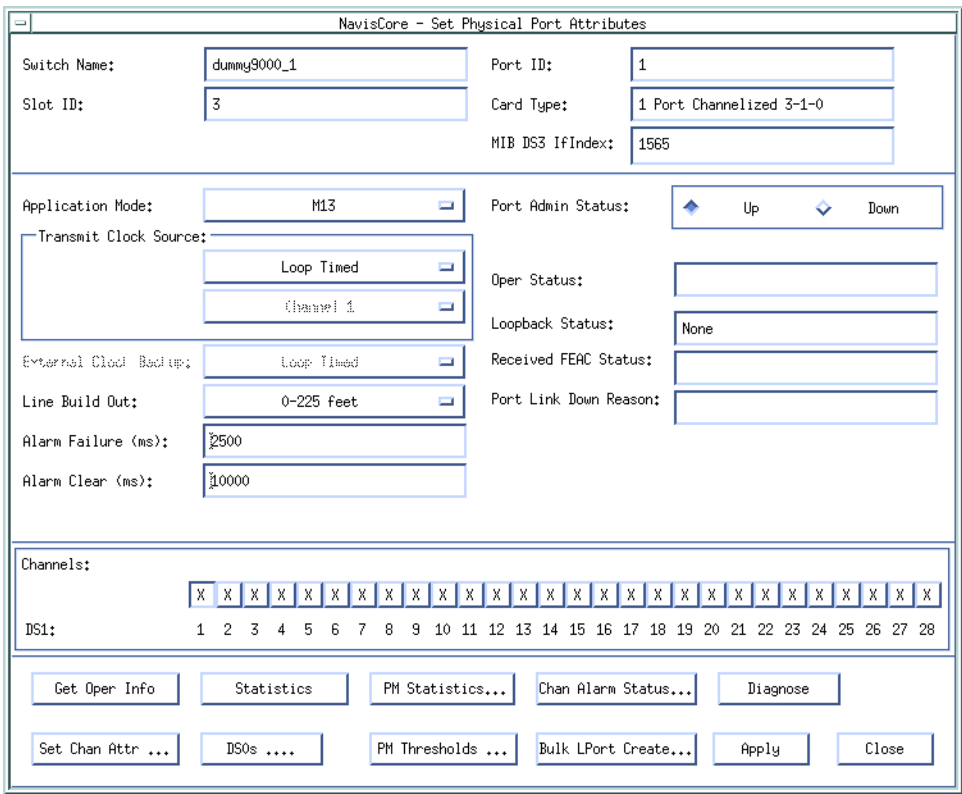


Figure 8-5. Set Physical Port Attributes Dialog Box (Channelized DS3-1-0)

Table 8-8 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-8. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
MIB DS3 IfIndex	Interface number used for link performance. (If you use a third-party MIB browser, the value is displayed.)
Oper Status	The card's current operational status.
Loopback Status	Displays the current loopback status of the card.
Received FEAC Status	Displays the FEAC (Far-End Alarm and Control) status received by the physical port if C-bit parity is enabled. This field indicates the status of the physical port on the other end of the connection. If you are using M13, this field displays None.
Port Link Down Reason	Displays the reason for the down link. If the link is up, this field displays None.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Chan Alarm Status	Displays the channel alarm status for all 28 channels. For more information about channel alarms, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Diagnose	Displays diagnostic test information for the selected physical port. For more information about diagnostics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Set Chan Attr	Displays the Set Channel Attributes dialog box.

Table 8-8. Set Physical Port Attributes Dialog Box Fields and Buttons (Continued)

Field/Button	Function
DS0s	Displays the DS0 allocation on the physical port. For more information, see "Displaying DS0 Allocation on Physical Ports" on page 8-36.
PM Thresholds	Enables you to configure Performance Monitoring Thresholds. See "Performance Monitoring on Channelized DS3 and Channelized DS3-1-0 Physical Ports" on page A-3.
PM Statistics	Access Performance Monitoring Statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Bulk Lport Creation (*channelized DS3-1-0 I/O modules only*)	Displays the Bulk LPort Creation Selection dialog box. This button does not appear unless you enable it in the *cascadeview.cfg* file. For more information, see "About Bulk LPorts" on page 8-31.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the required dialog box fields described in Table 8-9.

Table 8-9. Set Physical Port Attributes Fields (Channelized DS3)

Field	Action/Description
Application Mode	Select the DS3 application mode. Options include: *M13 (default)* – Uses C-bits in a frame to indicate the presence or absence of stuffed bits. *C-bit Parity* – Uses the first C-bit in M-subframe 1 to identify the format as C-bit parity.
Transmit Clock Source	Select the transmit clock source. The DS3 receive clock is independent from the DS3 transmit clock. Options include: *Loop Timed (default)* – The clock source is derived from the timing received. *Internal* – The internal timing generator provides the clock source. *External* – An external connection provides a DS1 clock source. This source drives a phased locked loop circuit to provide DS3 clocking. If you select this option, you should also set an external backup clock source.
External Clock Backup	(*Optional*) If the external clock source fails, you can set this parameter to automatically enable either loop timed or internal clock source. This field is enabled only when the external clock option is selected as the transmit clock source. See "About External Clock Backup for Channelized DS3 Modules" on page 8-20 for more information.
Line Build Out	Specify the distance measurement from the channelized DS3 module to the network equipment. Options include: • 0 - 225 feet (default) • 225 - 450 feet

Table 8-9. Set Physical Port Attributes Fields (Channelized DS3) (Continued)

Field	Action/Description
Alarm Failure (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) indicates the switch “soaks” the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms indicates the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.
Alarm Clear (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) is resolved. The default value of 10000 ms (10 seconds) indicates the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms indicates the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

Configuring Channel Attributes

To configure a DS1 channel and define its attributes, use the following steps:

1. From the Set Physical Port Attributes dialog box (Figure 8-5), double-click the button of the channel you want to configure.

   The Set Channel Attributes dialog box appears as shown in Figure 8-6, displaying 24 DS0 channels.

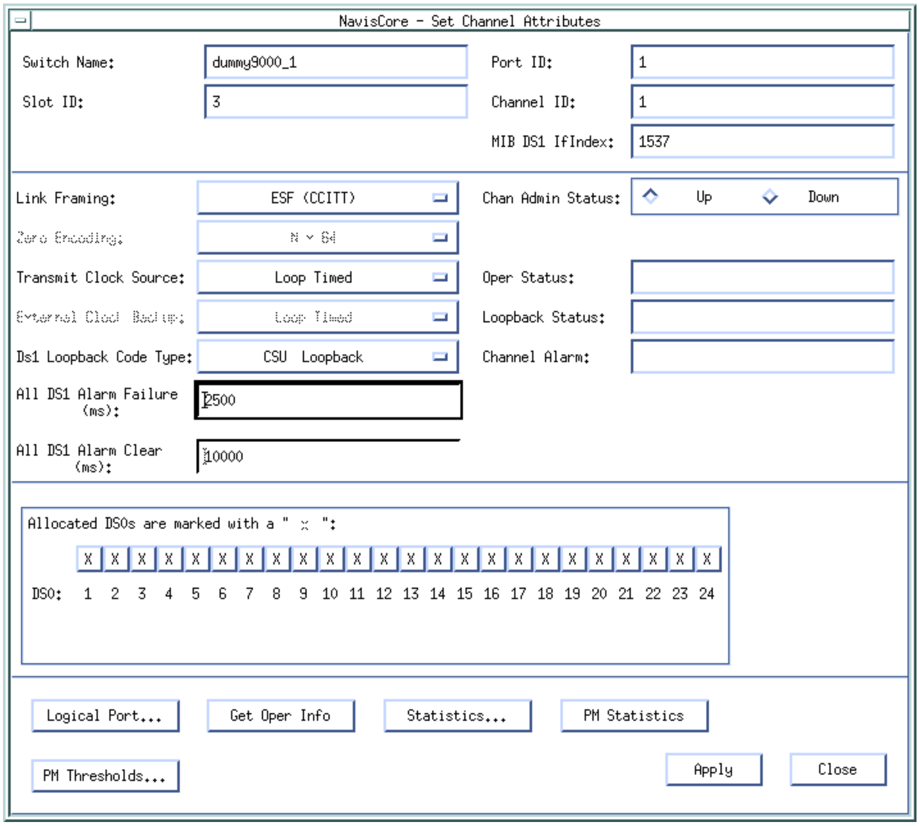


Figure 8-6. Set Channel Attributes Dialog Box

The Set Channel Attributes Dialog Box

The Set Channel Attributes dialog box displays buttons and non-configurable fields described in Table 8-10.

Table 8-10. Set Channel Attributes Fields and Buttons

Field/Button	Function
Switch Name	Name of the switch in which the module resides.
Slot ID	Slot number where the module resides.
Port ID	Number of the port you are configuring.
Channel ID	Number of the channel you are configuring.
MIB DS1 IfIndex	Interface number used for link performance. (If you use a third-party MIB browser, the value is displayed.)
Oper Status	The card's current operational state.
Loopback Status	The card's current loopback status.
Channel Alarm	Indicates the alarm status of the channel. For information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Logical Port	Displays information for the selected logical port and allows you to add or modify a logical port.
Get Oper Info	Displays a brief status for the selected channel. This command updates the Oper Status field to show the current channel status.
Statistics	Displays channel summary statistics for the selected channel. For information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
DS1 Statistics	Displays link performance statistics for the selected channel. For information about DS1 statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
PM Thresholds	Enables you to configure performance monitoring statistics. See Appendix A, "Configuring Performance-Monitoring Thresholds".
PM Statistics	Enables you to access performance monitoring statistics. See the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the required dialog box fields described in Table 8-11.

Table 8-11. Set Channel Attributes Fields

Field	Action/Description
Link Framing	Select a framing format. Framing configures the T1/E1 interface for a particular framing specification, enabling you to distinguish between the individual channels. Framing adds one additional bit to each frame. ***Note**: The customer premise equipment (CPE) must use the same framing specification as the Ascend physical port.* Options include: *ESF (CCITT) (default)* – Extended Superframe. Extends the D4 framing format from 12 frames to 24 frames, and uses modified framing bits to provide a cyclic redundancy check (CRC), secondary channel, and data link. The advantage of ESF framing over D4 framing is that it enables Ascend equipment to monitor and respond to a maintenance message from the network. Facility Data Link (FDL) for CCITT is the European standard. *D4 Framing* – Consists of 12 frames (also called “Superframe”). It provides end-to-end synchronization and signaling associated with a particular channel.
Zero Encoding	Select an encoding format for the T1 interface. Options include: *N x 64 (clear channel) (default)* – Refers to the speed of the channel for clear channel. Using this method, each channel uses 64 Kbps (the entire bandwidth). *N x 56 (Jammed Bit)* – Refers to jammed bit zero encoding. Jammed Bit is also known as Alternate Mark Inversion (AMI). This method forces at least one pulse every eight bits into bit 8 of each channel.

Table 8-11. Set Channel Attributes Fields (Continued)

Field	Action/Description
Transmit Clock Source	Select the transmit clock source for the DS1. Options include: *Loop Timed (default)* – The clock source is derived from the timing received. *Internal* – The internal timing generator provides the clock source. *External* – An external connection provides the clock source. If you select this option, you should also set an external clock backup.
External Clock Backup	If the external clock source fails, you can set this parameter to automatically enable either loop timed or internal clock source. See page 8-20 for more information about external clock source and backup for a channelized DS3 module.
DS1 Loopback Code Type	Specify the loopback as one of the following: *CSU Loopback* – Specifies that the DS1 loopback loops back the CSU at the customer premise equipment (CPE). *NI Loopback* – Specifies that the DS1 loopback loops back the Network Interface (NI) at the customer premise equipment (CPE).
All DS1 Alarm Failure (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits before declaring a DS1 interface problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) means the switch soaks the DS1 interface alarm for 2.5 seconds before declaring the DS1 interface down. A value of 0 ms means the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the DS1 interface down due to any transient failure in the transmission path; for a DS1 interface that provides trunk connectivity, this may cause unnecessary rerouting of circuits. ***Note**: If you modify this field, the change applies to all 28 DS1 channels.*

Table 8-11. Set Channel Attributes Fields (Continued)

Field	Action/Description
All DS1 Alarm Clear (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a DS1 interface problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) means the switch waits 10 seconds after the alarm clears before declaring the DS1 interface up. A value of 0 ms means the DS1 interface comes back up as soon as the DS1 interface failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the DS1 interface up before the transmission path is stabilized. ***Note***: *If you modify this field, the change applies to all 28 DS1 channels.*
Chan Admin Status	Set the Chan Admin Status field. Options include: *Up* – Activates the channel. *Down* – Disables the channel or takes the channel offline to run diagnostics.
Allocated DS0s are marked with a cross	Select the DS0 channels for this configuration. Configured DS0 channels are marked with an X. By default, all DS0 channels are configured. Click the left mouse button on the channel to deselect/select the X. To deselect DS0 channels, click on the channel to remove the X. You can select/deselect channels by using the following Channel Allocation editing buttons. -- To deselect all channels ++ To select all channels - To deselect a specific channel + To select a specific channel
Number of Allocated Channels	Displays the number of DS0 channels allocated for use on a channelized DS3. This number changes according to the number of DS0 channels you add or remove. Confirm the number of channels is correct.

3. Choose Apply to set the channel attributes.
4. Choose Close to return to the Set Physical Port Attributes dialog box.
5. Choose Apply to save the physical port attributes and send an SNMP Set command to the switch.
6. Choose Close to exit the dialog box.
7. To define the logical port parameters that complete this configuration, see one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

About Bulk LPorts

In previous versions of NavisCore, you could only create one logical port at a time. In this release, the Bulk Lport feature enables you to create multiple logical ports on the Channelized DS3-1-0 module which are based on logical port templates you created. (For more information about logical port templates, see the *NavisCore Frame Relay Configuration Guide*).

This feature only creates logical ports in the NavisCore database. To download logical port information to the B-STDX switch, you need to PRAM sync the switch from NavisCore.

Creating Bulk Logical Ports

> The Bulk LPort button is disabled by default. To enable it, set the environment variable ***CV_310_BULK_LPORT*** in the ***cascadeview.cfg*** file to TRUE. For more information on the cascadeview.cfg file, see the *NavisCore NMS Getting Started Guide.*

To create bulk logical ports:

1. From the Set Physical Port Attributes dialog box (Figure 8-5 on page 8-21), choose Bulk LPort. The Bulk LPort Creation Selection dialog box (Figure 8-7) appears.

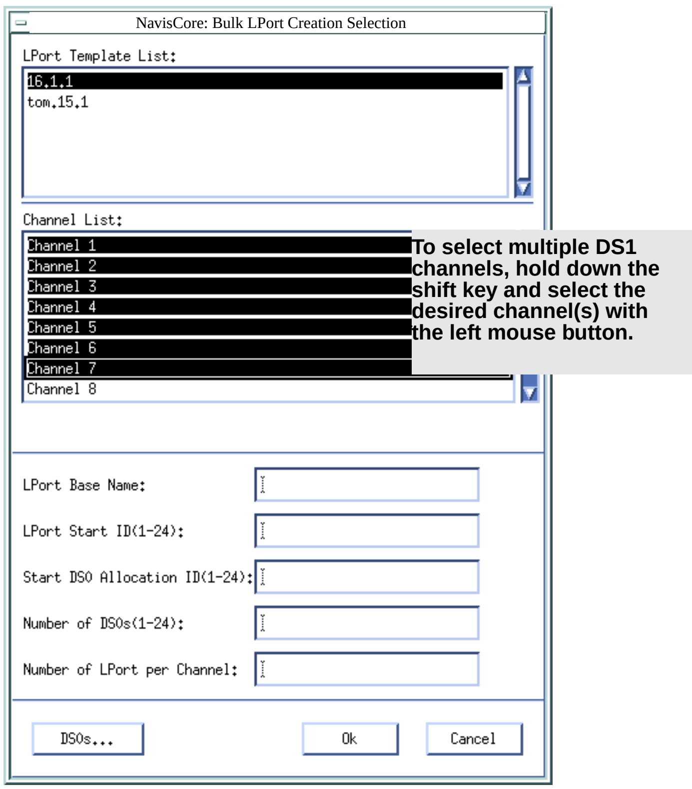


Figure 8-7. Bulk LPort Creation Selection Dialog Box

2. Select a logical port template from the LPort Template List window.

3. Complete the fields described in Table 8-12.

Table 8-12. Bulk Lport Creation Selection Fields

Field	Action/Description
LPort Template List	Select a logical port template from the displayed list. Logical port templates enable you to create logical ports that have identical configurations. For more information on logical port template creation, see the *NavisCore Frame Relay Configuration Guide.*
Channel List	Select a DS1 channel from the DS1 channel list. ***Note****: To select multiple DS1 channels, hold down the shift key and select the desired DS1 channels with the left mouse button.*
LPort Base Name	Enter the logical port base name that the template is based on.
LPort Start ID (1-24)	Enter a value between 1-24 for the starting logical port ID of the first logical port.
Start DS0 Allocation ID (1-24)	Enter a value between 1-24 for the starting DS0 ID.
Number of DS0s (1-24)	Enter the number of DS0s (bandwidth) for the logical port.
Number of LPorts per Channel	Enter the number of logical ports for the DS1 channel(s) you selected from the Channel List.

4. Choose OK to create the logical ports.

The Bulk LPort Creation dialog box appears (Figure 8-8).

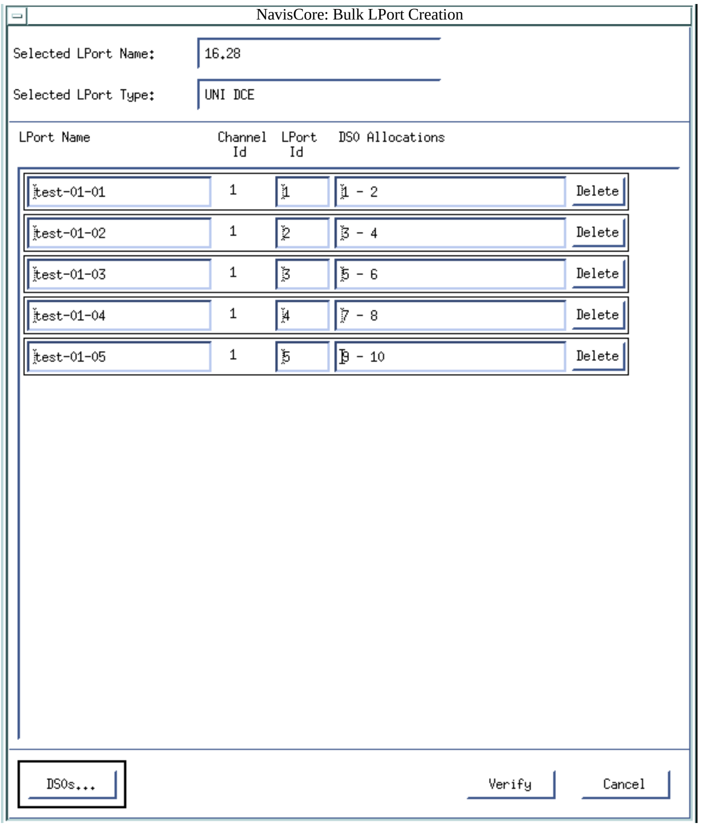


Figure 8-8. Bulk LPort Creation Dialog Box

5. Do one of the following:

- Choose Delete to remove the entry. Re-enter the values.
- To modify the entry, position the cursor in the field you want to modify and edit the values.

6. Choose Verify to add the logical port to the database.

The Bulk Creation dialog box (Figure 8-9)appears.

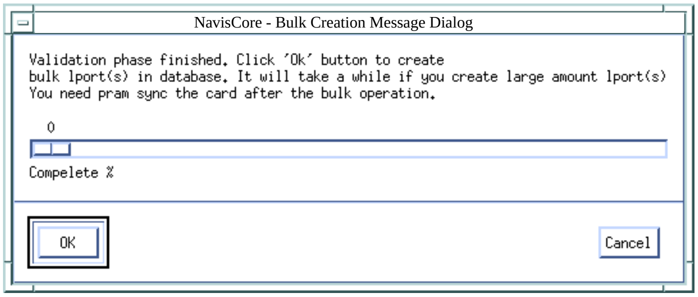


Figure 8-9. Bulk Creation Message Dialog Box

7. Choose OK.

8. When the process completes, choose OK.

The Bulk LPort Creation dialog box (Figure 8-10)reappears. This dialog box verifies the created logical port in the Result field.

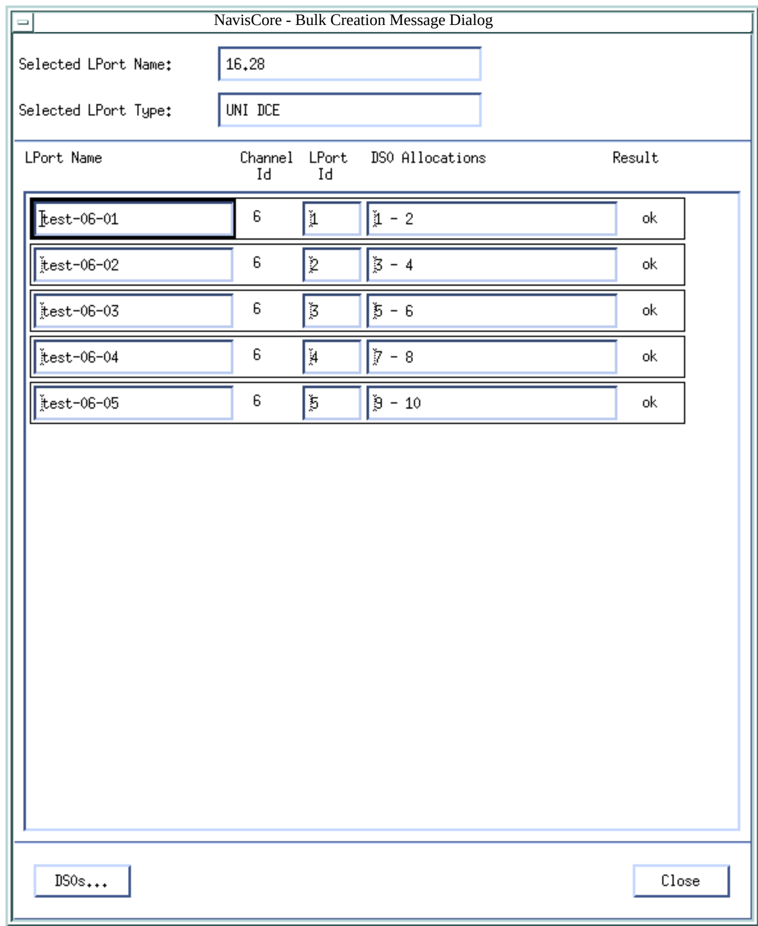


Figure 8-10. Bulk LPort Creation Dialog Box

9. To view the physical port's DS0 allocation, choose DS0. See "Displaying DS0 Allocation on Physical Ports" on page 8-36.

10. Choose Close to exit the dialog box.

11. PRAM Sync the switch to send the new information to the switch. For more information on this operation, see the *NavisCore NMS Getting Started Guide.*

Resolving Bulk LPort Creation Conflicts

If NavisCore detects a conflict, the system displays an error message (for example, “the logical port is already in use”). To resolve the conflict:

1. Choose DS0 to view the physical port’s DS0 allocation. See “Displaying DS0 Allocation on Physical Ports” on page 8-36 for more information.
2. Resolve the conflict.

Displaying DS0 Allocation on Physical Ports

To view DS0 allocation on physical ports:

1. Access the Set Physical Port Attributes dialog box as described in “Accessing Physical Port Attributes” on page 8-1.
2. Choose DS0. The DS0 allocation dialog box (Figure 8-11) appears. The example in Figure 8-11 shows allocated DS0s marked with the logical port ID.

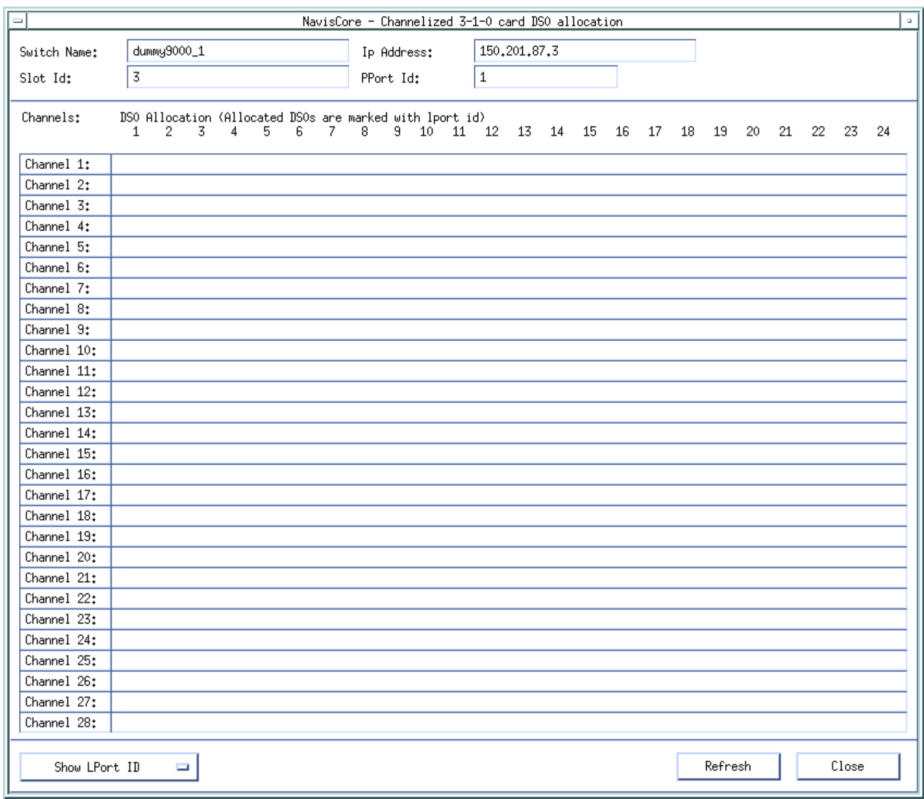


Figure 8-11. Channelized 3-1-0 card DS0 Allocation

3. Select one of the following options:
   - *Show LPort ID* — Displays allocated DS0s marked with the LPort ID.
   - *Show Interface Number* — Displays allocated DS0s marked with the Interface Number.
4. To refresh the dialog box, choose Refresh.
5. Choose Close until you return to the network map.

Defining 10-port DSX-1 Physical Ports

The 10-port DSX-1 I/O module enables fractional T1 connections at variable rates. The DSX-1 physical port attributes also dictate how many DS0 channels are used. By selecting or deselecting individual DS0 channels, you can enable or disable use of that particular DS0.

About External Clock Backup for DSX-1 Modules

You can configure physical ports to support either internal or external clocking. You use the Transmit Clock Source parameter to specify clocking. A DSX-1 module supports an external clock speed of up to 1.544 MHz.

If the physical port loses the external clock source, the External Clock Backup parameter enables the port to automatically revert to either an internal or loop-timed clock source. If the external clock reappears, the switch automatically returns to the external clock source. This feature increases the reliability of customer switched networks that include externally clocked ports.

Configuring 10-port DSX-1 Physicals Ports

To configure a 10-port DSX-1 physical port:

1. Access the Set Physical Port Attributes dialog box (Figure 8-12) as described in “Accessing Physical Port Attributes” on page 8-1.

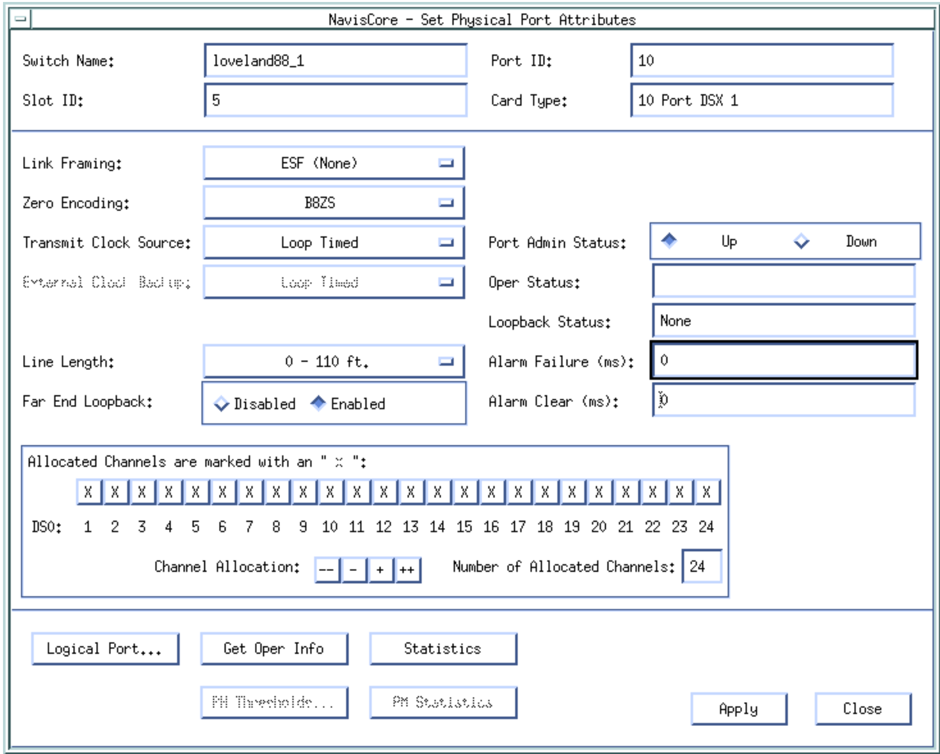


Figure 8-12. Set Physical Port Attributes Dialog Box (10-port DSX-1)

► If the Loopback Status field does not display None, do not modify any physical port attributes. Choose Cancel and see the *NavisCore Diagnostic and Troubleshooting Guide* for information about loopback status.

Table 8-13 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-13. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Oper Status	The card's current operational status.
Loopback Status	Displays the current loopback status of the card.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the fields described in Table 8-14.

Table 8-14. Set Physical Port Attributes Fields (10-port DSX)

Field	Action/Description
Link Framing	Select a framing format. Framing configures the T1 interface for a particular framing specification, enabling you to distinguish between channels. It is accomplished by adding one additional bit to each frame. ***Note****: The CPE must use the same framing specification as the Ascend physical port. See your facility service provider for more information about selecting a link framing specification.* Options include: *ESF (None) (default)* – No Facility Data Link (FDL) messaging support. *D4 Framing* – Consists of 12 frames (also called “Superframe”). It provides end-to-end synchronization and signaling associated with a particular channel.
Zero Encoding	Select an encoding format for the T1 interface. Zero encoding specifies the format of the data signal encoding. The signal has three different levels – positive, negative, and ground, which must be referenced from a master clock. ***Note****: Consult your facility service provider for more information about selecting a zero encoding method.* Options include: *B8ZS (Bipolar with 8 zero substitution) (default)* – Refers to the use of a specified pattern of normal bits and bipolar violation used to replace a sequence of eight zero bits. With B8ZS, a special code is added and then removed from the pulse stream in substitution for a 0 byte that has been transmitted by the user equipment. *Jammed Bit* – Refers to jammed bit zero encoding; also known as Alternate Mark Inversion (AMI). Using this method, at least one pulse every 8 bits is literally implemented by forcing a pulse in bit 8 of each channel.

Table 8-14. Set Physical Port Attributes Fields (10-port DSX) (Continued)

Field	Action/Description
Transmit Clock Source	Select the transmit clock source for the DSX-1. Options include: *Loop Timed (default)* – The clock source is derived from the timing received. *Internal* – The internal timing generator provides the clock source. *External* – An external connection provides the clock source. If you select this option, you should also set an external clock backup.
External Clock Backup	If the external clock source fails, this option can automatically enable either a loop-timed or internal clock source. See page 8-37 for more information about external clock source and backup for DSX-1 modules.
Line Length	Specify the distance measurement from the DSX-1 module to the network equipment. The default is 0 - 110.
Far End Loopback	Enable (default) or disable the switch's ability to respond to loopback commands from far-end equipment. *Enabled* – Allows the switch to respond to loopback commands from far-end equipment (loop-up and loop-down), which can put the port into remote loopback. The loopback signaling can be inband commands or FDL loopback commands. *Disabled* – Ignores inband and FDL loop-up and loop-down commands.
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

Table 8-14. Set Physical Port Attributes Fields (10-port DSX) (Continued)

Field	Action/Description
Alarm Failure (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) indicates the switch “soaks” the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms indicates the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.
Alarm Clear (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) indicates the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms indicates the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Allocated Channels are marked with a cross	Select the DS0 channels for this configuration. To deselect DS0 channels, click on the channel to remove the X. You can select/deselect channels by using the following Channel Allocation editing buttons. -- To deselect all channels ++ To select all channels - To deselect a specific channel +To select a specific channel

Table 8-14. Set Physical Port Attributes Fields (10-port DSX) (Continued)

Field	Action/Description
Number of Allocated Channels	Displays the number of DS0 channels allocated for use on this DSX-1 port. This number changes according to the number of DS0 channels you add or remove from the DSX-1 in the Allocated Channels are marked with a cross field. 64 Kbps bandwidth is allocated for each channel you select. For example, if you select 20 channels using the B8Zs zero encoding, a maximum of 1280 Kbps (20 x 64 = 1280) bandwidth is allocated for logical port configuration. Using the Jammed Bit zero encoding option, if you select 20 channels, a maximum of 1120 Kbps (20 x 56 = 1120) bandwidth is allocated for logical port configuration.

3. Choose Apply to save the physical port attributes and send an SNMP Set command to the switch.

4. Choose Close to exit the dialog box.

5. To define the logical port parameters that complete this configuration, see one of the following guides:

- *NavisCore Frame Relay Configuration Guide*
- *NavisCore IP Configuration Guide*
- *NavisCore ATM Configuration Guide*
- *NavisCore SMDS Configuration Guide*
- *NavisCore ISDN Configuration Guide*

Defining HSSI Physical Ports

The 2-port HSSI I/O module enables connections at data rates up to 44.212 Mbps. You can configure each of the module's two physical ports at speeds that increment from 1.579 Mbps to 44.212 Mbps to support DTE connections. The combined speed of both ports cannot exceed 44.212 Mbps.

To configure the physical port parameters for a 2-port HSSI module:

1. Access the Set Physical Port Attributes dialog box (Figure 8-13)as described in "Accessing Physical Port Attributes" on page 8-1.

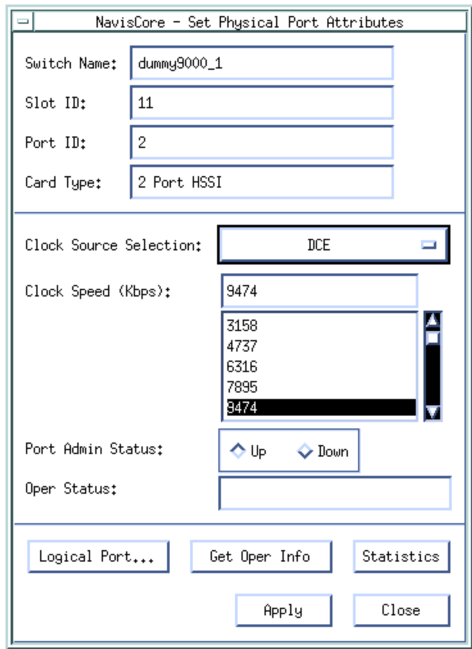


Figure 8-13. Set Physical Port Attributes Dialog Box (2-port HSSI)

Table 8-15 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-15. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.

Table 8-15. Set Physical Port Attributes Dialog Box Fields and Buttons (Continued)

Field/Button	Function
Oper Status	The card's current operational status.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the required dialog box fields described in Table 8-16.

Table 8-16. Set Physical Port Attributes Fields (2-port HSSI)

Field	Action/Description
Clock Source Selection	Select a clock source. The switch can either supply or receive clock at a rate of up to 44.212 Mbps. Options include: *DCE* – Configures the port to provide clock at the rate specified by the clock speed selection. Use this option when connecting to a DTE, where the switch provides both the transmit and receive clocks and uses a straight-through cable. Use a crossover cable to connect to a physical DCE. *DTE* – Configures the port to receive clock from an outside source, typically a CSU/DSU. However, you should set the clock speed even though it is not clocking. You need clock speed for logical port configuration. ***Note****: B-STDX 8000/9000 ports are always electrically DCE and require a crossover cable when interfacing with a modem or other DCE. See the* B-STDX Hardware Installation Guide *for cable diagram pinouts.*

Table 8-16. Set Physical Port Attributes Fields (2-port HSSI) (Continued)

Field	Action/Description
Clock Speed (Kbps)	If the clock source is set to DTE, the switch ignores the clock speed parameter for clocking purposes. However, you should set clock speed for the actual clock rate, since the cumulative total of all logical ports configured on the physical port cannot exceed the clock source setting. ***Note****: The total bandwidth of all physical ports on the HSSI module cannot exceed the maximum module capacity of 44.212 Mbps. If you exceed the maximum capacity, NavisCore displays an error message.*
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

3. Choose Apply to save the attributes and send an SNMP Set command to the switch.
4. Choose Close to exit the dialog box.
5. To define the logical port parameters that complete this configuration, see one of the following guides:
    - *NavisCore Frame Relay Configuration Guide*
    - *NavisCore IP Configuration Guide*
    - *NavisCore ATM Configuration Guide*
    - *NavisCore SMDS Configuration Guide*
    - *NavisCore ISDN Configuration Guide*

ATM-based I/O Modules

This section describes how to set the physical port attributes for the following ATM-based I/O modules:

- 1-port ATM UNI DS3/E3
- 1-port ATM IWU/OC3
- 1-port ATM CS DS3/E3

Peak Cell Rate

Peak cell rate (PCR) is an ATM traffic management parameter. In constant bit rate (CBR) transmissions, PCR determines how often data samples are sent. In available bit rate (ABR) transmission, PCR determines the maximum value of the allowed cell rate (ACR).

Sustainable Cell Rate

Sustainable cell rate (SCR) is the average cell transmission rate that is allowed over a given period of time on a given circuit. SCR allows the network to allocate sufficient resources (but fewer resources than would be allocated based on the peak cell rate) for guaranteeing that network performance objectives are met. This parameter applies only to variable bit rate traffic; it does not apply to CBR or unspecified bit rate (UBR) traffic.

VP Shaping

VP shaping is a technique that ATM I/O modules use to control the transmission rate of cells in an ATM network.

On B-STDX 9000 switches, VP shaping is supported on the ATM IWU and ATM CS I/O modules. The chip in each I/O module contains 15 user configurable shapers, each of which is responsible for controlling the transmission rate of cells across the circuits assigned to it.

Traffic Shaping on ATM UNI DS3/E3 I/O Modules

There are 15 user-configurable traffic shapers (IDs) available for cell transmission. Values 1 through 15 specify the traffic shaper to be used for the physical port. Each shaper has associated default values for priority, SCR, PCR, and maximum burst size (MBS). You can modify these defaults by entering a shaper configuration. Then using *Verify Traffic Shaper*, the NMS verifies the values for the shaper ID and changes the settings as necessary (depending on the hardware) since hardware cannot shape traffic at all settings. According to the configured priority, the shaper transmits data only when a shaper with a higher priority is not waiting for transmission.

Shaper Priority Settings

You assign priority values to shapers. There are 15 traffic shaper priority values; a shaper priority of 1 is highest, and a shaper priority of 15 is the lowest. You must set the shaper settings in ascending priority levels so that the priority value set for shaper N+1 is greater than or equal to the priority value set for shaper N. If you change the priority for shaper N, the NMS will force all configured N+1 and above shapers to be at least the configured priority of shaper N. The default shaper priority for all shapers is 1.

If you change shaper ID 3 to priority 2 and choose *Verify Traffic Shaper*, the NMS will change the priority for shapers 4 through 5 to priority level 2. If you change shaper ID 8 to priority 4, the NMS will also change the priority of shapers 9-15 to priority 4.

Traffic Shaping on CS/IWU I/O Modules

Traffic Shaping

ATM traffic parameters describe particular aspects of the ATM cell stream. The ATM cell stream includes:

- Peak Cell Rate (see “Peak Cell Rate” on page 8-47)
- Sustainable Cell Rate (see “Sustainable Cell Rate” on page 8-47)
- Maximum Burst Size

These values allow you to shape traffic, which limits transmitted traffic. The NEC ATM Segmentation and Reassembly (SAR) chip in CS/IWU cards performs traffic shaping.

NEC Hardware Shapers

The NEC ATM SAR chip provides 16 hardware shapers. The B-STDX software reserves the first chip as the line rate shaper (PCR=SCR=line rate). The line rate shaper is the maximum speed at which you can transfer traffic. You configure the rest of the 15 shapers through NavisCore. You configure each shaper with PCR, SCR, and MBS values, and assign priorities from 1 to 15. The lower the priority value, the higher the shaper priority.

The NEC ATM SAR chip internally schedules shapers once every 24 system clocks. This scheduling is based on the parameter settings (PCR, SCR, and MBS) and shaper priorities. The NEC ATM SAR chip is clocked at 33 Mhz, giving a clock period of 30 nanoseconds (ns). As a result, the NEC scheduler evaluates the next shaper every 720 ns.

The NEC ATM SAR chip transmits a cell every 2.8 μ (357,143 cells/sec). Idle cells are inserted when valid cells are unavailable. When valid cells are unavailable, idle cells are inserted, then discarded.

Shaper Configuration

The NEC ATM SAR chip derives its values from user-configured parameters (PCR, SCR, MBS). NavisCore converts these values into values that the NEC ATM SARC chip can use when setting shaper registers. The NEC chip uses the following values when configuring a shaper:

Table 8-17. Shaper Values

Value	Description
Priority	The shaper priority. The range is between 1 and 15 (1 being the highest priority).
I/M	I is the number of cells transmitted in M cell times. I is an 8-bit quantity, M is a 24-bit quantity. The I/M ratio sets the SCR (average rate) for the shaper.
P	The minimum interval, in cell times, between cells emitted for the same virtual circuit.
C	The maximum number of cells that can be transmitted successively at the peak cell rate.

In the Ascend Enterprise MIB Definitions, the table *pportTrafficShaperTable* defines NEC shaper values. Table 8-18 contains the MIB items and their NEC shaper value equivalents:

Table 8-18. MIB Definitions

MIB	Description
pporttrafficShaperIndex	The shaper index value from 1-15.
pportTrafficShaperPriority	The priority value
PportTrafficShaperCellRatioDividend	The value for I
Pport TrafficShaperCellRatioDivisor	The value for M
PportTrafficShaperPeak	The value for P
PportTrafficShaperCredit	The value for C

The user enters values for PCR, SCR, and MBS, and the values are converted to I, M, P, and C values using the following formula:

Conversion Formula

P = (357143 / PCR) -1

C = MBS

SCR = I/M * (357143)

To best approximate SCR from the I/M ratio, maximize the value for I (255):

M = (255*357143) / SCR

This formula describes how the NEC chip generates PCR and SCR.

Cell Trunk Shaper Priority Assignment

To allow for circuit prioritization by circuit QoS class, the switch code creates three groups of shapers used for VBR rt, VBR nrt, and UBR circuits. Five shapers are assigned to each group. The user can modify the shaper settings with the following rules in mind:

- The shaper priority set for shaper n + 1 must be greater than or equal to the priority set for shaper n.
- VBR rt circuits will be assigned to shapers 1 - 5 (shaper group 1).
- VBR nrt circuits will be assigned to shapers 6 - 10 (shaper group 2).
- UBR circuits will be assigned to shapers 11 - 15 (shaper group 3).
- Shaper 0 is set to PCR = SCR and is not changeable by the user. This shaper is used to carry control circuits.
- The MBS value must be 1 or greater.
- The PCR value is verified to see if it can be generated by the NEC ATM SAR shaper using the preceding formula for P ("Conversion Formula" on page 8-51). If the PCR value cannot be achieved, then NavisCore changes the PCR value to the closest achievable PCR value.
- If SCR is greater than PCR, NavisCore forces SCR to equal PCR.

Assignment of a circuit to an individual shaper within a QoS shaper class is done based on the SCR (CIR) of the circuit. At connection establishment, the QoS value is used to select a shaper group, then the circuit will be assigned to the shaper whose SCR closely approximates the SCR (CIR) of the circuit. The conversion formula is the same as the one used for CAC when determining bandwidth allocation for circuits:

SCR0 = CIR * IOH1 / 8,

where:

IOH1 is the Interworking Overhead =

((N_Avg + AALHS) / 48) / N_Avg,

For an average frame size of 256, IOH1 is approximately equal to 0.02148.

The user can configure shapers to the desired PCR, SCR, and MBS within each of the three QoS groups. The shaper entry priority field determines transmit priority of the traffic associated with the shaper.

For example, using Table 8-19, a circuit with QoS VBR nrt and an SCR = 5000 would be assigned to shaper 9 (second QoS group for nrt and 60000 as the highest SCR). A circuit with a QoS of UBR and an SCR = 80000 would be assigned to shaper 11. A circuit with QoS VBR rt and an SCR = 49000 would be assigned to shaper 3.

Table 8-19. Shaper Parameters

Shaper ID	Priority	SCR	PCR	Burt Tolerance	QoS
1	1	353207	353207	2	VBR rt
2	1	89285	353207	2	
3	1	60000	353207	100	
4	1	48000	48000	2	
5	1	24000	24000	2	
6	2	353207	353207	2	VBR nrt
7	2	80000	353207	100	
8	2	72000	72000	2	
9	2	60000	60000	2	
10	2	44642	353207	2	
11	3	353207	353207	2	UBR
12	3	72000	72000	2	
13	3	50000	50000	2	
14	3	35000	35000	2	
15	3	22321	353207	2	

The NEC chip schedules the shaper every 70 nanoseconds (ns). When this takes place, a cell, segmented from the frame associated with the circuit, is assigned to the highest priority shaper. Table 8-19 shows how priority works when multiple circuits, assigned to different priority shapers, present data (data which is transmitted simultaneously from the circuits).

Shaper Assignment Example

In this example, using the shapers in Table 8-19, seven circuits are active on a cell trunk. Circuits VC a and VC b are QoS class VBR rt. Circuits VC c, VC d and VC e are QoS class VBR nrt. Circuits VC f and VC g are QoS class UBR circuits.

Table 8-20. Circuit Values

Circuit Name	QoS class	SCR
VC a	VBR rt	72000
VC b	VBR rt	68000
VC c	VBR nrt	44000
VC d	VBR nrt	44000
VC e	VBR nrt	44000
VC f	UBR	20000
VC g	UBR	20000

Table 8-21 lists the configured shaper values:

Table 8-21. Shaper Values

Shaper Parameters	Shaper 2[a]	Shaper 10[b]	Shaper 15[c]
PCR	353207	353207	353207
SCR	89285	44642	22321
MBS	2	2	2
priority	1	2	3

[a] For shaper 2, the I/M ratio is 1 cell in 4 cell times (SCR/PCR = 1/4).
[b] For shaper 10, the I/M ratio is 1 cell in 8 cell times (SCR/PCR = 1/8).
[c] For shaper 15, the I/M ratio is 1 cell in 16 cell times (SCR/PCR = 1/16).

> I is the number of cells transmitted in M cell times (I is an 8-bit quantity, M is a 24-bit quantity). The I/M ratio sets the SCR (average rate) for the shaper.

Each of the circuits are assigned to the following shapers:

Table 8-22. Shapers Assigned to Circuits

Shaper 2	Shaper 10	Shaper 15
VC a	VC c	VC f
VC b	VC d	VC g
	VC g	

Table 8-23 illustrates the cell stream emitted for this configuration:

Table 8-23. Cell Stream Rates

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaper 2	a	b			a	b			a	b			a	b		
Shaper 10			c	d			e				c	d			e	
Shaper 15								f								g

Following the results listed in Table 8-23, the following events occur in sequential order:

- VC a and b send 1 cell every 4 cell times.
- VC c and d send cells.
- The scheduler recognizes that shaper 2 has the highest priority and sends a cell from VC a and b again.
- The scheduler returns to shaper 10 and sends a cell from VC e.
- The scheduler finds no work for shaper 2 or 10, so it sends a cell from shaper 15, VC f.
- The cycle repeats.

Configuring the Shaper Settings

If you do not change the physical port shaper defaults, the cell trunk operation remains the same as in the previous software release. In this case, all shapers are set to the line rate shaper, and all priorities are equal. If you use the shaper defaults, the switch still assigns the circuits, based on QoS, to the first shaper in each QoS shaper group. However, all circuits will be serviced with equal priority since the shaper's priorities are equal.

Use caution when you set circuit prioritization shapers when circuits, having the Graceful Discard Option ON, traverse the cell trunk. With Graceful Discard on, frame relay circuits burst data up to the access rate of the ingress card. The potential problem is when SCR is calculated using CIR, which does not take into account the bursts that Graceful Discard allows. If SCR (set in the Pport shaper field) closely matches SCR, calculate from the CIR value when the circuit exceeds the Burst Tolerance value data (accumulated in the VC transmit queues). If the data source continues to exceed CIR, then discard is inevitable due to shaper congestion.

Defining ATM UNI DS3/E3 Physical Ports

The ATM UNI DS3/E3 module physical port configuration steps are similar. Special considerations are described in Table 8-25 on page 8-60.

To configure the physical port parameters for the ATM UNI DS3/E3:

1. Access the Set ATM Physical Port Attributes dialog box (Figure 8-14) as described in "Accessing Physical Port Attributes" on page 8-1.

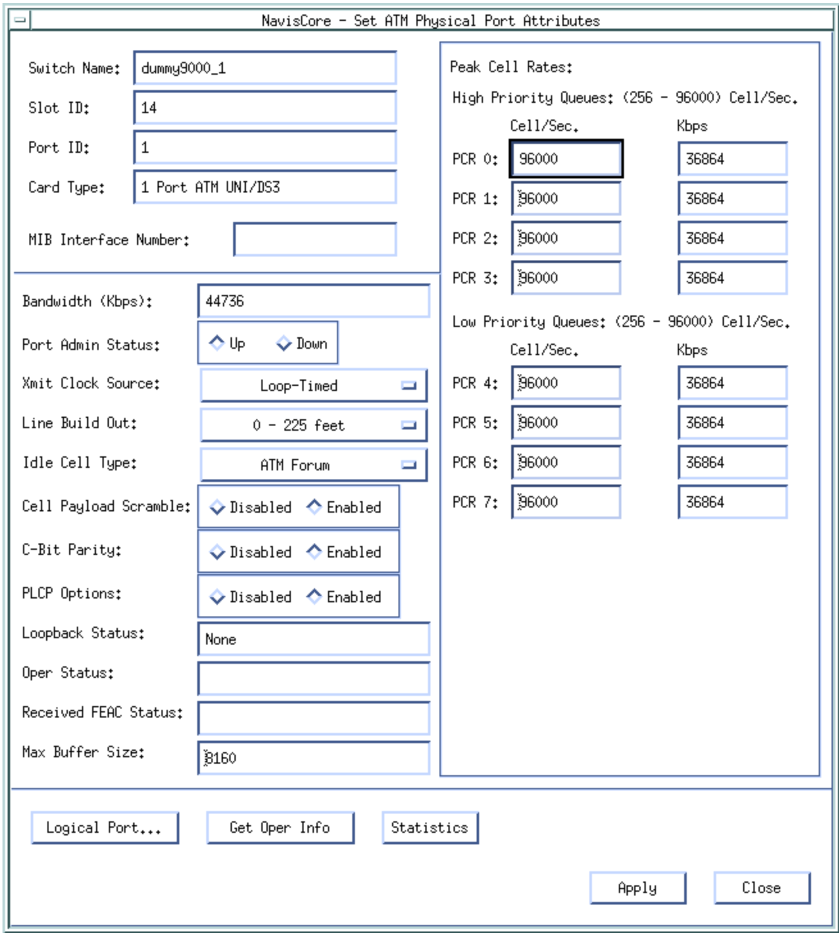


Figure 8-14. Set ATM Physical Port Attributes Dialog Box (ATM UNI DS3)

> If the Loopback Status field does not display None, do not modify any physical port attributes. Choose Cancel and see the *NavisCore Diagnostic and Troubleshooting Guide.*

Table 8-24 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-24. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
MIB Interface Number	Interface number used for link performance. (If you use a third-party MIB browser, the value is displayed.)
Bandwidth (Kbps)	Displays the amount of bandwidth available for this physical port.
Loopback Status	Defaults to None. If you enable loopback tests, this field displays the card's actual loopback status. For more information about loopbacks, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Oper Status	Displays a brief status to indicate the operational status of the selected port.
Received FEAC Status (*ATM UNI DS3*)	Displays the Far-End Alarm and Control (FEAC) status received by the physical port, if C-bit parity is enabled. This field indicates the status of the physical port on the other end of the connection. If you are using M13, this field displays None.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the required dialog box fields described in Table 8-25.

Table 8-25. Set Physical Port Attributes Fields (ATM UNI DS3/E3)

Field	Action/Description
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.
Xmit Clock Source	Select the transmit clock source. Options include: *Loop-Timed (default)* – The clock source is derived from the network timing received. *Internal* – The internal T1/E1 timing generator provides the clock source.
Line Build Out (*ATM UNI DS3 only*)	Select the line build-out. This value represents the length of the cable from the switch to the network equipment to which it is attached. Options include: 0 – 225 feet (*default*) for a short cable 226 – 450 feet for a long cable
Idle Cell Type	Select the format to be used when cells are idle. Options include *ATM Forum and ITU*.
Cell Payload Scramble	Disable this function only if the equipment connected to this port does not support Cell Payload Scramble. The Cell Payload Scramble function prevents user data from being misinterpreted (ATM cell header delineation).
C-Bit Parity (*ATM UNI DS3 only*)	Enable or disable C-Bit Parity. The C-Bit Parity function enables you to monitor the end-to-end performance of T3 circuits. This function works with Cell Payload Scramble.

Table 8-25. Set Physical Port Attributes Fields (ATM UNI DS3/E3) (Continued)

Field	Action/Description
PLCP Option (*ATM UNI DS3*)	Enable or disable the Physical Layer Convergence Protocol (PLCP). *Enable* – ATM UNI DS3 module uses a PLCP frame, which transmits 12 ATM cells every 125 µs. The ATM cell payload bandwidth is 36.9 Mbps (96000 x 48 x 8bps) for UNI DS3 and 27.6 Mbps for CS E3 cards. Use this option if the customer premise equipment can handle PLCP frames. *Disable* – The module uses ATM direct mapping to pack ATM cells into the DS3/E3 bit stream. The ATM cell payload bandwidth is 40 Mbps (104268 x 48 x 8bps) for UNI DS3 and 30.7 Mbps for CS E3 cards. This option provides the most bandwidth. Use this option only if you can disable PLCP for the CPE connected to this port.
Max Buffer Size (*ATM UNI DS3*)	Specify the maximum number of bytes in the reassembly buffer. The default is 8152. By configuring a smaller size, you provide more buffers to reassemble packets and reception is improved. However, the maximum buffer size must be large enough to hold the largest packet of information. Packets are discarded if the reassembly buffer is full.
Peak Cell Rates	Specify the Peak cell rate (PCR), which is the maximum transmission rate at which cells are transmitted. When you configure a queue, enter the PCR values in terms of cells-per-second. The corresponding value, expressed in terms of Kbps, is derived automatically according to your input. Options include: • For the ATM UNI DS3 module with PLCP enabled, specify a range from 256 cells/sec to 96000 cells/sec. • For the ATM UNI DS3 module with PLCP disabled, specify a range from 256 cells/sec to 104268 cells/sec. • For the ATM UNI E3 module, specify a range from 256 cells/sec to 8000 cells/sec.

3. Choose Apply to save the physical port attributes.
4. Choose Cancel to exit the dialog box.
5. To define the logical port parameters that complete this configuration, see one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Defining ATM Interworking Unit (IWU) Physical Ports

To configure the physical port parameters for the ATM IWU module:

1. Access the Set ATM Physical Port Attributes dialog box (Figure 8-15) as described in "Accessing Physical Port Attributes" on page 8-1.

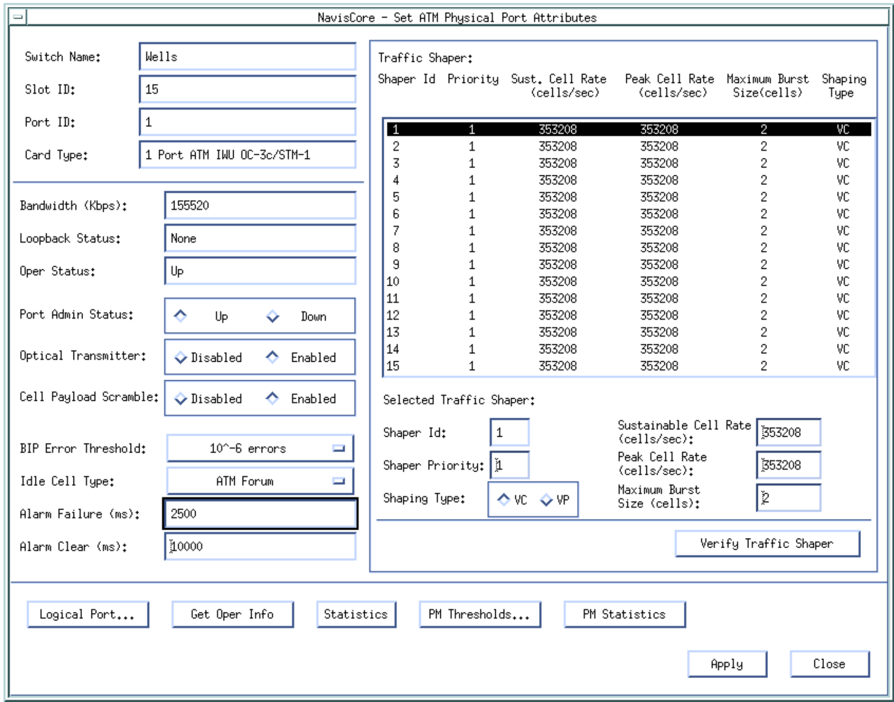


Figure 8-15. Set ATM Physical Port Attributes Dialog Box (IWU)

> If the Loopback Status field does not display None, do not modify any physical port attributes. Choose Cancel and see the *NavisCore Diagnostic and Troubleshooting Guide* for more information about loopback testing.

Table 8-26 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-26. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Bandwidth (Kbps)	Displays the amount of bandwidth available for this physical port.
Loopback Status	Defaults to None. If you enable loopback tests, this field displays the ATM IWU card's loopback status. For more information about DS3 Loopback, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Oper Status	Displays a brief status to indicate the operational status of the selected port.
Verify Traffic Shaper	Determines whether or not the Shaper Priority, SCR, PCR, and/or Maximum Burst Size (MBS) values are acceptable (valid) values for the defined card. Normally, the value that you enter for SCRs and PCRs is different from the verified value since the NMS attempts to match the entered values to the closest value that is acceptable for the hardware.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
PM Thresholds	Configure Performance Monitoring Thresholds. See "Performance Monitoring on ATM IWU/OC3 Physical Ports" on page A-13.

Table 8-26. Set Physical Port Attributes Dialog Box Fields and Buttons (Continued)

Field/Button	Function
PM Statistics	Access Performance Monitoring Statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the required dialog box fields described in Table 8-27.

Table 8-27. Set ATM Physical Port Attributes (ATM IWU)

Field	Action/Description
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.
Optical Transmitter	Set this field to Enabled or Disabled. This field is a safety feature intended to prevent personal injury when you repair or replace the module, or connect cables to the module. By default, this option is set to Disabled. The Disabled setting disables the transmitter for this port, preventing the port from transmitting incoming traffic.You must set this field to *Enabled* to transmit incoming traffic out of this port. **WARNING:** BEFORE YOU REMOVE THE OPTICAL CABLE, SET THIS FIELD TO **Disabled**. IF THE OPTICAL CONNECTORS ARE EXPOSED, THE TRANSMITTER BEAM CAN CAUSE PERSONAL INJURY. ***Note:*** *When you disable the transmitter, the CPE or switch at the other end of the connection reports a red port alarm to indicate signal loss.*
Cell Payload Scramble	Disable this function only if the equipment connected to this port does not support Cell Payload Scramble. The Cell Payload Scramble function prevents user data from being misinterpreted (ATM cell header delineation).
BIP Error Threshold	Select the Bit Interleaving Parity error threshold to indicate the physical port's sensitivity to network errors. Options include: • $10^{\wedge -6}$ errors • $10^{\wedge -5}$ errors • $10^{\wedge -4}$ errors • ignore

Table 8-27. Set ATM Physical Port Attributes (ATM IWU) (Continued)

Field	Action/Description
Idle Cell Type	Select the format to be used when cells are idle. Options include: • *ATM Forum* • *ITU*
Alarm Failure (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) indicates the switch "soaks" the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms indicates the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.
Alarm Clear (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) indicates the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms indicates the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.

3. Complete the Traffic Shaper parameters described in Table 8-28.

Table 8-28. Traffic Shaper Fields (ATM IWU)

Field	Action/Description
Shaper Id	Select a value from 1 through 15 to specify the traffic shaper to be used for this physical port. For UNI DS3/E3 cards, see “Traffic Shaping on ATM UNI DS3/E3 I/O Modules” on page 8-48. For CS/IWU cards, see “Traffic Shaping on CS/IWU I/O Modules” on page 8-49.
Shaper Priority	Select a Shaper Priority from 1 to 15. Shaper 1 has the highest priority. Shaper 15 has the lowest priority. For ATM UNI DS3/E3 cards, see “Traffic Shaping on ATM UNI DS3/E3 I/O Modules” on page 8-48. For CS/IWU cards, see “Traffic Shaping on CS/IWU I/O Modules” on page 8-49.
Shaping Type	Select one of the following: *VC* – Shaping is performed on a circuit by circuit basis for each circuit assigned to the shaper. *VP* – Shaping is performed on an aggregate (that is virtual path) basis for all of the circuits assigned to the shaper. For more information, see “VP Shaping” on page 8-47.
Sustainable Cell Rate	Specify an SCR that is less than or equal to the peak cell rate (PCR). SCR is usually some fraction of the PCR and its value must be greater than or equal to 1/64 of the PCR. For more information, see “Sustainable Cell Rate” on page 8-47.
Peak Cell Rate	Select the peak cell rate which determines the maximum transmission rate at which cells are transmitted. When PLCP is disabled, specify a range from 1400 cells/sec to 8000 cells/sec. When PLCP is enabled, specify a range from 1400 cells/sec to 72000 cells/sec. For more information, see “Peak Cell Rate” on page 8-47. ***Note**: The SCR is scaled up by the same amount that the configured PCR value is scaled up when it is mapped into a PCR queue. The following formula determines the actual SCR value used for traffic shaping:* *SCR (actual) = SCR (configured) * [PCR (actual)/PCR (configured)]*

Table 8-28. Traffic Shaper Fields (ATM IWU) (Continued)

Field	Action/Description
Maximum Burst Size (cells)	Select the maximum burst size which determines the maximum number of cells that can be transmitted at the peak cell rate. This allows a burst of cells to arrive at a rate higher than the sustainable cell rate. This parameter applies only to variable bit rate (VBR) traffic; it does not apply to the CBR or UBR traffic. For ATM CS E3 modules, choose a value from 1 to 255.

4. Choose Verify Traffic Shaper to enable the NMS to verify the shaper settings.
5. Choose Apply to save the attributes.
6. Choose Cancel to exit the dialog box.
7. Define the clock source as described in "Defining the Clock Source for ATM CS and ATM IWU Modules" on page 8-75.

Defining ATM Cell Switching (CS) Physical Ports

To configure the physical port parameters for the ATM CS module:

1. Access the Set ATM Physical Port Attributes dialog box (Figure 8-16)as described in “Accessing Physical Port Attributes” on page 8-1.

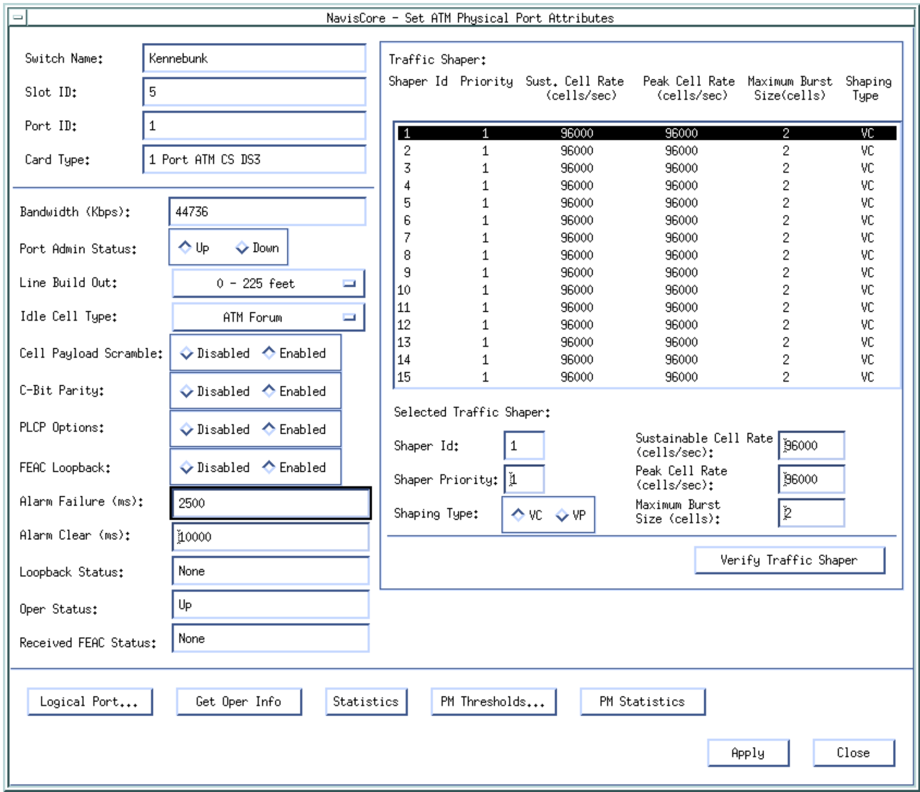


Figure 8-16. Set ATM Physical Port Attributes Dialog Box (ATM CS)

> If the Loopback Status field does not display None, do not modify any physical port attributes. Choose Cancel and see the *NavisCore Diagnostic and Troubleshooting Guide* for information about loopback testing.

Table 8-29 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-29. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Bandwidth (Kbps)	Displays the amount of bandwidth available for this physical port.
Loopback Status	Defaults to None. If you enable loopback tests, this field displays the ATM DS3 card's loopback status. For more information about DS3 Loopback, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Oper Status	Displays a brief status to indicate the operational status of the selected port.
Rec FEAC Status (*ATM CS DS3 I/O modules only*)	Displays the Far-End Alarm Control (FEAC) status received by this physical port, if C-Bit Parity is Enabled. This field indicates the physical port status on the other end of the connection.
Verify Traffic Shaper	Determines whether or not the Shaper Priority, SCR, PCR, and/or Maximum Burst Size (MBS) values are acceptable (valid) values for the defined card. Normally, the value that you enter for SCRs and PCRs is different from the verified value since the NMS attempts to match the entered values to the closest value that is acceptable for the hardware.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Displays a brief status for the selected physical port.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.

Table 8-29. Set Physical Port Attributes Dialog Box Fields and Buttons (Continued)

Field/Button	Function
PM Thresholds (*ATM CS DS3 I/O modules*)	Configure Performance Monitoring Thresholds. See “Performance Monitoring on ATM CS DS3/E3 Physical Ports” on page A-9.
PM Statistics	Access Performance Monitoring Statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the fields described in Table 8-30.

Table 8-30. Set ATM Physical Port Attributes Fields (ATM CS)

Field	Action/Description
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.
Line Build Out (*ATM CS DS3 I/O modules* only)	Select either 0 – 225 feet (*default*) for a short cable, or 226 – 450 feet for a long cable. This value represents the length of the cable from the switch to the network equipment to which it is attached.
Idle Cell Type	Select the format to be used when cells are idle. Options include *ATM Forum and ITU*.
Cell Payload Scramble	Disable this function only if the equipment connected to this port does not support Cell Payload Scramble. The Cell Payload Scramble function prevents user data from being misinterpreted (ATM cell header delineation).
C-Bit Parity (*ATM CS DS3 I/O modules* only)	Select Disabled or Enabled. The C-Bit Parity function provides a way to monitor the end-to-end performance of T3 circuits. This function works in conjunction with Cell Payload Scramble.

Table 8-30. Set ATM Physical Port Attributes Fields (ATM CS) (Continued)

Field	Action/Description
PLCP Option (*ATM CS DS3 I/O modules* only)	Select Enabled or Disabled to enable or disable the Physical Layer Convergence Protocol (PLCP). *Enabled* – The ATM DS3 module uses a PLCP frame which transmits 12 ATM cells every 125 μs. The ATM cell payload bandwidth is 36.9 Mbps. Use this option if the customer premise equipment can handle PLCP frames. *Disabled* – The DS3 module uses ATM direct mapping to pack ATM cells into the DS3 bit stream. The ATM cell payload bandwidth is 40 Mbps. This option provides the most bandwidth. Use this option only if you can disable PLCP for the CPE connected to this port.
FEAC Loopback	Enable (default) or disable the switch’s ability to respond to loopback commands on the Far-End Alarm and Control (FEAC) channel. Select Enable to allow the switch to respond to FEAC loopback commands from far end equipment (loop up and loop down), that can put the port into remote loopback. Select Disable to ignore loop up and loop down commands on the FEAC channel.
Alarm Failure (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) indicates the switch “soaks” the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms indicates the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.

Table 8-30. Set ATM Physical Port Attributes Fields (ATM CS) (Continued)

Field	Action/Description
Alarm Clear (ms)	Enter a value from 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) indicates the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms indicates the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.

3. Complete the Traffic Shaper parameters as described in Table 8-28 on page 8-68.
4. Choose Verify Traffic Shaper to enable the NMS to verify the shaper settings.
5. Choose Apply to save the physical port attributes and send an SNMP Set command to the switch.
6. Choose Cancel to exit the dialog box.
7. Define the clock source as described in the next section.

Defining the Clock Source for ATM CS and ATM IWU Modules

The Clock Source command on the Set Switch Attributes dialog box enables you to define the clock source for the ATM CS or ATM IWU module. The system automatically selects *one* ATM CS or ATM IWU module as the clock master for the entire switch. The clock master provides the central clocking signal to all other ATM CS and ATM IWU modules in the switch. The clock master synchronizes to the highest configured clock source to provide the clocking signal. If no clock source is configured, the ATM CS and ATM IWU modules default to internal clocking.

To set the clock source, use the following steps:

1. On the network map, select the switch object that contains the physical port.

2. From the Administer menu, select Ascend Parameters ⇒ Set Parameters.The switch backpanel appears.

3. Select Set Switch Attributes and choose Go. The Set Switch Attributes dialog box(Figure 8-17) appears.

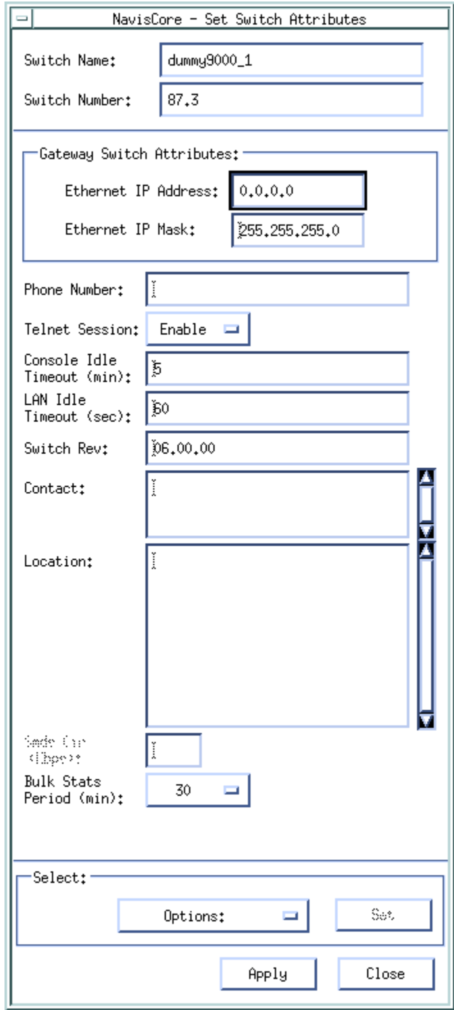


Figure 8-17. Set Switch Attributes Dialog Box

4. From the Options menu, select Clock Sources and choose Go.

   The Set Clock Sources dialog box (Figure 8-18) appears.

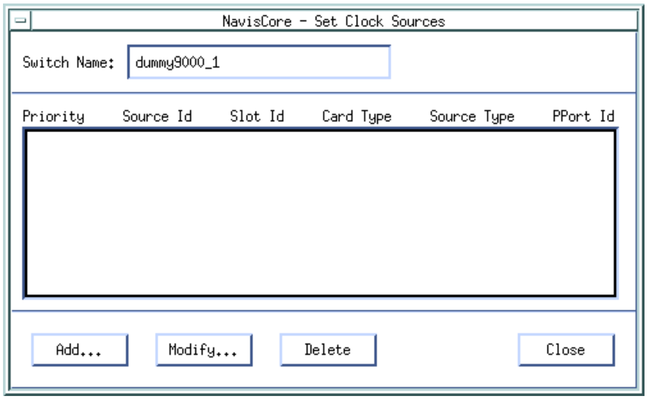


Figure 8-18. Set Clock Sources Dialog Box

5. Choose Add. The Add Clock Source dialog box (Figure 8-19) appears.

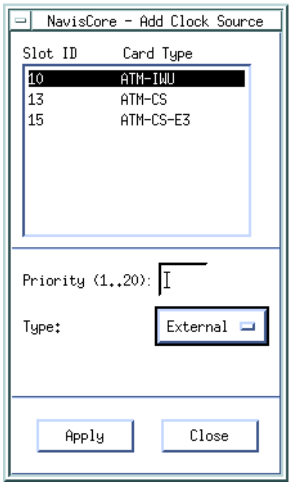


Figure 8-19. Add Clock Source Dialog Box

The Slot ID and Card Type fields display the configured ATM CS and ATM IWU modules for the selected switch.

6. For each module, complete the dialog box fields described in Table 8-31.

Table 8-31. Add Clock Source Fields

Field	Action/Description
Priority (1.20)	Select a priority level between 1(*highest*) and 20 (*lowest*). This number determines which module is used first.
Type	Select the clock type for this module. Options include: *External (default)* – An external connection provides the clock source. *Line* – Physical port provides the clock source.
Clock Source	If you selected Line for the clock type, the Clock Source defaults to PPort 1.

7. Choose Apply to save the settings.
8. Choose Close to exit the dialog box.
9. To define the logical port parameters that complete this configuration, see one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Defining Ethernet Physical Ports

The Ethernet module provides two 100-Mbps 10 BASE-T Ethernet ports.

> Please contact your Sales Representative regarding the availability of the 2-port Ethernet module.

To configure the Ethernet module physical port parameters:

1. Access the Set Physical Port Attributes dialog box (Figure 8-20)as described in "Accessing Physical Port Attributes" on page 8-1.

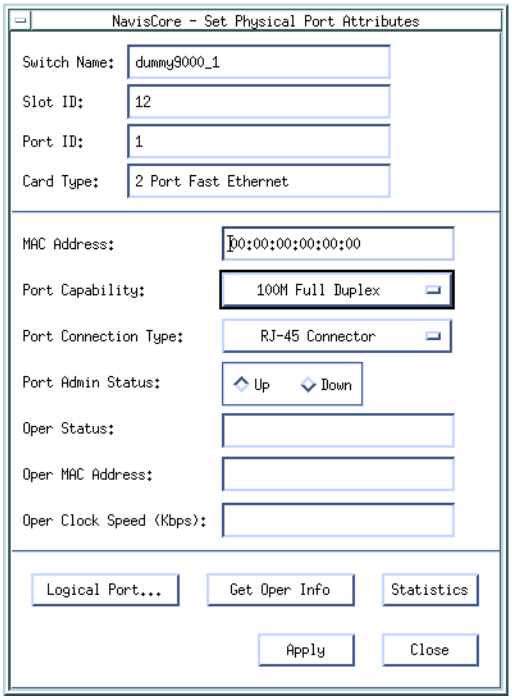


Figure 8-20. Set Physical Port Attributes Dialog Box

Table 8-32 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 8-32. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Oper Status	Indicates the operational status of the physical port (Up or Down).
Oper MAC Address	Indicates the MAC address of the port. A MAC address is a standardized data link address that is required for every port or device that connects to a LAN.
Oper Clock Speed (Kbps)	Indicates the clock speed of the port.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Updates the Oper Status, Oper MAC Address, and Oper Clock Speed fields.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the fields described in Table 8-33.

Table 8-33. Set Ethernet Physical Port Fields

Field	Description
MAC Address	Enter the MAC address. A MAC address is a standardized data link address that is required for every port or device that connects to a LAN. The default is all zeros, which indicates the port will come up with the MAC address that has been built into the ROM. If you enter in the MAC address, you override the built-in MAC address in ROM. The following are valid MAC format examples: • `00:67:3b:9c:71:a5` • `00673b9c71a5` (Upper and lower case entries are acceptable.)
Port Capability	Select the Ethernet port's speed and mode of operation: *100M Full Duplex* – Port running at 100 Mbps and in full duplex mode (ability to transmit and receive at the same time) *100M Half Duplex* – Port running at 100 Mbps and in half duplex mode (ability to transmit only or receive only) *10M Full Duplex* – Port running at 10 Mbps and in full duplex mode (ability to transmit and receive at the same time) *10M Half Duplex* – Port running at 10 Mbps and in half duplex mode (ability to transmit only or receive only)
Port Connection Type	Select the port connection type: *MII Connector* – Specifies four Media Independent Interface (MII) connectors. *RJ-45 Connector* – Specifies four RJ45-8 connector type, which comes in 2 pairs with a category 5 UTP.
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

3. To exit, choose Apply and then OK to save the physical port attributes and send an SNMP SET command to the switch. Choose Cancel to exit the dialog box.
4. To define the logical port parameters that complete this configuration, see one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Physical Port Colors

On the switch backpanel (via NavisCore), physical ports change color to indicate their operational status. Table 8-34 describes the physical port coloring scheme:

Table 8-34. Physical Port Coloring Scheme

Color	Description
Gray	Indicates the physical port is unknown. This condition usually occurs if the configuration does not exist or a logical port is not defined.
Green	Indicates the physical port is accurately configured and operational.
Red	Indicates the physical port is configured but has an Amin Status of Down, an Operational Status of Down, and/or all logical ports have an Admin Status or an Operational Status of Down.
Cyan	Indicates the physical port is configured but one or more (but not all) logical ports have an Admin Status or an Operational Status of Down. ***Note****: Cyan is a light blue color.*

9

Configuring CBX/GX Physical Ports

This chapter explains how to configure the physical port parameters that determine how a specific port handles clock source and clock rate.

Accessing Physical Port Attributes

After you define an I/O module, you can configure attributes for each of its physical ports. After you define the physical port(s), you configure the logical port attributes.

To access physical port functions in NavisCore:

1. Select the switch for which you want to configure a physical port.
2. Log in to NavisCore using either a provisioning or operator password.
3. From the Administer menu, select Ascend Parameters ⇒ Set Parameters. The Switch Back Panel dialog box appears.
4. Select the physical port you want to configure and choose Attrs. The Set Physical Port Attributes dialog box appears (for example, Figure 9-1 displays an 8-port ATM DS3 I/O module).

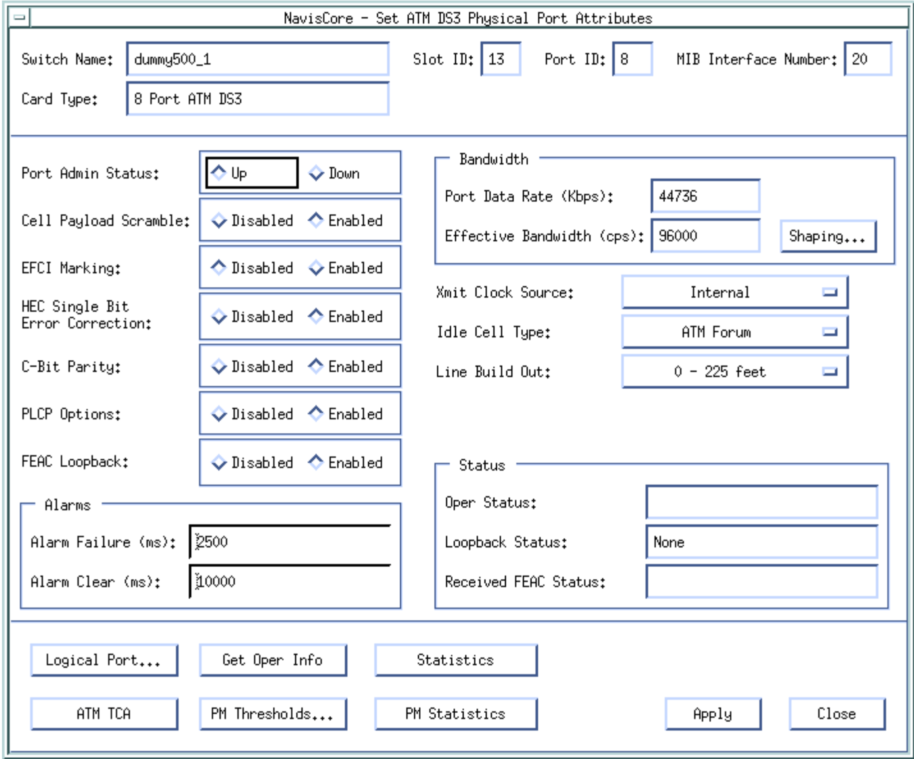


Figure 9-1. ATM DS3 I/O Module

Parameters vary depending on the type of port. See Table 9-1 to define each CBX/GX physical port type:

Table 9-1. CBX/GX Physical Port Type

Physical Port Type	See
ATM DS3/E3 (CBX)	page 9-3
ATM OC (CBX and GX)	page 9-9
ATM T1/E1 (CBX)	page 9-19
Frame DS3 (CBX)	page 9-26
Ethernet (CBX)	page 9-31

Defining ATM DS3/E3 Physical Ports (CBX 500)

The Asynchronous Transfer Mode (ATM) DS3/E3 module provides eight DS3/E3 ports. To configure the physical ports for a DS3/E3 module:

1. Access the physical port attributes as described in "Accessing Physical Port Attributes" on page 9-1. The Set ATM DS3 Physical Port Attributes dialog box (Figure 9-2) appears.

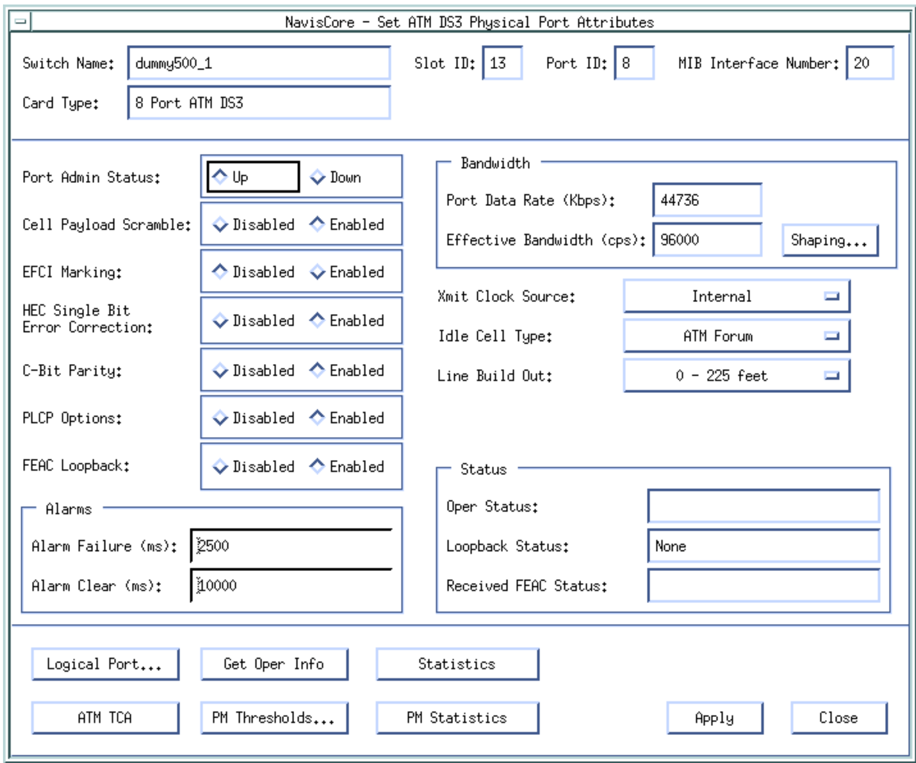


Figure 9-2. Set ATM DS3 Physical Port Attributes Dialog Box

Table 9-2 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 9-2. Physical Port Attributes Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
MIB Interface Number	Displays the MIB interface number for the physical port. The software assigns a unique number to each physical port on the switch.
Card Type	The type of card you are configuring.
Port Data Rate (Kbps)	Represents the raw physical data rate of the port. Due to the bandwidth lost as a result of the ATM layer to physical layer mapping, this number is always greater than the actual cell rate that can be transmitted out the port. The actual rate of cell transmission is dependent on the method of ATM layer mapping used.
Effective Bandwidth (cps)	Represents the actual cell transmission rate the physical port uses. By default, the physical port transmits cell traffic at the maximum rate supported on the physical interface. However, you can use the Shaping command to select a transmission rate that is lower than the maximum rate.
Shaping	Access ATM DS3 traffic shaping parameters. See "Complete the fields as described in Table 9-6 on page 9-12." on page 9-17.
Oper Status	Indicates the operational status of the physical port (Up or Down). If this field is blank, the IOM did not respond to a status request. See Table 9-4 on page 9-8 for a description of these messages.
Loopback Status	Displays the port loopback status, if you enabled diagnostic loopback tests. The default is None. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Received FEAC Status (*ATM DS3 only)*	Displays the FEAC (Far-End Alarm and Control) status received by this physical port if C-Bit Parity is enabled. This field indicates the status of the physical port on the other end of the connection.
Logical Port	Configure logical ports on this physical port. For more information, see the *NavisCore ATM Configuration Guide.*
Get Oper Info	Update the physical port status message in the Oper Status field.
Statistics	Access physical port summary statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.

Table 9-2. Physical Port Attributes Fields and Buttons (Continued)

Field/Button	Function
ATM TCA (*CBX modules only*)	Configure ATM threshold crossing alarms. See page 9-36.
PM Thresholds	Configure performance monitoring threshold attributes. See "Performance Monitoring on ATM DS3/E3 Physical Ports (CBX)" on page A-16.
PM Statistics	Access the performance monitoring statistics and transmission MIB information. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide.*
Apply	Apply your changes to the switch configuration. Once a switch is online, this command updates switch PRAM.
Close	Exit the dialog box without saving your changes.

2. Complete the dialog box fields as described in Table 9-3.

Table 9-3. Set ATM DS3 [E3] Physical Port Attributes Fields

Field	Action/Description
Port Admin Status	Set this option to Up (default) to enable immediate access to the port. Set the Admin Status to Down to save the configuration in the database without activating the port or to take the port offline to run diagnostics. Each time you modify the Port Admin Status, choose Apply and then OK to send the change to the switch.
Cell Payload Scramble	Enable (default) or disable the Cell Payload Scramble function. The Cell Payload Scramble function prevents user data from being misinterpreted (that is, it prevents ATM cell header alienation).
EFCI Marking	The Explicit Forward Congestion Indicator (EFCI) determines if congestion (or impending congestion) exists in a node. This option is disabled by default. If enabled, the congested node modifies the EFCI bit in the ATM cell header to indicate congestion. If the equipment connected to the CBX 500 can use the EFCI bit to adjust its transmission rate, it may lower the connection cell rate to relieve the congestion. EFCI is only set in the UBR queue and affects all connections in this physical port queue. Disable this option if you do not want to use EFCI marking on this physical port.
HEC Single Bit Error Correction	Enable (default) or disable the single bit header error correction (HEC) on a per port basis. When the framer is operating in the default mode with single bit error correction enabled, the framer corrects the single bit errors but does not count them. Disable this function on the framer to determine how many errors are occurring on the physical port.
C-Bit Parity (*DS3 modules only*)	Enable (default) or disable the C-Bit Parity function. The C-Bit Parity function provides a way to monitor the end-to-end performance of T3 circuits. ***Note:*** *This feature requires C-bit parity-compatible customer premise equipment (CPE).*
PLCP Options	Enables or disables the Physical Layer Convergence Protocol (PLCP) option. When Enabled (default), the physical port uses a PLCP frame, which transmits 12 ATM cells every 125 μs. Note that when PLCP is enabled, available bandwidth is reduced. When PLCP is disabled, the port operates in a direct mapping header error control (HEC) mode.
FEAC Loopback (*DS3 modules only*)	Enable (default) or disable the switch's ability to respond to loopback commands on the Far-End Alarm and Control (FEAC) channel. Select Enable to allow the switch to respond to FEAC loopback commands from far end equipment (loop up and loop down), that can put the port into remote loopback. Select Disable to ignore loop up and loop down commands on the FEAC channel.

Table 9-3. Set ATM DS3 [E3] Physical Port Attributes Fields (Continued)

Field	Action/Description
Alarm Failure (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) means the switch "soaks" the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms means the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.
Alarm Clear (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) means the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms means the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Xmit Clock Source	Specify the transmit clock source. *Internal* – (Default) The IOM's internal timing source provides the clock source to this port. The IOM Clock Source setting in the Set IOM Card Attributes dialog box (see page 7-16) determines the internal clock source. *Loop-Timed* – The clock source is derived from the signal coming into this port.
Line Build Out (*DS3 modules only*)	Select 0 – 225 feet (default) for a short cable or 226 – 450 feet for a long cable. This measurement represents the length of the cable that connects the physical port to other network equipment.
Idle Cell Type	Allows you to specify the type of cell that is used to fill the gaps between user data cells that are transmitted out of the physical port. The physical port receive function is not affected by this option (both ITU and ATMF are recognized and processed by the physical port receiver). Select one of the following options: *ATM Forum* (default) – The fill cell will have a header of 00 00 00 00 55 and a payload of 6A (for all 48 bytes). CLP=0 in the cell header. *ITU* – The fill cell will have a header of 00 00 00 01 52 and a payload of 6A (for all 48 bytes). CLP=1 in the cell header.

Table 9-4 identifies the Oper Status messages for this physical port. Use the Get Oper Info command to update this field.

Table 9-4. DS3/E3 Get Oper Info Messages

Message	Description
red alarm	Receive loss of frame (LOF) signal
yellow alarm	Receive far end LOF signal
blue alarm	Receive alarm indication signal (AIS)
idle	Idle signal condition
looped-back	Physical port in loopback mode
loss-of-signal	Receive loss of signal (LOS)
loss-of-cell-delineation	ATM loss of cell delineation detected
plcp-yellow	Receiving PLCP yellow

3. To modify the default physical port performance thresholds for this physical port, go to Appendix A.

4. To modify the default physical port traffic shaping parameters, see page 9-17.

5. To modify the default threshold crossing attributes, see page 9-36.

6. To exit, choose Apply and then OK to save the physical port attributes. Choose Cancel to exit the dialog box.

7. Now you can define the logical port parameters for this configuration. See one of the following guides:

- *NavisCore Frame Relay Configuration Guide*
- *NavisCore IP Configuration Guide*
- *NavisCore ATM Configuration Guide*
- *NavisCore SMDS Configuration Guide*
- *NavisCore ISDN Configuration Guide*

Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)

The CBX and GX switch platforms support the following optical I/O modules:

- OC3c/STM-1 modules (CBX and GX)
- 1-port OC12c/STM-4 modules (CBX and GX)
- 1-port OC48/STM-16 module (GX only)

Once you configure the physical port (for the OC48 module, both parent port and subports) parameters for these modules, you can configure performance monitoring thresholds (see Appendix A). You can also configure a second physical port as a backup. This feature is called *automatic protection switching* (APS). See Chapter 10 for more information on APS.

> Please contact your Sales Representative regarding the availability of the OC48 module.

To configure the physical ports for OC modules:

1. Complete the steps in "Accessing Physical Port Attributes" on page 9-1 to access the Set Physical Port Attributes dialog box (Figure 9-3) for either an OC3c/STM-1 module, OC12c/STM-4 module, or OC48/STM-16 module.

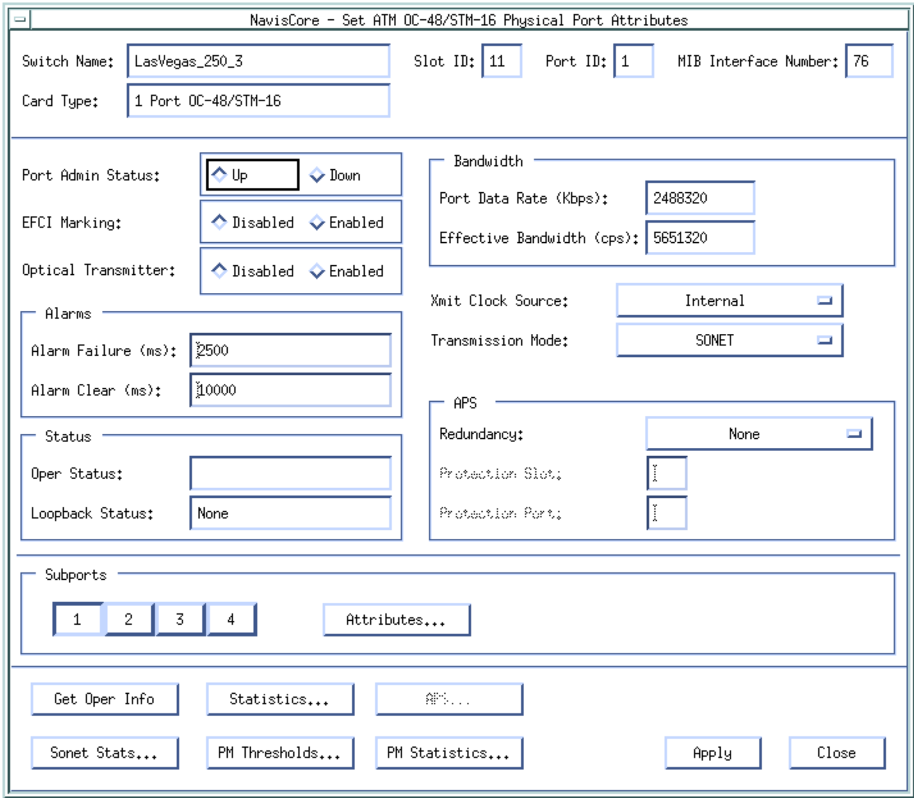


Figure 9-3. Set ATM OC-48/STM-16 Ports Physical Port Attributes Dialog Box

Table 9-5 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 9-5. Physical Port Attributes Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Parent Port ID (*OC48 subports only*)	The parent port (number) of the OC48/STM-16 IOM.
MIB Interface Number	Displays the MIB interface number for the physical port. The software assigns a unique number to each physical port on the switch.
Card Type	The type of card you are configuring.
Subport ID (*OC48 subports only*)	The subport (number) you are configuring
Physical Port ID (*OC48 subports only*)	The port (number) you are configuring.
Port Data Rate (Kbps)	Represents the raw physical data rate of the port. Due to the bandwidth lost as a result of the ATM layer to physical layer mapping, this number is always greater than the actual cell rate that can be transmitted out the port. The actual rate of cell transmission is dependent on the method of ATM layer mapping used. See Table 10-2 on page 10-8 for additional information.
Effective Bandwidth (cps)	Represents the actual cell transmission rate the physical port uses. By default, the physical port transmits cell traffic at the maximum rate supported on the physical interface. However, you can use the Shaping command to select a transmission rate that is lower than the maximum rate.
Oper Status	Indicates the operational status of the physical port (Up or Down). If this field is blank, the IOM/BIO did not respond to a status request. See Table 9-7 on page 9-16 for a description of these messages.
Loopback Status	Displays the port's loopback status if you enabled diagnostic loopback tests. The default is None. See the *NavisCore Diagnostic and Troubleshooting Guide* for more information.
Shaping (*OC3/STM-1 only*)	Enables you to modify the default physical port traffic shaping parameters. See "Defining Physical Port Traffic Shaping (CBX)" on page 9-18.

Table 9-5. Physical Port Attributes Fields and Buttons (Continued)

Field/Button	Function
Logical Port	Configure logical ports on this physical port. For more information, see the *NavisCore ATM Configuration Guide*.
Get Oper Info	Update the physical port status message in the Oper Status field.
Statistics	Access physical port summary statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
APS	Access the automatic protection switching (APS) configuration dialog box (see page 10-3).
PM Thresholds	Configure performance monitoring threshold attributes. See "Performance Monitoring on OC3/STM-1, OC-12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page A-21.
PM Statistics	Access the performance monitoring statistics and transmission MIB information. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide.*
ATM TCA (*CBX modules only*)	Configure ATM threshold crossing alarms. See page 9-36.
Apply	Apply your changes to the switch configuration. Once a switch is online, this command updates switch PRAM.
Close	Exit the dialog box without saving your changes.

2. Complete the fields as described in Table 9-6.

Table 9-6. Set ATM OC3/STM-1 [OC12/STM-4] [OC48/STM-16] Physical Port Attributes Fields

Fields	Action/Description
Port Admin Status (*for OC48 subports, this field displays Subport Admin Status*)	Set this option to Up to enable immediate access to the port. Set the Admin Status to Down to save the configuration in the database without activating the port or to take the port offline to run diagnostics. Each time you modify the Port Admin Status, choose the Apply command to send the change to the switch. ***Note:*** *Changing the Port Admin Status to down sets the physical port operational state to down, but this action does not result in an APS switchover; if you admin down a physical port, user data will be disrupted if the port is active.*

Table 9-6. Set ATM OC3/STM-1 [OC12/STM-4] [OC48/STM-16] Physical Port Attributes Fields (Continued)

Fields	Action/Description
Cell Payload Scramble	Enables (default) or disables the Cell Payload Scramble function. The Cell Payload Scramble function prevents user data from being misinterpreted (that is, it prevents ATM cell header alienation).
EFCI Marking	The Explicit Forward Congestion Indicator (EFCI) determines if congestion (or impending congestion) exists in a node. The default is *disabled*. If Enabled, the congested node modifies the EFCI bit in the ATM cell header to indicate congestion. If the equipment connected to the CBX 500 can use the EFCI bit to adjust its transmission rate, it may lower the connection cell rate to relieve the congestion. EFCI is only set in the UBR queue and affects all connections in this physical port’s queue. Disable this option if you do not want to use EFCI marking on this physical port.
HEC Single Bit Error Correction	Enables or disables the single bit header error correction (HEC) on a per-port basis. When the framer is operating in the default mode of single bit error correction enabled, the framer corrects the single bit errors, but does not count them. Disable the single bit error correction function on the framer to determine how many errors are occurring on the physical port.
Optical Transmitter	This field is a safety feature intended to prevent personal injury when you repair/replace the module or connect cables to the module. By default, this option is disabled. This disables the transmit laser or LED for this port, so it cannot transmit incoming traffic. You must Enable this option to transmit incoming traffic out of this port. ***Note:*** *When you disable the transmit laser, the CPE or switch at the other end of the connection reports a red port alarm to indicate signal loss. Disabling the transmit laser may cause an APS switchover; if you disable the optical transmitter, user data will be disabled if the port was active.* ***WARNING****: Before you remove the optical cable, set this field to disabled. If the optical connectors are exposed, the transmit laser beam can cause personal injury.*
Alarm Failure (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) means the switch “soaks” the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms means the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.

Table 9-6. Set ATM OC3/STM-1 [OC12/STM-4] [OC48/STM-16] Physical Port Attributes Fields (Continued)

Fields	Action/Description
Alarm Clear (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) means the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms means the physical port comes back up as soon physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Xmit Clock Source	Specify the transmit clock source. *Internal* – (Default) The IOM/BIO internal timing source provides the clock source to this port. The IOM/BIO Clock Source setting in the Set IOM/BIO Card Attributes dialog box (see Figure 6-5 on page 6-10) determines the internal clock source. *Loop-Timed* – The clock source is derived from the signal coming into this port.
Idle Cell Type	Allows you to specify the type of cell that is used to fill the gaps between user data cells that are transmitted out of the physical port. The physical port receive function is not affected by this option (both ITU and ATMF are recognized and processed by the physical port receiver). Select one of the following options: *ATM Forum* (default) – The fill cell will have a header of 00 00 00 00 55 and a payload of 6A (for all 48 bytes). CLP=0 in the cell header. *ITU* – The fill cell will have a header of 00 00 00 01 52 and a payload of 6A (for all 48 bytes). CLP=1 in the cell header.
Transmission Mode	Enables you to designate individual ports for either SONET (OC3/OC12/OC48) or SDH (STM-1/STM-4/STM-16). For OC3 modules, you can configure OC3 framing on one port and STM-1 framing on another. • Select *SONET* (default) to configure the port for OC3/OC12/OC48 (North America) • Select *SDH* to configure the port for STM-1/STM-4/STM-16 (International)

Table 9-6. Set ATM OC3/STM-1 [OC12/STM-4] [OC48/STM-16] Physical Port Attributes Fields (Continued)

Fields	Action/Description
Redundancy	Specify one of the following: *Intra-Card APS 1+1* – Enables the Automatic Protection Switching (APS) feature. This feature allows you to use a second port on this module as a backup. *APS Resilient UNI* – Enables you to use the APS feature in conjunction with fault tolerant PVC functionality. If the entire module should go down, this feature enables a physical port on a different module to respond as a backup. *APS with Trunk Backup* – Enables you to use a trunk backup that is configured between protection ports. To configure APS redundancy, see “Using Redundancy” on page 10-2. The default is None (no backup port). ***Note****: CBX and GX OC3/STM-1, and OC12/STM-4 modules support APS. In addition, the GX OC48/STM-16 module supports APS.*
Subports (OC48 modules only)	The OC48/STM-16 module is 4 OC12/STM-4 modules bundled into one. Therefore, you must configure all 4 physical subports on the OC48. See “Defining OC48/STM-16 Subports” on page 9-17.

Table 9-7 identifies the Oper Status messages for this physical port. Use the Get Oper Info command to update this field.

Table 9-7. OC3c/STM-1,OC12/STM-4, and OC48/STM-16 Get Oper Info Messages

Message	Description
Down with signal label mismatch	Sonet Path signal label mismatch
Down with loss of signal	Receive loss of signal (LOS)
Down with loss of frame	Receive loss of frame (LOF)
Down with cell delination loss	Loss of ATM cell delineation
Down with line AIS	Receive Sonet line alarm indication signal (AIS)
Down with path AIS	Receive Sonet path AIS
Down with loss of pointer	Sonet loss of pointer
Down with line RFI	Receive Sonet line remote failure indication (RFI)
Down with path RFI	Receive remote Sonet path RFI
Down with signal label undefined	Sonet Path signal label unequipped

3. To modify the default physical port performance thresholds for this physical port, continue with "Complete the fields as described in Table 9-6 on page 9-12." on page 9-17.
4. To configure the second port on this module as a backup port, see Chapter 10.
5. (*OC3/STM-1 only*) To modify the default physical port traffic shaping parameters, see page 9-18.
6. To modify the default threshold crossing attributes, see page 9-36.
7. To define OC48 subports, see "Defining OC48/STM-16 Subports" on page 9-17.
8. To exit, choose Apply and then OK to save the physical port attributes and create an SNMP SET command to send to the switch. Choose Cancel to exit.
9. Now you can define the logical port parameters for this configuration. See one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Defining OC48/STM-16 Subports

Before you define OC48/STM-16 subports, verify you defined the parent port as described in "Defining OC3c/STM-1, OC12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page 9-9.

1. Access the Set ATM OC48/STM-16 Physical Port Attributes dialog box (Figure 9-4) using the steps in "Accessing Physical Port Attributes" on page 9-1.

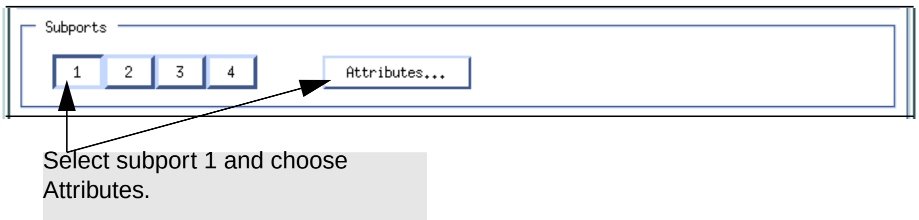


Figure 9-4. Subports Section Field

2. In the Subports section of the Set ATM OC48/STM-16 Physical Port dialog box, select 1 and choose Attributes (see Figure 9-4). The Set SubPort Attributes dialog box appears (Figure 9-6).

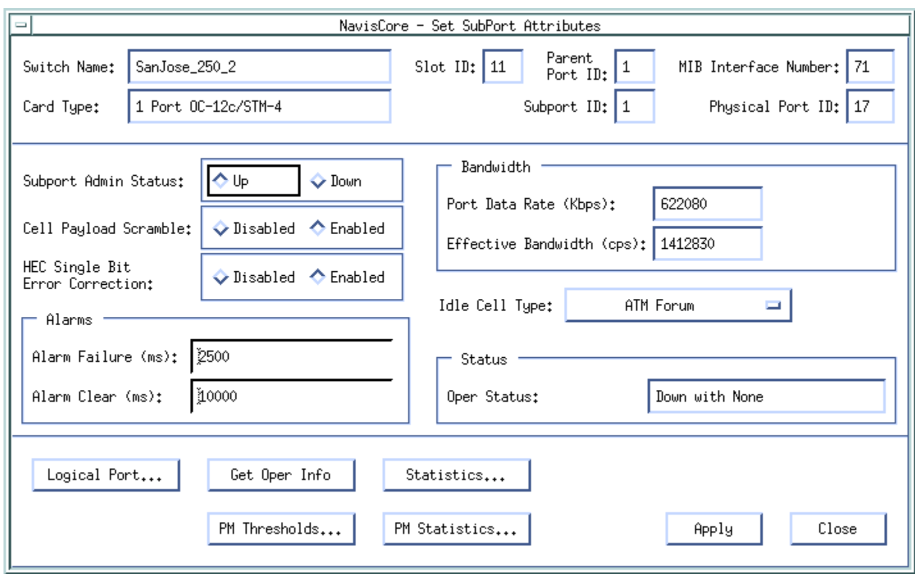


Figure 9-5. Set SubPort Attributes

3. Complete the fields as described in Table 9-6 on page 9-12.
4. Repeat Step 1 through Step 3 to define subports 2, 3, and 4.
5. To exit, choose Apply and then OK to save the physical port attributes and create an SNMP SET command to send to the switch. Choose Cancel to exit.

Defining Physical Port Traffic Shaping (CBX)

For OC3/STM-1 and ATM DS3/E3 physical ports, NavisCore provides the capability to set an ATM physical port traffic shaping parameter. This parameter functions as a pacing mode that enables you to control the effective bandwidth on the physical port.

Use the following formula to compute the effective physical port bandwidth:

[1/(n + 1)] * pport clock rate

where 360000 cps is the clock rate for an OC3/STM-1 port, 104268 is the clock rate for a DS3/E3 port, and “n” is the pacing mode you specify. The sum of the logical port bandwidth on the physical port cannot exceed the configured effective physical port bandwidth. Likewise, you cannot decrease the effective physical port bandwidth below the sum of the configured logical port bandwidth.

To access physical port traffic shaping:

1. From either the Set OC3/STM-1 Physical Port Attributes or the Set DS3 [E3] Physical Port Attributes (Figure 9-2 on page 9-3) dialog boxes, choose the Shaping buttons. The following dialog box appears.

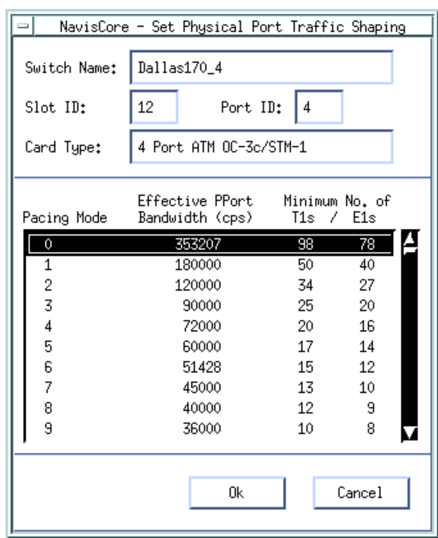


Figure 9-6. Set Physical Port Traffic Shaping Dialog Box

2. Select the pacing mode you need to achieve the desired effective physical port bandwidth or the number of T1/E1s in the inverse MUX. Valid values are 1 to 255.

3. Choose OK to return to the Set Physical Port Attributes dialog box.

Defining T1/E1 Physical Ports (CBX 500)

The 8-port T1 and E1 modules contain physical ports that can operate at 1.544 Mbps (T1) or 2.048 Mbps (E1). You can configure up to 112 T1 or E1 ports per switch. Once you configure physical port parameters, configure the performance monitoring thresholds (see page 9-36). For a T1 module that uses an extended superframe circuit type, you can also specify the facility data link parameters (see page 9-34).

To configure the physical port parameters for these modules:

1. Access physical port attributes as described in "Accessing Physical Port Attributes" on page 9-1. The Set ATM T1 Physical Port Attributes dialog box (Figure 9-7) appears.

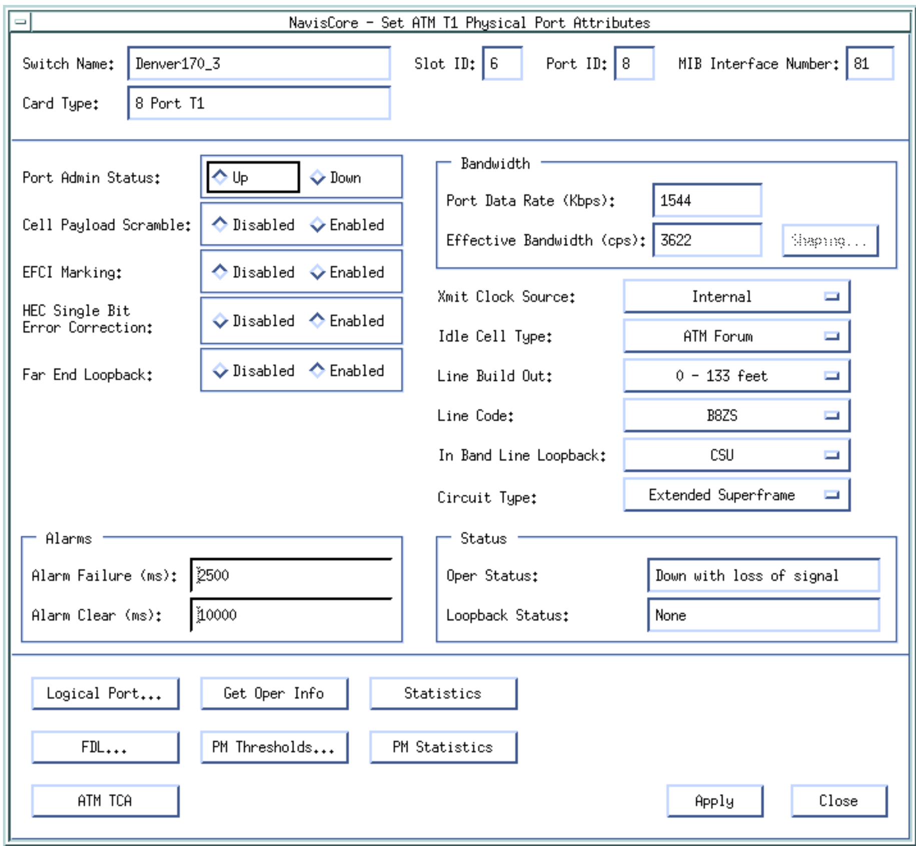


Figure 9-7. Set ATM T1 [E1] Physical Port Attributes Dialog Box

Table 9-8 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 9-8. Physical Port Attributes Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
MIB Interface Number	Displays the MIB interface number for the physical port. The software assigns a unique number to each physical port on the switch.
Card Type	The type of card you are configuring.
Port Data Rate (Kbps)	Represents the raw physical data rate of the port. Due to the bandwidth lost as a result of the ATM layer to physical layer mapping, this number is always greater than the actual cell rate that can be transmitted out the port. The actual rate of cell transmission is dependent on the method of ATM layer mapping used. See Table 10-2 on page 10-8 for additional information.
Effective Bandwidth (cps)	Represents the actual cell transmission rate the physical port uses. By default, the physical port transmits cell traffic at the maximum rate supported on the physical interface.
Oper Status	Indicates the operational status of the physical port (Up or Down). If this field is blank, it means the IOM did not respond to a status request.
Loopback Status	Displays the port loopback status, if you enable diagnostic loopback tests. The default is *None.* See the *NavisCore Diagnostic and Troubleshooting Guide* for more information.
Logical Port	Configure logical ports on this physical port. For more information, see the *NavisCore ATM Configuration Guide*.
Get Oper Info	Update the physical port status message in the Oper Status field.
Statistics	Access physical port summary statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
FDL	Configure facility data link (FDL) control parameters for Extended Superframe T1 circuits types (see page 9-34).
PM Thresholds	Configure performance monitoring threshold attributes. See "Performance Monitoring on ATM T1/E1 Physical Ports (CBX)" on page A-24.
PM Statistics	Access the performance monitoring statistics and transmission MIB information. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide.*

Table 9-8. Physical Port Attributes Fields and Buttons (Continued)

Field/Button	Function
ATM TCA (*CBX modules only*)	Configure ATM threshold crossing alarms. See page 9-36.
Apply	Apply your changes to the switch configuration. Once a switch is online, this command updates switch PRAM.
Close	Exit the dialog box without saving your changes.

2. Complete the dialog box fields as described in Table 9-9.

Table 9-9. Set ATM T1/E1 Physical Port Attributes Fields

Field	Action/Description
Port Admin Status	Set this option to Up (default) to enable immediate access to the port. Set the Admin Status to Down to save the configuration in the database without activating the port or to take the port off-line to run diagnostics. If you modify the Port Admin Status, choose Apply.
Cell Payload Scramble	Enable or disable the Cell Payload Scramble function. The Cell Payload Scramble function prevents user data from being misinterpreted (that is, it prevents ATM cell header alienation). For T1 modules, the default is disabled; for E1 modules, it is enabled.
EFCI Marking	The Explicit Forward Congestion Indicator (EFCI) determines if congestion (or impending congestion) exists in a node. This option is disabled by default. If enabled, the congested node modifies the EFCI bit in the ATM cell header to indicate congestion. If the equipment connected to the CBX 500 can use the EFCI bit to adjust its transmission rate, it may lower the connection cell rate to relieve the congestion. EFCI is only set in the UBR queue and affects all connections in this physical port queue. Disable this option if you do not want to use EFCI marking on this physical port.
HEC Single Bit Error Correction	Enable (default) or disable the single bit header error correction (HEC) on a per-port basis. When the framer is operating in the default mode with single bit error correction enabled, the framer corrects the single bit errors but does not count them. Disable this function on the framer to determine how many errors are occurring on the physical port.
Far End Loopback (*T1 I/O modules only*)	Enable (default) or disable the switch ability to respond to loopback commands from far end equipment. Select Enable to allow the switch to respond to loopback commands from far end equipment (loop up and loop down) that can put the port into remote loopback. The loopback signaling can be inband commands, or FDL loopback commands. Select Disable to ignore inband and FDL loop up and loop down commands.
Alarm Failure (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) means the switch “soaks” the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms means the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.

Table 9-9. Set ATM T1/E1 Physical Port Attributes Fields (Continued)

Field	Action/Description
Alarm Clear (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) means the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms means the physical port comes back up as soon physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Xmit Clock Source	Specify the transmit clock source. The default is *Internal*. *Loop-Timed* – The clock source is derived from the clock signal coming into this port. *Internal* – The IOM internal timing source provides the clock source to this port. The IOM Clock Source setting in the Set IOM Card Attributes dialog box (see Figure 6-5 on page 6-10) determines the internal clock source.
Line Build Out (*T1 modules only*)	Select the measurement that represents the length of the cable that connects the physical port to other network equipment, such as a router. The default is 0-133 feet.
Line Code	Indicates the encoding method used on the T1/E1 interface. Line Code specifies the format of the data signal encoding. The signal has three different levels - positive, negative, and ground, which must be referenced from a master clock. The default for T1 ports is B8ZS. ***Note:*** *See your facility service provider for more information about which line code method to use.* *Bipolar with 8 zero substitution (B8ZS)* – (T1 only) This is the ATM Forum standard for ATM cell transmission over a T1 interface. Use this option for optimum performance; the “B8ZS” refers to the use of a specified pattern of normal bits and bipolar violation that is used to replace a sequence of eight zero bits. With B8ZS, a special code is placed in and then removed from the pulse stream in substitution for a 0 byte that has been transmitted by the user equipment. *HDB3* – (E1 only) This is the ATM Forum standard for ATM cell transmission over an E1 interface. Use this option for optimum performance. *AMI No Bit Stuff (*T1 Only*)* – The AMI No Bit Stuff option allows for ATM cell transmission over AMI interfaces. This mode of operation is not supported by the ATM Forum or ITU and is only provided for users that have transmission equipment that does not support B8ZS operation. *Alternate Mark Inversion (AMI)* – The AMI option (also known as Jammed Bit) is used only for troubleshooting of physical layer interfaces. This mode does not support ATM cell transmission.

Table 9-9. Set ATM T1/E1 Physical Port Attributes Fields (Continued)

Field	Action/Description
Idle Cell Type	Allows you to specify the type of cell that is used to fill the gaps between user data cells that are transmitted out of the physical port. The physical port receive function is not affected by this option (both ITU and ATMF are recognized and processed by the physical port receiver). Select one of the following options. *ATM Forum* (default) – The fill cell will have a header of 00 00 00 00 55 and a payload of 6A (for all 48 bytes). *ITU* – The fill cell will have a header of 00 00 00 01 55 and a payload of 6A (for all 48 bytes).
Circuit Type (*T1 only*)	Configures the T1 interface for a particular framing specification. Framing provides a method of distinguishing between the individual channels. It is accomplished by adding one additional bit to each frame. The default is Extended Superframe. Selections include: *Superframe* – A frame format that consists of twelve frames (also referred to as "*D4 framing*"). It provides end-to-end synchronization and signaling associated with a particular channel. *Extended Superframe* – A framing format that extends the D4 framing format from 12 frames to 24 frames and uses modified framing bits to provide a cyclic redundancy check (CRC), secondary channel, and data link. The advantage of this format over "superframe" is that it enables the Ascend equipment to monitor and respond to network maintenance messages. ***Note:*** *Make sure you configure the customer premise equipment (CPE) to use the same framing specification as the Ascend physical port.* *If you select extended superframe, you can specify the facility data link information (FDL). See "Defining Facility Data Link (FDL) Parameters" page 9-34 for more information.*
In Band Line Loopback	Designates the in-band line loopback code format that is transmitted to the far end to perform far-end inband loopback testing. Also designates the loopback code format the switch will recognize if far-end equipment sets this port into loopback. Selections are CSU or NI (also referred to as smart jack) loopbacks. The default is CSU.

Table 9-10 identifies the Oper Status messages for this physical port. Use the Get Oper Info command to update this field.

Table 9-10. T1/E1 Get Oper Info Messages

Message	Description
admin down	The port's admin status is set to down.
yellow alarm	Receive yellow alarm from far end equipment.
blue alarm	Receive blue alarm indication signal (AIS) from far end equipment.
red alarm	Loss of frame (LOF) detected on the receive signal.
loss-of-signal	Loss of signal (LOS) condition detected on the port.
looped-back	Physical port in loopback mode.
equipment mismatch	Detected physical interface daughter card type (IOA) does not match the configured IOM type. This message means all physical ports on this IOM are down.
loss-of-cell-delineation	Detecting loss of ATM cell delineation.

3. To modify the default physical port performance thresholds for this physical port, continue with "Configuring ATM Threshold Crossing Alarms (CBX)" on page 9-36.

4. To modify the default threshold crossing alarms, see page 9-36.

5. To exit, choose Apply and then OK to save the physical port attributes and send an SNMP SET command to the switch. Choose Cancel to exit the dialog box.

6. Now you can define the logical port parameters for this configuration. See one of the following guides:

- *NavisCore Frame Relay Configuration Guide*
- *NavisCore IP Configuration Guide*
- *NavisCore ATM Configuration Guide*
- *NavisCore SMDS Configuration Guide*
- *NavisCore ISDN Configuration Guide*

Defining 6-Port Frame DS3 Physical Ports (CBX)

The 6-port Frame DS3 modules provide six DS3 ports and support all Frame Relay services as well as Frame Relay-ATM Service Interworking and Network Interworking services.When you configure a 6-Port Frame DS3 I/O module, you need to define the DS3 clock source and clock rate.

About External Clock Backup for Frame DS3 Modules

You can configure physical ports to support either internal or external clocking. You use the *Xmit Clock Source* parameter to specify clocking. A 6-Port Frame DS3 module supports an external clock speed between 34.368 and 44.736 Mbps.

If the physical port loses the external clock source, the External Clock Backup parameter enables the port to automatically revert to either an internal or loop-timed clock source. This feature increases the reliability of customer switched networks that include externally clocked ports.

About DS3 Signal Application Mode

The DS3 signal is partitioned into M-frames of 4760 bits each. The M-frames are divided into seven M-subframes of 680 bits. The first C-bit in M-subframe 1 is used as an application identification channel (AIC) to identify the specific DS3 M-frame. The AIC determines the mode of operation for a DS3 signal.

Configuring 6-Port Frame DS3 Physical Ports

To configure the physical port for a 6-port Frame DS3 module:

1. Access the Set Physical Port Attributes dialog box (Figure 9-8) as described in "Accessing Physical Port Attributes" on page 9-1.

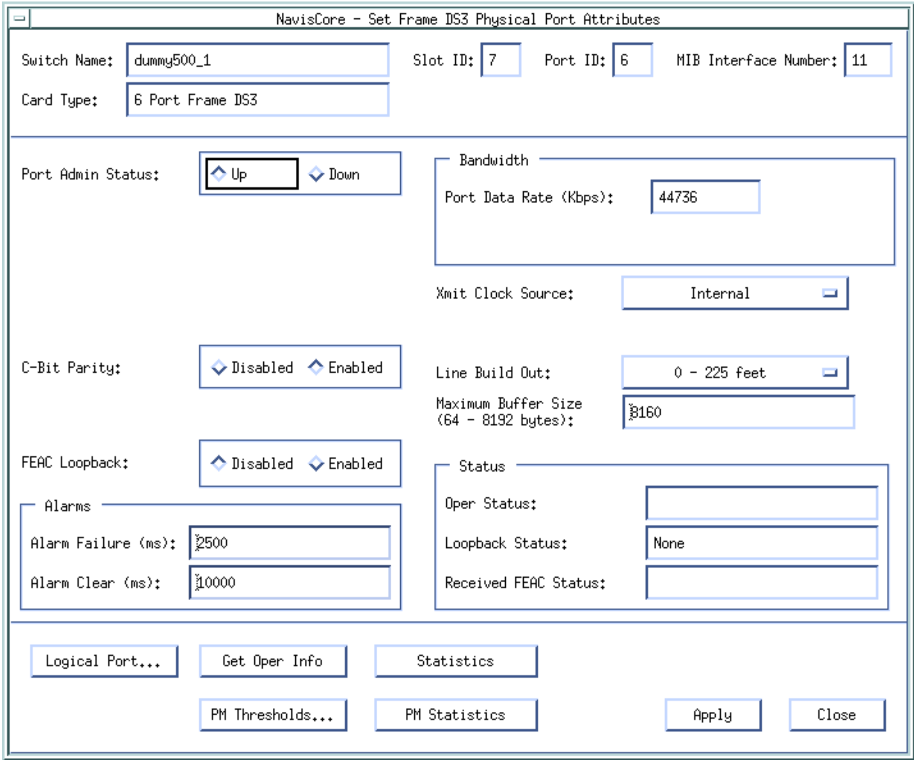


Figure 9-8. Set Frame DS3 Physical Port Attributes Dialog Box

Table 9-11 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 9-11. Physical Port Attributes Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
MIB Interface Number	Displays the MIB interface number for the physical port. The software assigns a unique number to each physical port on the switch.
Card Type	The type of card you are configuring.
Bandwidth Port Data Rate (kbps)	Displays the Pport bandwidth, which is the total bandwidth of the Lport to be defined on this Pport
Oper Status	Indicates the operational status of the physical port (Up or Down). If this field is blank, the IOM did not respond to a status request. See Table 9-4 on page 9-8 for a description of these messages.
Loopback Status	Displays the port loopback status, if you enabled diagnostic loopback tests. The default is None. See the *NavisCore Diagnostic and Troubleshooting Guide* for more information.
Received FEAC Status	Displays the FEAC (Far-End Alarm and Control) status received by this physical port if C-Bit Parity is enabled. This field indicates the status of the physical port on the other end of the connection.
Logical Port	Configure logical ports on this physical port. For more information, see the *NavisCore ATM Configuration Guide*.
Get Oper Info	Update the physical port status message in the Oper Status field.
Statistics	Access physical port summary statistics. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide*.
PM Thresholds	Configure performance monitoring threshold attributes. See "Performance Monitoring on ATM DS3/E3 Physical Ports (CBX)" on page A-16.
PM Statistics	Access the performance monitoring statistics and transmission MIB information. For more information, see the *NavisCore Diagnostic and Troubleshooting Guide.*
Apply	Apply your changes to the switch configuration. Once a switch is online, this command updates switch PRAM.
Close	Exit the dialog box without saving your changes.

2. Complete the dialog box fields described in Table 9-12.

Table 9-12. Set 6-Port Frame DS3/E3 Physical Port Attributes Fields

Field	Action/Description
Port Admin Status	Set this option to Up (*default*) to enable immediate access to the port. Set the Admin Status to Down to save the configuration in the database without activating the port or to take the port offline to run diagnostics. Each time you modify the Port Admin Status, choose Apply and then OK to send the change to the switch.
C-Bit Parity	Enable (*default*) or disable the C-Bit Parity function. The C-Bit Parity function provides a way to monitor the end-to-end performance of T3 circuits. *Note*: This feature requires C-bit parity-compatible customer premise equipment (CPE).
FEAC Loopback	Enable (*default*) or disable the switch's ability to respond to loopback commands on the Far-End Alarm and Control (FEAC) channel. Select Enable to allow the switch to respond to FEAC loopback commands from far end equipment (loop up and loop down), that can put the port into remote loopback. Select Disable to ignore loop up and loop down commands on the FEAC channel.
Alarm Failure (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits before declaring a physical layer problem (i.e., loss of signal) a real failure. The default value of 2500 ms (2.5 seconds) indicates the switch "soaks" the physical layer alarm for 2.5 seconds before declaring the physical port down. A value of 0 ms indicates the physical port goes down immediately following any physical layer failure. If you set the value lower than the default of 2.5 seconds, the switch takes the physical port down due to any transient failure in the transmission path; for a port that provides trunk connectivity, this may cause unnecessary rerouting of circuits.

Table 9-12. Set 6-Port Frame DS3/E3 Physical Port Attributes Fields (Continued)

Field	Action/Description
Alarm Clear (ms)	Enter a value between 0 to 65535 ms to determine how long the switch waits once a failure is cleared before declaring a physical layer problem (i.e., loss of signal) resolved. The default value of 10000 ms (10 seconds) indicates the switch waits 10 seconds after the alarm clears before declaring the physical port up. A value of 0 ms indicates the physical port comes back up as soon as the physical layer failure alarm clears. If you set the value lower than the default of 10 seconds, the switch may declare the physical port up before the transmission path is stabilized.
Xmit Clock Source	Specify the transmit clock source. *Internal* – (*default*) The IOM's internal timing source provides the clock source to this port. The IOM Clock Source setting in the Set IOM Card Attributes dialog box determines the internal clock source. *Loop-Timed* – The clock source is derived from the signal coming into this port.
Line Build Out	Select 0 – 225 feet (*default*) for a short cable or 226 – 450 feet for a long cable. This measurement represents the length of the cable that connects the physical port to other network equipment.
Max Buffer Size	Specify the maximum number of bytes in the reassembly buffer. The default is 8152. By configuring a smaller size, you provide more buffers to reassemble packets and reception is improved. However, the maximum buffer size must be large enough to hold the largest packet of information. Packets are discarded if the reassembly buffer if full.

3. To exit, choose Apply and then OK to save the physical port attributes and send an SNMP SET command to the switch.

4. Choose Cancel to exit the dialog box.

5. Now you can define the logical port parameters for this configuration. See one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Defining Ethernet Physical Ports (CBX)

The Ethernet module provides four 100-Mbps 10 BASE-T Ethernet ports.

To configure the Ethernet module physical port parameters:

1. Access the Set Physical Port Attributes dialog box (Figure 9-8) as described in "Accessing Physical Port Attributes" on page 9-1.

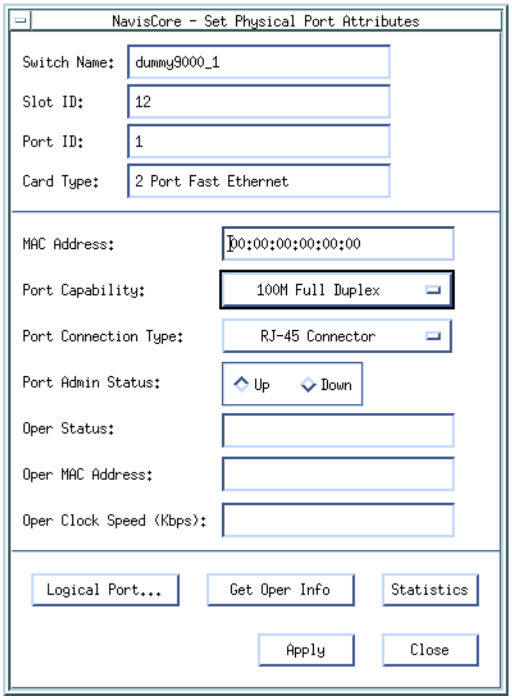


Figure 9-9. Set Physical Port Attributes Dialog Box

Table 9-13 describes buttons and non-configurable fields on the Set Physical Port Attributes dialog box.

Table 9-13. Set Physical Port Attributes Dialog Box Fields and Buttons

Field/Button	Function
Switch Name	The name of the switch in which the module resides.
Slot ID	The I/O slot (number) in which the module resides.
Port ID	The port (number) you are configuring.
Card Type	The type of card you are configuring.
Oper Status	Indicates the operational status of the physical port (Up or Down).
Oper MAC Address	Indicates the MAC address of the port. A MAC address is a standardized data link address that is required for every port or device that connects to a LAN.
Oper Clock Speed (Kbps)	Indicates the clock speed of the port.
Logical Port	Enables you to configure logical ports on this physical port.
Get Oper Info	Updates the Oper Status, Oper MAC Address, and Oper Clock Speed fields.
Statistics	Displays the summary statistics for the selected physical port. For more information about summary statistics, see the *NavisCore Diagnostic and Troubleshooting Guide*.
Apply	Applies changes to the configuration.
Close	Exits the dialog box without applying changes.

2. Complete the fields described in Table 9-14.

Table 9-14. Set Ethernet Physical Port Fields

Field	Description
MAC Address	Enter the MAC address. A MAC address is a standardized data link address that is required for every port or device that connects to a LAN. The default is all zeros, which indicates the port will come up with the MAC address that has been built into the ROM. If you enter in the MAC address, you override the built-in MAC address in ROM. The following are valid MAC format examples: • `00:67:3b:9c:71:a5` • `00673b9c71a5` (Upper and lower case entries are acceptable.)
Port Capability	Select the Ethernet port's speed and mode of operation: *100M Full Duplex* – Port running at 100 Mbps and in full duplex mode (ability to transmit and receive at the same time) *100M Half Duplex* – Port running at 100 Mbps and in half duplex mode (ability to transmit only or receive only) *10M Full Duplex* – Port running at 10 Mbps and in full duplex mode (ability to transmit and receive at the same time) *10M Half Duplex* – Port running at 10 Mbps and in half duplex mode (ability to transmit only or receive only)
Port Connection Type	Select the port connection type: *MII Connector* – Specifies four Media Independent Interface (MII) connectors. *RJ-45 Connector* – Specifies four RJ45-8 connector type, which comes in 2 pairs with a category 5 UTP.
Port Admin Status	Set the Port Admin Status. Each time you modify the Port Admin Status, choose Apply to send the change to the switch. *Up* – Activates the port. *Down* – Disables the port or takes the port offline to run diagnostics.

3. To exit, choose Apply and then OK to save the physical port attributes and send an SNMP SET command to the switch. Choose Cancel to exit the dialog box.
4. To define the logical port parameters that complete this configuration, see one of the following guides:
   - *NavisCore Frame Relay Configuration Guide*
   - *NavisCore IP Configuration Guide*
   - *NavisCore ATM Configuration Guide*
   - *NavisCore SMDS Configuration Guide*
   - *NavisCore ISDN Configuration Guide*

Defining Facility Data Link (FDL) Parameters

For T1 modules, if you select Extended Superframe as the Circuit Type (see page 9-24), you can specify the facility data line (FDL) control parameters.

To define FDL parameters:

1. From the Set ATM T1 Physical Port Attributes dialog box (Figure 9-7 on page 9-19), choose FDL. The Set ATM T1 Physical Port FDL Parameters dialog box (Figure 9-9)appears.

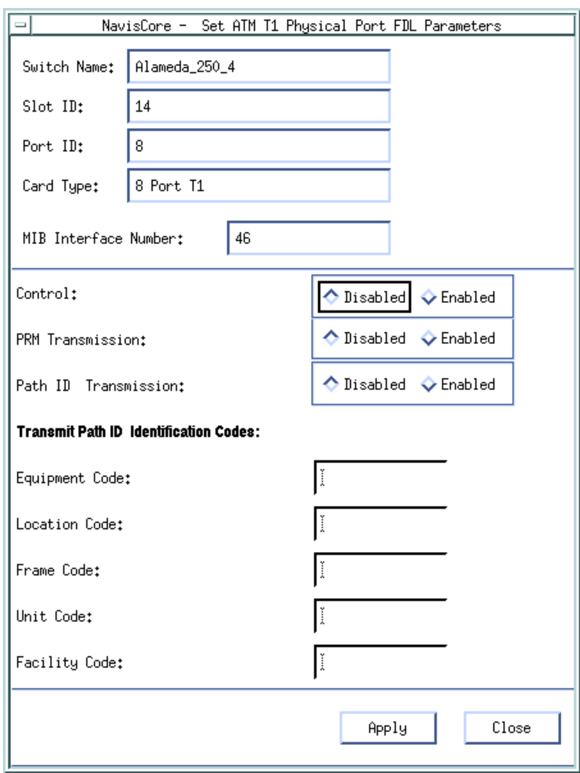


Figure 9-10. Set ATM Physical Port FDL Parameters Dialog Box

2. Complete the dialog box fields as described in Table 9-15.

Table 9-15. Set ATM Physical Port FDL Parameters Fields

Field	Action/Description
Control	Select Enabled to use the FDL control parameters; select Disabled (the default) if the carrier does not use them.
PRM Transmission	The T1 module processes incoming performance report messages (PRM) that provide error count information for far-end equipment. Select Enabled to transmit a similar PRM signal from this port. Select Disabled (the default) if the equipment connected to this port does not process PRM signals.
Path ID Transmission	The T1 module processes the path identification messages it receives from far-end equipment. Select Enabled to transmit a similar Path ID signal from this port. Select Disabled (the default) if the equipment connected to this port does not process path ID information. ***Note:*** *You can disable PRM Transmission and Path ID Transmission signals to save overhead.*
Equipment Code	Enter up to 10 characters to describe this piece of Ascend hardware.
Location Code	Enter up to 11 characters to describe the location of this Ascend hardware.
Frame Code	Enter up to 10 characters to describe the location (within a building) of this Ascend hardware.
Unit Code	Enter up to 6 characters to identify the hardware location (within a bay).
Facility Code	Enter up to 38 characters to identify the specific DS1 path that this physical port uses.

3. Choose Apply and then OK to save your changes. Choose Close to return to the Set Physical Port Attributes screen (Figure 9-7 on page 9-19).

Configuring ATM Threshold Crossing Alarms (CBX)

To configure threshold crossing alarms:

1. From the Set Physical Port Attributes dialog box, choose TCA. The Thresholds Crossing Alarm Configuration dialog box (Figure 9-10) appears.

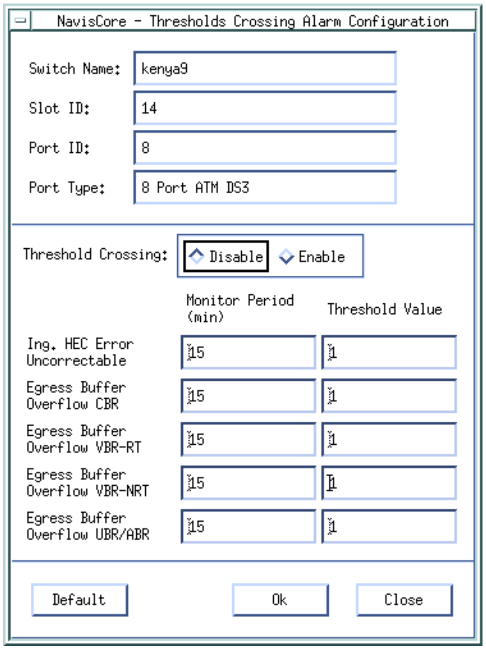


Figure 9-11. Threshold Crossing Alarm Configuration Dialog Box

2. Complete the dialog box fields as described in Table 9-16 or choose Default to set the values to their defaults.

Table 9-16. Threshold Crossing Alarm Configuration Fields

Field	Action/Description
Threshold Crossing	Enable or disable threshold crossing. When enabled, threshold crossing provides support for trap alarms that are generated during a variety of error conditions. This feature can prevent the trap message log from receiving too many messages that reflect the same condition. When one of these conditions occurs, a trap message is generated. When you enable threshold crossing, a timer is then set to monitor this condition for the period you specify. No additional trap messages are generated unless this condition reoccurs more than *x* number of times, where *x* equals the threshold value. If you disable threshold crossing, a trap message is generated each time one of these conditions occurs.

Table 9-16. Threshold Crossing Alarm Configuration Fields (Continued)

Field	Action/Description
If you enable threshold crossing, specify the Monitor Period and Threshold Value for each of the following conditions. If the number of times this condition occurs during this Monitor Period exceeds the Threshold Value you set, an additional trap message is generated.	
Ingress HEC Error Uncorrectable	Monitor uncorrectable ingress header error control (HEC) conditions.
Egress Buffer Overflow CBR	Monitor the CBR queue's egress buffer for overflow conditions.
Egress Buffer Overflow VBR-RT	Monitor the VBR-RT queue's egress buffer for overflow conditions.
Egress Buffer Overflow VBR-NRT	Monitor the VBR-NRT queue's egress buffer for overflow conditions.
Egress Buffer Overflow UBR/ABR	Monitor the UBR/ABR queue's egress buffer for overflow conditions.

Physical Port Colors

On the switch backpanel (via NavisCore), physical ports change color to indicate their operational status.Table 9-17 describes the physical port coloring scheme:

Table 9-17. Physical Port Coloring Scheme

Color	Description
Gray	Indicates the physical port is unknown. This condition usually occurs if the configuration does not exist or a logical port is not defined.
Green	Indicates the physical port is accurately configured and operational.
Red	Indicates the physical port is configured but has an Amin Status of Down, an Operational Status of Down, and/or all logical ports have an Admin Status or an Operational Status of Down.
Cyan	Indicates the physical port is configured but one or more (but not all) logical ports have an Admin Status or an Operational Status of Down. ***Note****: Cyan is a light blue color.*

10

Configuring Optical-Card Redundancy (CBX and GX)

There are three different redundancy options you can configure for an optical card. The APS 1+1 feature enables you to designate a primary (*working*) port and a backup (*protection*) port. Under normal conditions, traffic passes over the working port. When a line failure condition occurs, traffic automatically transfers over to the protection port. In addition, an APS switchover also occurs when the working line receives LOF, L-AIS, or LOS defects.

APS Resilient UNI enables you to use the APS feature in conjunction with fault tolerant PVC functionality. If the entire module should go down, this feature enables a physical port on a different module to respond as a backup. Circuits configured on these ports recognize a service name, not a logical port name, as the endpoint. For more information, see the *NavisCore ATM Configuration Guide*.

APS with Trunk Backup enables you to configure a standby trunk when a primary trunk fails. Trunk backups become active if trunks time out. For more information, see the *NavisCore ATM Configuration Guide*.

There are two types of physical port redundancy:

Intracard APS — Allows you to assign a protection port on the same IOM as the working port.

Intercard APS — Allows you to assign a protection port on a different IOM than the working port (in case the working port's IOM fails). Ascend recommends that you use Intercard APS for redundancy options APS Resilient UNI and APS with Trunk Backup.

Intercard APS, as described in this chapter, is not "true" Intercard APS. This version of Intercard APS transmits data through circuit reroute, whereas "true" Intercard APS transmits data in two streams. True Intercard APS will be supported in a future release.

The minimum revision CBX modules that support physical port redundancy are:

- OC-3/STM-1, switch software version 03.00.xx.xx
- OC-12/STM-4, switch software version 02.00.00.00

APS is supported on the following new versions of CBX OC3/STM-1 IOMs:

Product Code 11058L – Supports APS with no FCP support.
Product Code 11075L – Supports APS with FCP support.

To determine if your CBX OC3/STM-1 IOM supports APS, use the NavisCore "View Card Attributes" dialog box. The Switch Software Capability and Hardware Capability fields should indicate "APS."

Using Redundancy

To enable redundancy features:

1. Access the Set Physical Port Attributes dialog box (see Figure 9-3).
2. Select one of the following redundancy options:

   Intra-card APS 1 +1 – Enables you to use a second port on this module as a backup. Enter the physical port ID of the protection port.

   APS Resilient UNI – Enables you to use APS in conjunction with fault tolerant PVC functionality. If you select this option, enter the slot ID and physical port ID for the protection port and slot. ***Note****: Ascend recommends you select a physical port on a different IOM/BIO than the working port (Intercard APS).*

   APS with Trunk Backup – Enables you to use a trunk backup that is configured between the protection ports. If you select this option, enter the slot ID and physical port ID for the protection port and slot. ***Note****: Ascend recommends you select a physical port on a different IOM/BIO than the working port (Intercard APS).*
3. Continue with the following section to configure APS parameters.

Configuring APS Parameters

As part of the APS feature, you configure failure thresholds that the working port must exceed before traffic transfers to the protection port. You can configure the APS function to revert back to the working port when the failure condition clears.

> For more information about APS, see the Bellcore Synchronous Optical Network (SONET) Transport Systems: Common Generic Criteria Specification (GR-253-CORE).

To configure APS parameters:

1. From the Set Physical Port Attributes dialog box (see Figure 9-3), choose *APS*. The Set APS Attributes dialog box appears (Figure 10-1).

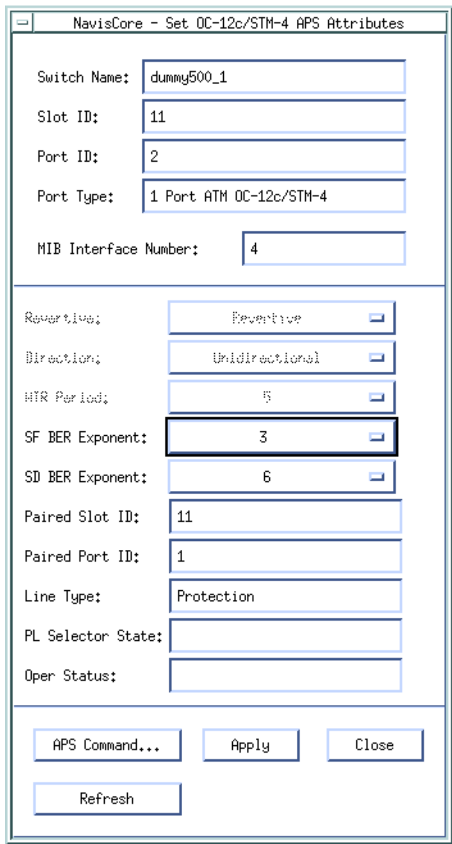


Figure 10-1. Set OC-12c/STM-4 APS Attributes Dialog Box

When you access the Set APS Attributes dialog box from the protection port, the Line Type field displays Protection. In this case, you cannot modify the Revertive, Direction, and WTR Period fields.

2. Complete the APS attributes as described in Table 10-1.

Table 10-1. Set APS Attributes Fields

Field	Action/Description
Revertive	Designates how this port handles traffic once a line failure clears. Select one of the following: *Revertive* – Traffic transfers back to the working port when the wait-to-restore (WTR) time period expires. Revertive is the default for Intracard APS 1+1. *Nonrevertive* – Traffic continues to pass over the protection port until you use the APS Command (see page 10-8) to transfer back to the working port. Nonrevertive is the default for Resilient UNI with APS and Trunk Backup with APS. ***Note**: For resilient UNI with APS and Trunk Backup with APS, you must select Nonrevertive.*
Direction	Determines whether or not one endpoint will switch over independently of the other. (In APS, there is a one-for-one correlation between the ports, and traffic is always transmitted on both working and protection lines.) *Unidirectional* – One end switches independently of the other. Unidirectional is the default for Intracard APS 1+1. *Bidirectional* (APS 1+1 only) – When one end detects a line defect, it signals the other end to switch. Thus, both ends switch in tandem. Bidirectional is the default for Resilient UNI with APS and Trunk Backup with APS. ***Note**: For resilient UNI with APS and Trunk Backup with APS, you must select Bidirectional.*
WTR Period	If this port uses the Revertive option, set the wait-to-restore (WTR) time period (5 to 12 minutes). The default is 5 minutes. This is the period of time the port waits once the automatically initiated switch condition (i.e., SD, SF, LOF, AIS, or LOS) clears before it transfers traffic back to the working port. The port does not use this timer if you used the APS Command to transfer traffic to the protection port (see page 10-8).
SF BER Exponent	Set the Signal Fail (SF) Bit Error Rate (BER) exponent. Values can range from 3 to 5; the default is 3. The port uses this value to compute the signal fail threshold. When the BER exceeds $10^{-threshold}$, the port detects the line failure and transfers traffic to the protection port. The port transfers traffic based on how you configured the Direction option (either unidirectional or bidirectional). ***Note**: The clear condition for SF BER is a bit error rate of less than* 10^{-7}.
SD BER Exponent	Set the Signal Degrade (SD) Bit Error Rate (BER) exponent. Values can range from 6 to 9; the default is 6. The port uses this value to compute the signal degrade threshold. When the BER exceeds $10^{-threshold}$, the port detects the line failure and transfers traffic to the protection port. The port transfers traffic based on how you configured the Direction option (either unidirectional or bidirectional). ***Note:** The clear condition for SD BER is a bit error rate of less than 1/10th the current SD threshold.*
Paired Slot ID	Displays the slot location ID of the card on which the protection port resides. If you view this information for a protection port, it displays the slot ID of the working port.

Table 10-1. Set APS Attributes Fields (Continued)

Field	Action/Description
Paired Port ID	Displays the port ID of the protection port. If you view this information for a protection port, it displays the port ID of the working port.
Line Type	Indicates whether the port is a working line or a protection line.
PL Selector State	Indicates the protection line selector state. “Selected” means the protection line is active; “Released” indicates the working line is active. If either port in an APS-pair is capable of receiving data, the Oper Status field on the Set/Show Physical Port Attributes dialog box should display Up.
Oper Status	Indicates the operational status of the port, either Up or Down.

3. Choose Apply to save these settings and Close return to the Set Physical Port Attributes dialog box (page 9-1).
4. To exit, choose Apply and then OK to save the physical port attributes and create an SNMP SET command to send to the switch.
5. Choose Cancel to exit.

> Once you configure the physical port and APS attributes for either the APS Resilient UNI working port or APS with Trunk Backup working port, you must configure additional parameters. See “Using APS Resilient UNI” on page 10-10 or “Using APS with Trunk Backup” on page 10-10.

Viewing Redundant Physical Ports

You can view the list of redundant physical port pairs that are configured for a selected switch. To view this list:

1. Select a switch and from the Administer menu, select Ascend Parameters -> Set Parameters. The Switch Back Panel dialog box appears.
2. Select View Port Redundancy and choose Go to view the Physical Port Redundancy Pairings dialog box (Figure 10-2).

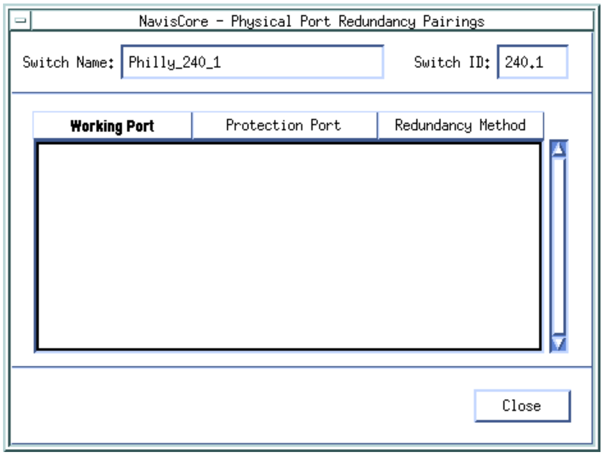


Figure 10-2. Physical Port Redundancy Pairings Dialog Box

Viewing Protection Port Attributes

You can review the physical port parameters for the optical card protection port. Access the Switch Back Panel dialog box and select the protection port. Choose Attrs. The following dialog box appears (Figure 10-2).

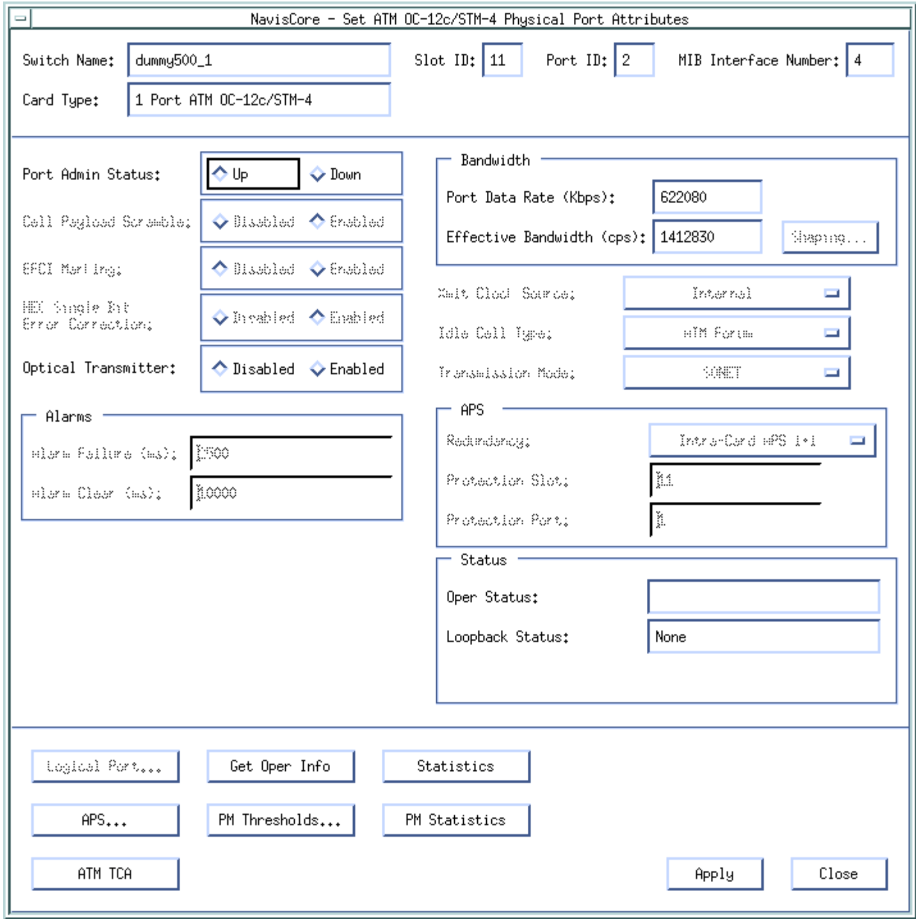


Figure 10-3. Set OC12/STM-4 Physical Port Attributes [Backup Port]

Note that you can only configure the Port Admin Status and Optical Transmitter fields. All other parameters use the values that you defined for the working port. This dialog box also includes buttons that access the same options used by the working port (see Table 9-5 on page 9-11). Note that if this port is configured for Intra-card APS 1+1, you cannot configure logical ports on the protection port.

Using Port Redundancy

There are several commands that you use to manage the working and protection port. The Set APS Attributes dialog box contains the APS Commands button, which you use to send external commands to the switch. Some of the functions you can perform include manually switching between the working and protection port.

Sending APS Commands to the Switch

To use the APS commands:

1. From the Set APS Attributes dialog box (Figure 10-1 on page 10-3), choose APS Commands. The Send APS dialog box (Figure 10-4) appears.

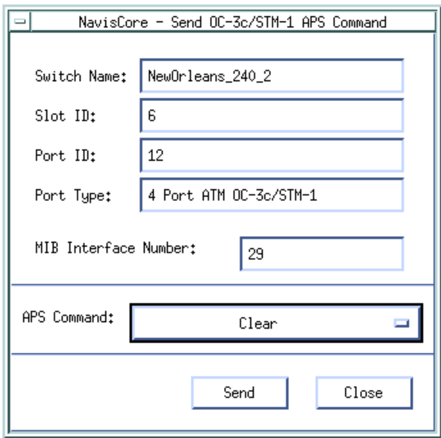


Figure 10-4. Send OC-3c/STM-1 APS Commands

2. Select an APS Command and choose Send. Table 10-2 describes the APS commands that are available to the working or protection port.

Table 10-2. APS Commands

Command	Used to	Port Type Available
Clear	Clear all of the switch commands listed below for the selected port type.	APS and Working
Lockout of Protection	Prevent the working port from switching to the protection port.	Protection
Forced Switch (working -> protection)	Switch from the working port to the protection port. This command does not work if a higher priority request is already in effect.	Working

Table 10-2. APS Commands (Continued)

Command	Used to	Port Type Available
Forced Switch (protection -> working)	Switch from the protection port to the working port. This command does not work if a higher priority request is already in effect.	Protection
Manual Switch (working -> protection)	Switch from the working port to the protection port. This command does not work if a higher priority request is already in effect. ***Note:*** *If you manually switch to the protection port and then there is a line failure on the working port, the software now prioritizes the port switch as a "forced switch."*	Working
Manual Switch (protection -> working)	Switch from the protection port to the working port. This command does not work if a higher priority request is already in effect.	Protection

Using APS Resilient UNI

Verify that you completed the following:

- Configure two working ports (which are on two different switches) and their APS Resilient UNI attributes

- Configure two protection ports (which are on the same switches as the working ports, respectively) and their APS Resilient UNI attributes

Once this is done, complete the configuration is as follows:

1. Configure 2 UNI logical ports for the 2 working ports. See the *NavisCore ATM Configuration Guide*.
2. Configure the service name bindings. See the *NavisCore ATM Configuration Guide*.
3. Configure 2 UNI logical ports for the 2 protection ports. Specify Can Backup Service Names as Yes. See the *NavisCore ATM Configuration Guide* for instructions.
4. Configure a fault tolerant PVC/resilient UNI between the 2 working ports. Use the service names as the endpoints instead of the logical port names (see the *NavisCore ATM Configuration Guide*).

If the working port fails, the fault tolerant PVC/resilient UNI software automatically moves the circuits to the protection port.

Using APS with Trunk Backup

Verify that you completed the following:

- Configure two working ports (which are on two different switches) and their APS with trunk backup attributes

- Configure two protection ports (which are on the same switches as the working ports) and their APS with trunk backup attributes

Once this is done, complete the the configuration as follows:

1. Configure 2 direct trunk logical ports for the 2 working physical ports. See the *NavisCore ATM Configuration Guide*.
2. Configure 2 direct trunk logical ports for the 2 protection physical ports**.** See the *NavisCore ATM Configuration Guide*.
3. Configure a primary trunk between the two working ports. See the *NavisCore ATM Configuration Guide*.
4. Configure a backup trunk between the two protection ports. See the *NavisCore ATM Configuration Guide*.

A

Configuring Performance-Monitoring Thresholds

B-STDX, CBX, and GX Ascend switch platforms support physical-layer performance-monitoring functions, as derived from ANSI 231, for all physical port types. These performance monitoring functions allow for the timely detection of performance degradation in network elements at the physical layer. This appendix explains how to configure performance threshold attributes according to physical port type. For information on monitoring physical layer performance, see the *NavisCore Diagnostic and Troubleshooting Guide*.

About Performance Monitoring

The NMS allows you to set performance parameter thresholds for the 15-minute and one-day accumulation periods for each physical port. If you enable threshold crossing, the port will generate traps if these thresholds are exceeded. You can then set performance threshold attributes to meet your needs, or use the default values.

This chapter is divided according to switch platform. See one of the following sections:

- "B-STDX Performance Monitoring" on page A-2
- "CBX/GX Performance Monitoring" on page A-16

> When you configure PM Thresholds for the following I/O modules, you configure both near and far end performance monitoring:
>
> – ATM IWU/OC3 module on the B-STDX
>
> – OC3/STM1 module on the CBX and GX
>
> – OC-12c/STM-4 module on the CBX and GX
>
> If you change PM threshold values for these I/O modules, the changes affect both near and far end PM threshold values.

B-STDX Performance Monitoring

See one of the following sections for your physical port type:

- "Performance Monitoring on Channelized DS3 and Channelized DS3-1-0 Physical Ports" on page A-3
- "Performance Monitoring on DS1 Channels and Channelized T1 Physical Ports" on page A-7
- "Performance Monitoring on ATM CS DS3/E3 Physical Ports" on page A-9
- "Performance Monitoring on ATM IWU/OC3 Physical Ports" on page A-13

Performance Monitoring on Channelized DS3 and Channelized DS3-1-0 Physical Ports

1. From the Set Physical Port Attributes dialog box, choose PM Thresholds The Set DS3 Performance Thresholds dialog box (Figure A-1) appears.

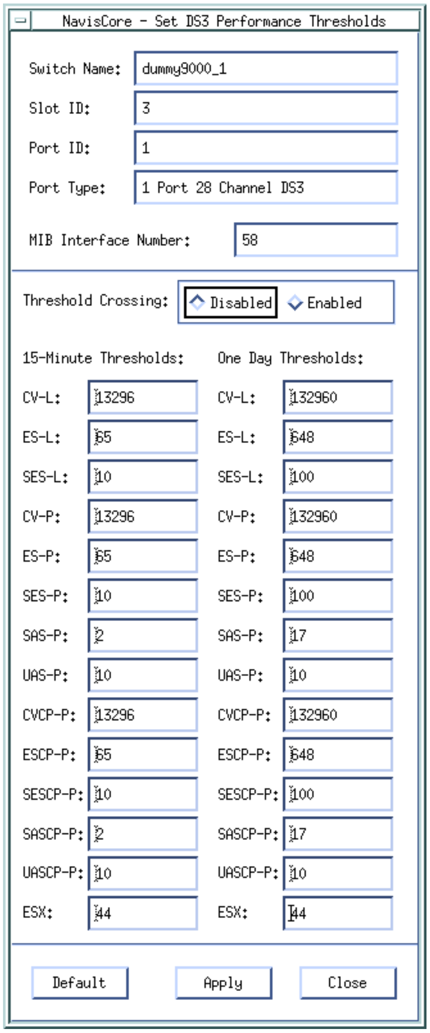


Figure A-1. Set DS3 Performance Thresholds Dialog Box

2. Threshold Crossing is Disabled by default. Enable it if you want to generate traps for threshold crossing.

3. Use Table A-1 to set the 15-minute and one-day threshold values. Use the Default button to return these values to the default settings.

Table A-1. DS3 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
Near End Line Parameters					
CV-L (Code Violations)	A count of both BPVs and EXZs occurring over the accumulation period.	1 - 16383	13296	1 - 1048575	132960
ES-L (Errored Seconds)	A count of 1-second intervals containing one or more BPVs, one or more EXZs, or one or more LOS defects.	1 - 900	65	1 - 65535	648
SES-L (Severely Errored Seconds)	A count of 1-second intervals with more than x BPVs plus EXZs, or one or more LOS defects.	1 - 63	10	1 - 4095	100

Table A-1. DS3 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
Near End Path Parameters					
CV-P (Code Violations)	A count of error events occurring in the accumulation period.	1 - 16383	13296	1 - 1048575	132960
ES-P (Errored Seconds)	A count of 1-second intervals containing the occurrence of one or more P-bit parity errors, one or more SEF defects, or one or more AIS defects.	1 - 900	65	1 - 65535	648
SES-P (Severely Errored Seconds)	A count of 1-second intervals containing more than x P-bit parity errors, one or more SEF defects, or one or more AIS defects.	1 - 63	10	1 - 4095	100
SAS-P (AIS Seconds)	A count of 1-second intervals containing one or more AIS defects.	1 - 63	2	1 - 4095	17
UAS-P (P-bit Unavailable Seconds)	A count of 1-second intervals for which the DS3 path is unavailable.	1 - 63	10	1 - 4095	10
CVCP-P (C-bit Coding Violations)	This error is counted when the three FEBE bits in an M-frame are not all set to one (1).	1 - 16383	13296	1 - 1048575	132960

Table A-1. DS3 Performance Monitoring Thresholds (Continued)

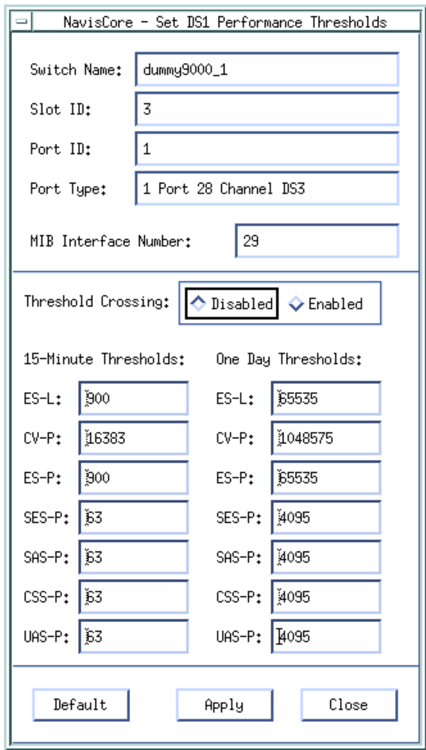
Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
ESCP-P (C-bit Errored Seconds)	A count of 1-second intervals containing one or more M-frames with the three FEBE bits not all set to one (1); or one or more far-end SEF/AIS defects.	1 - 900	65	1 - 65535	648
SESCP-P (C-bit Severely Errored Seconds)	A count of 1-second intervals containing more than x M-frames with the three FEBE bits not all set to one (1); or one or more far-end SEF/AIS defects.	1 - 63	10	1 - 4095	100
SASCP-P (C-bit AIS Seconds)	A count of 1-second intervals containing one or more far-end SEF/AIS defects.	1 - 63	2	1 - 4095	17
UASCP-P (C-bit Unavailable Seconds)	A count of 1-second intervals for which the DS3 path is unavailable.	1 - 63	10	1 - 4095	10
ESX (Defects in Errored Seconds)	A count of 1-second intervals containing 1 or more unclassified errors.	1 - 255	44	1 - 65535	44

4. When you finish, choose Apply to save your changes and Close to return to the Set Physical Port Attributes dialog box (Figure 9-2 on page 9-3).

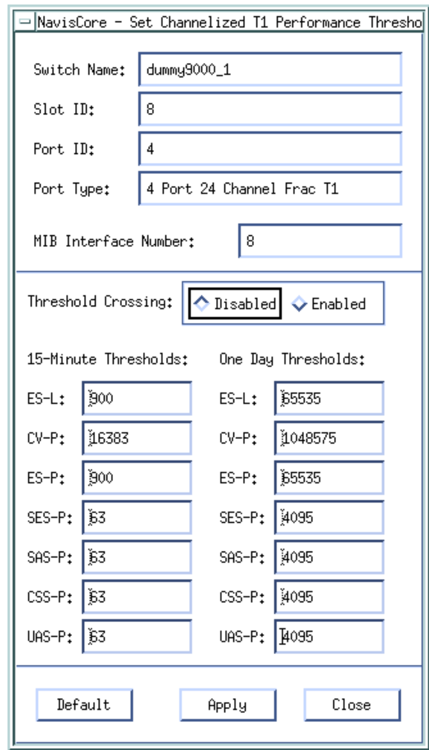
Performance Monitoring on DS1 Channels and Channelized T1 Physical Ports

To configure performance thresholds:

1. From the Set Channel Attributes dialog box (for DS1 channels) or the Set Physical Port Attributes dialog box (for Channelized T1 physical ports), choose PM Thresholds. Either of the dialog boxes (Figure A-2) appear.



Set DS1 Performance Thresholds dialog box



Set Channelized T1 Performance Thresholds dialog box

Figure A-2. Set DS1 (Left) and Channelized T1 (Right) Performance Thresholds Dialog Boxes

2. Threshold Crossing is disabled by default. Enable it if you want to generate traps for threshold crossing.

3. Use Table A-2 to set the 15-minute and one-day threshold values. Use the Default button to return these values to the default settings.

Table A-2. DS1 Channel/Channelized T1 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
ES-L (Line Errored Seconds)	A count of 1-second intervals with one or more BPVs or EXZs.	1 - 900	900	1 - 65535	65535
CV-P (Path Code Violations)	A count of frame synchronization bit errors; i.e., the count of CRC-6 errors in ESF format.	1 - 16383	16383	1 - 1048575	1048575
ES-P (Path Errored Seconds)	A count of 1-second intervals with one or more CRC-6 errors or one or more CS events.	1 - 900	900	1 - 65535	65535
SES-P (Path Severely Errored Seconds)	A count of 1-second intervals with 320 or more CRC-6 errors, or one or more SEF or AIS defects.	1 - 63	63	1 - 4095	4095
SAS-P	A count of 1-second intervals with one AIS defect.	1 - 63	63	1 - 4095	4095
CSS-P	A count of 1-second intervals with one or more controlled slip events.	1 - 63	63	1 - 4095	4095
UAS-P (Path Unavailable Seconds)	A count of 1-second intervals for which the DS1 path is unavailable. The path is unavailable upon detection of 10 contiguous seconds with no SESs.	1 - 63	63	1 - 4095	4095

4. When you finish, choose Apply to save your changes and Close to return to the Set Channel Attributes dialog box or the Set Physical Ports dialog box.
5. Choose Apply and then OK to save the physical port attributes and send an SNMP SET command to the switch. Choose Cancel to exit.

Performance Monitoring on ATM CS DS3/E3 Physical Ports

1. From the Set Physical Port Attributes dialog box, choose PM Thresholds. The Set ATM CS DS3 [E3] Performance Threshold dialog box appears (Figure A-3).

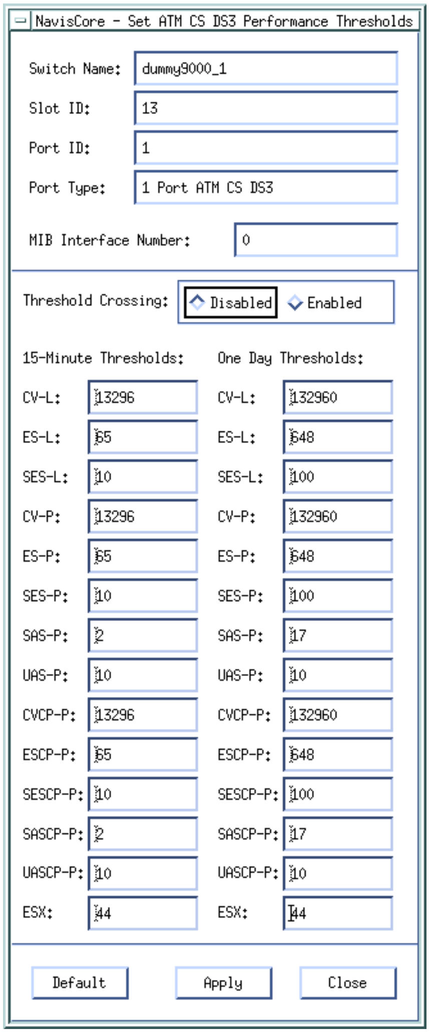


Figure A-3. Set ATM CS DS3 Performance Monitoring Thresholds Dialog Box

2. Threshold Crossing is Disabled by default. Enable it if you want to generate traps for threshold crossing.

3. Use Table A-3 to set the 15-minute and one-day threshold values. Use the Default button to return these values to the default settings.

Table A-3. ATM CS DS3/E3 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
Near End Line Parameters					
CV-L (Code Violations)	A count of both BPVs and EXZs occurring over the accumulation period.	1 - 16383	13296	1 - 1048575	132960
ES-L (Errored Seconds)	A count of 1-second intervals containing one or more BPVs, one or more EXZs, or one or more LOS defects.	1 - 900	65	1 - 65535	648
SES-L (Severely Errored Seconds)	A count of 1-second intervals with more than x BPVs plus EXZs, or one or more LOS defects.	1 - 63	10	1 - 4095	100

Table A-3. ATM CS DS3/E3 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
Near End Path Parameters					
CV-P (Code Violations)	A count of error events occurring in the accumulation period.	1 - 16383	13296	1 - 1048575	132960
ES-P (Errored Seconds)	A count of 1-second intervals containing the occurrence of one or more P-bit parity errors, one or more SEF defects, or one or more AIS defects.	1 - 900	65	1 - 65535	648
SES-P (Severely Errored Seconds)	A count of 1-second intervals containing more than x P-bit parity errors, one or more SEF defects, or one or more AIS defects.	1 - 63	10	1 - 4095	100
SAS-P (AIS Seconds)	A count of 1-second intervals containing one or more AIS defects.	1 - 63	2	1 - 4095	17
UAS-P (P-bit Unavailable Seconds)	A count of 1-second intervals for which the DS3 path is unavailable.	1 - 63	10	1 - 4095	10
CVCP-P (C-bit Coding Violations)	This error is counted when the three FEBE bits in an M-frame are not all set to one (1).	1 - 16383	13296	1 - 1048575	132960

Table A-3. ATM CS DS3/E3 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
ESCP-P (C-bit Errored Seconds)	A count of 1-second intervals containing one or more M-frames with the three FEBE bits not all set to one (1); or one or more far-end SEF/AIS defects.	1 - 900	65	1 - 65535	648
SESCP-P (C-bit Severely Errored Seconds)	A count of 1-second intervals containing more than x M-frames with the three FEBE bits not all set to one (1); or one or more far-end SEF/AIS defects.	1 - 63	10	1 - 4095	100
SASCP-P (C-bit AIS Seconds)	A count of 1-second intervals containing one or more far-end SEF/AIS defects.	1 - 63	2	1 - 4095	17
UASCP-P (C-bit Unavailable Seconds)	A count of 1-second intervals for which the DS3 path is unavailable.	1 - 63	10	1 - 4095	10
ESX (Defects in Errored Seconds)	A count of 1-second intervals containing 1 or more unclassified errors.	1 - 255	44	1 - 65535	44

4. When you finish, choose Apply to save your changes and Close to return to the Set Physical Port Attributes dialog box.

Performance Monitoring on ATM IWU/OC3 Physical Ports

When you configure PM Thresholds for the ATM IWU/OC3 I/O module, you configure both near and far end performance monitoring. If you change any PM threshold value, the change applies to both near and far end PM threshold values.

1. From the Set Physical Port Attributes dialog box, choose PM Thresholds. The Set ATM IWU/OC3 Performance Threshold dialog box (Figure A-4) appears.

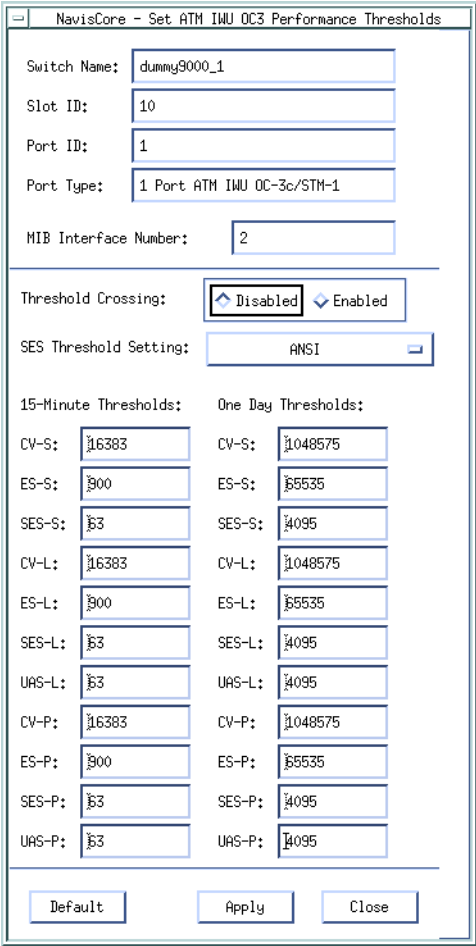


Figure A-4. Set ATM IWU/OC3 Performance Thresholds Dialog Box

2. Threshold Crossing is Disabled by default. Enable it if you want to generate traps for threshold crossing.

3. Select the SES Threshold Setting which corresponds to the standard the switch software will use to calculate the severely errored seconds counts. The default is ANSI. Select Bellcore to use the SONET MIB (RFC 1595) thresholds.

Table A-4 describes the threshold values used for ANSI and Bellcore standards.

Table A-4. ATM IWU/OC3 Severely Errored Seconds Threshold Values

Parameter	ANSI Value	Bellcore Value
Section SES	8800	63
Line SES	10000	124
Path SES	8800	63

4. Use Table A-5 to set the 15-minute and one-day threshold parameters. Use the Default button to return these values to the default setting.

Table A-5. ATM IWU/OC3 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
CV-S (Section Code Violations)	A count of BIP-8 errors that are detected at the section layer of the incoming signal.	1 - 16383	16383	1 - 1048575	1048575
ES-S (Section Errored Seconds)	A count of 1-second intervals containing one or more BIP-8 errors (B1 byte), one or more SEF defects, or one or more LOS defects.	1 - 900	900	1 - 65535	65535
SES-S (Section Severely Errored Seconds)	A count of 1-second intervals containing x or more BIP-8 errors (B1 byte), one or more SEF defects, or one or more LOS defects.	1 - 63	63	1 - 4095	4095
CV-L (Line Code Violations)	A count of the BIP-8 errors detected at the line layer of the incoming signal.	1 - 16383	16383	1 - 1048575	1048575
ES-L (Line Errored Seconds)	A count of 1-second intervals containing one or more BIP-8 errors (B2 byte), or one or more AIS defects.	1 - 900	900	1 - 65535	65535

Table A-5. ATM IWU/OC3 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
SES-L (Line Severely Errored Seconds)	A count of 1-second intervals containing x or more BIP-8 errors (B2 byte) or one or more AIS defects.	1 - 63	63	1 - 4095	4095
UAS-L (Unavailable Seconds)	A count of 1-second intervals for which the SONET line is unavailable.	1 - 63	63	1 - 4095	4095
CV-P (Path Code Violations)	A count of BIP-8 errors that are detected at the STS-path layer of the incoming signal.	1 - 16383	16383	1 - 1048575	1048575
ES-P (Path Errored Seconds)	A count of 1-second intervals containing one or more BIP-8 errors (B3 byte), one or more AIS defects, or one or more LOP-P defects.	1 - 900	900	1 - 65535	65535
SES-P (Path Severely Errored Seconds)	A count of 1-second intervals containing x or more BIP-8 errors (B3 byte), one or more LOP-P defects, or one or more AIS defects.	1 - 63	63	1 - 4095	4095
UAS-P (Path Unavailable Seconds)	A count of 1-second intervals for which the SONET STS-path is unavailable.	1 - 63	63	1 - 4095	4095

5. When you finish, choose Apply to save your changes and Close to return to the Set Physical Port Attributes dialog box.

CBX/GX Performance Monitoring

See one of the following sections for your CBX/GX physical port type:

- "Performance Monitoring on ATM DS3/E3 Physical Ports (CBX)" on page A-16
- "Performance Monitoring on OC3/STM-1, OC-12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" on page A-21
- "Performance Monitoring on ATM T1/E1 Physical Ports (CBX)" on page A-24

> The section "Performance Monitoring on OC3/STM-1, OC-12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)" pertains to the following modules:
>
> – OC3/STM-1 and OC-12c/STM-4 CBX and GX modules
>
> – OC48/STM-16 GX modules
>
> All other sections are relevant to CBX modules only.

Performance Monitoring on ATM DS3/E3 Physical Ports (CBX)

To configure these parameters,

1. From either the Set ATM DS3[E3] Physical Port Attributes dialog box, choose PM Thresholds. The Set ATM DS3 [E3] Performance Thresholds dialog box (Figure A-5) appears.

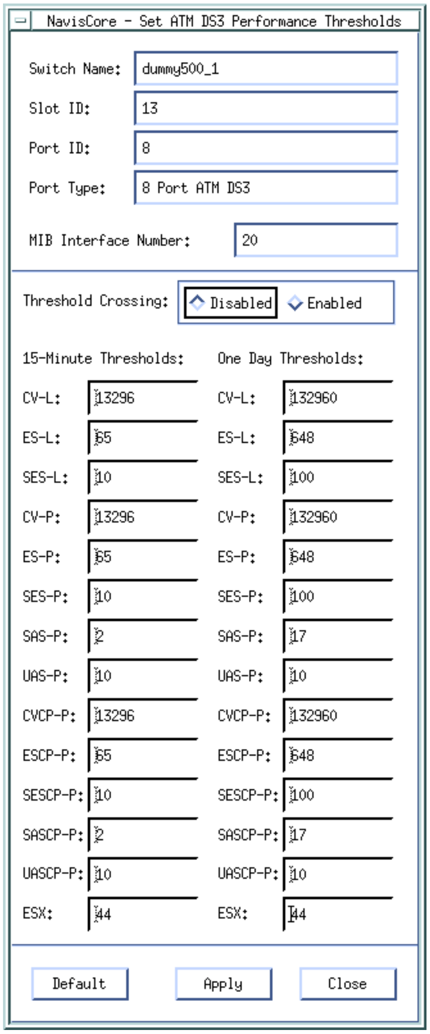


Figure A-5. Set ATM DS3 Performance Thresholds Dialog Box

2. Threshold Crossing is Disabled by default. Enable it if you want to generate traps for threshold crossing.
3. Use Table A-6 to set the 15-minute and one-day threshold values. Use the Default button to return these values to the default settings.

Table A-6. ATM DS3/E3 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
Near End Line Parameters					
CV-L (Code Violations)	A count of both BPVs and EXZs occurring over the accumulation period.	1 - 16383	13296	1 - 1048575	132960
ES-L (Errored Seconds)	A count of 1-second intervals containing one or more BPVs, one or more EXZs, or one or more LOS defects.	1 - 900	65	1 - 65535	648
SES-L (Severely Errored Seconds)	A count of 1-second intervals with more than x BPVs plus EXZs, or one or more LOS defects.	1 - 63	10	1 - 4095	100

Table A-6. ATM DS3/E3 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
Near End Path Parameters					
CV-P (Code Violations)	A count of error events occurring in the accumulation period.	1 - 16383	13296	1 - 1048575	132960
ES-P (Errored Seconds)	A count of 1-second intervals containing the occurrence of one or more P-bit parity errors, one or more SEF defects, or one or more AIS defects.	1 - 900	65	1 - 65535	648
SES-P (Severely Errored Seconds)	A count of 1-second intervals containing more than x P-bit parity errors, one or more SEF defects, or one or more AIS defects.	1 - 63	10	1 - 4095	100
SAS-P (AIS Seconds)	A count of 1-second intervals containing one or more AIS defects.	1 - 63	2	1 - 4095	17
UAS-P (P-bit Unavailable Seconds)	A count of 1-second intervals for which the DS3 path is unavailable.	1 - 63	10	1 - 4095	10
CVCP-P (C-bit Coding Violations)	This error is counted when the three FEBE bits in an M-frame are not all set to one (1).	1 - 16383	13296	1 - 1048575	132960

Table A-6. ATM DS3/E3 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
ESCP-P (C-bit Errored Seconds)	A count of 1-second intervals containing one or more M-frames with the three FEBE bits not all set to one (1); or one or more far-end SEF/AIS defects.	1 - 900	65	1 - 65535	648
SESCP-P (C-bit Severely Errored Seconds)	A count of 1-second intervals containing more than x M-frames with the three FEBE bits not all set to one (1); or one or more far-end SEF/AIS defects.	1 - 63	10	1 - 4095	100
SASCP-P (C-bit AIS Seconds)	A count of 1-second intervals containing one or more far-end SEF/AIS defects.	1 - 63	2	1 - 4095	17
UASCP-P (C-bit Unavailable Seconds)	A count of 1-second intervals for which the DS3 path is unavailable.	1 - 63	10	1 - 4095	10
ESX (Defects in Errored Seconds)	A count of 1-second intervals containing 1 or more unclassified errors.	1 - 255	44	1 - 65535	44

4. When you finish, choose Apply to save your changes and Close to return to the Set Physical Port Attributes dialog box.

Performance Monitoring on OC3/STM-1, OC-12c/STM-4, and OC48/STM-16 Physical Ports (CBX and GX)

This section pertains to OC3/STM-1 and OC-12c/STM-4 modules on both the CBX and GX platforms (Note, the OC48/STM-16 module is only available on the GX). When you configure PM Thresholds for these I/O modules, you configure both near and far end performance monitoring. If you change any PM threshold value, the change applies to both near and far end PM threshold values.

To configure these parameters:

1. From the Set Physical Port Attributes dialog box, choose PM Thresholds. The Set ATM OC-3c/STM-1 Performance Thresholds dialog box (Figure A-6) appears.

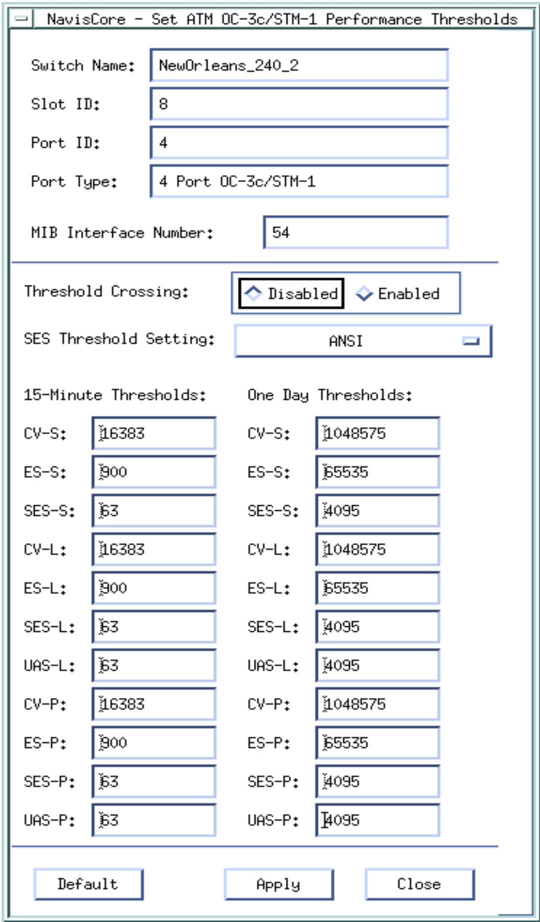


Figure A-6. Set ATM OC3/STM-1 Performance Thresholds Dialog Box

2. Threshold Crossing is Disabled by default. Enable it if you want to generate traps for threshold crossing.

3. Select the SES Threshold Setting which corresponds to the standard the switch software will use to calculate the severely errored seconds counts. The default is ANSI. Select Bellcore to use the SONET MIB (RFC 1595) thresholds.

   Table A-7 describes the threshold values used for ANSI and Bellcore standards.

Table A-7. OC3/STM-1, OC12/STM-4, OC48/STM-16 Severely Errored Seconds Threshold Values

Parameter	ANSI Value	Bellcore Value
Section SES	8800	63
Line SES	10000	124
Path SES	8800	63

4. Use Table A-8 to set the 15-minute and one-day threshold parameters. Use the Default button to return these values to the default setting.

Table A-8. OC3/STM-1, OC12/STM-4, and OC48/STM-16 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
CV-S (Section Code Violations)	A count of BIP-8 errors that are detected at the section layer of the incoming signal.	1 - 16383	16383	1 - 1048575	1048575
ES-S (Section Errored Seconds)	A count of 1-second intervals containing one or more BIP-8 errors (B1 byte), one or more SEF defects, or one or more LOS defects.	1 - 900	900	1 - 65535	65535
SES-S (Section Severely Errored Seconds)	A count of 1-second intervals containing x or more BIP-8 errors (B1 byte), one or more SEF defects, or one or more LOS defects.	1 - 63	63	1 - 4095	4095
CV-L (Line Code Violations)	A count of the BIP-8 errors detected at the line layer of the incoming signal.	1 - 16383	16383	1 - 1048575	1048575

Table A-8. OC3/STM-1, OC12/STM-4, and OC48/STM-16 Performance Monitoring Thresholds (Continued)

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
ES-L (Line Errored Seconds)	A count of 1-second intervals containing one or more BIP-8 errors (B2 byte), or one or more AIS defects.	1 - 900	900	1 - 65535	65535
SES-L (Line Severely Errored Seconds)	A count of 1-second intervals containing x or more BIP-8 errors (B2 byte) or one or more AIS defects.	1 - 63	63	1 - 4095	4095
UAS-L (Unavailable Seconds)	A count of 1-second intervals for which the SONET line is unavailable.	1 - 63	63	1 - 4095	4095
CV-P (Path Code Violations)	A count of BIP-8 errors that are detected at the STS-path layer of the incoming signal.	1 - 16383	16383	1 - 1048575	1048575
ES-P (Path Errored Seconds)	A count of 1-second intervals containing one or more BIP-8 errors (B3 byte), one or more AIS defects, or one or more LOP-P defects.	1 - 900	900	1 - 65535	65535
SES-P (Path Severely Errored Seconds)	A count of 1-second intervals containing x or more BIP-8 errors (B3 byte), one or more LOP-P defects, or one or more AIS defects.	1 - 63	63	1 - 4095	4095
UAS-P (Path Unavailable Seconds)	A count of 1-second intervals for which the SONET STS-path is unavailable.	1 - 63	63	1 - 4095	4095

5. When you finish, choose Apply to save your changes and Close to return to the Set Physical Port Attributes dialog box.

Performance Monitoring on ATM T1/E1 Physical Ports (CBX)

To configure performance thresholds:

1. From either the Set Physical Port Attributes dialog box, choose PM Thresholds. The Set ATM T1 [E1] Performance Thresholds dialog box (Table A-7) appears.

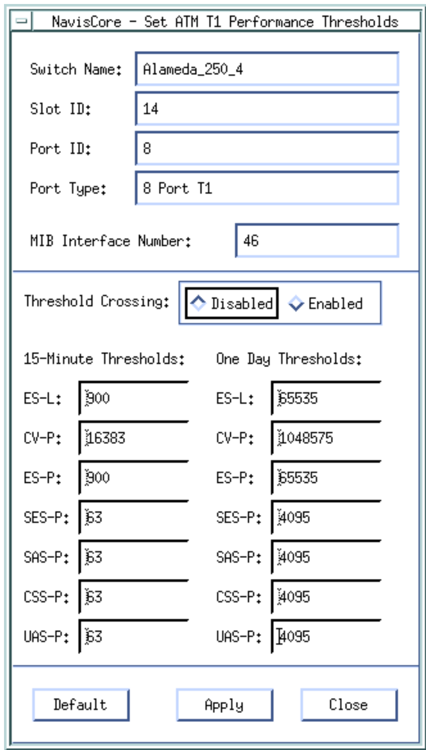


Figure A-7. Set ATM T1 Performance Thresholds Dialog Box

2. Threshold Crossing is disabled by default. Enable it if you want to generate traps for threshold crossing.

3. Use Table A-9 to set the 15-minute and one-day threshold values. Use the Default button to return these values to the default settings.

Table A-9. ATM T1/E1 Performance Monitoring Thresholds

Field	Description	15 Min. Range	15 Min. Default	One Day Range	One Day Default
ES-L (Line Errored Seconds)	A count of 1-second intervals with one or more BPVs or EXZs.	1 - 900	900	1 - 65535	65535
CV-P (Path Code Violations)	A count of frame synchronization bit errors; i.e., the count of CRC-6 errors in ESF format.	1 - 16383	16383	1 - 1048575	1048575
ES-P (Path Errored Seconds)	A count of 1-second intervals with one or more CRC-6 errors or one or more CS events.	1 - 900	900	1 - 65535	65535
SES-P (Path Severely Errored Seconds)	A count of 1-second intervals with 320 or more CRC-6 errors, or one or more SEF or AIS defects.	1 - 63	63	1 - 4095	4095
SAS-P	A count of 1-second intervals with one AIS defect.	1 - 63	63	1 - 4095	4095
CSS-P	A count of 1-second intervals with one or more controlled slip events.	1 - 63	63	1 - 4095	4095
UAS-P (Path Unavailable Seconds)	A count of 1-second intervals for which the DS1 path is unavailable. The path is unavailable upon detection of 10 contiguous seconds with no SESs.	1 - 63	63	1 - 4095	4095

4. When you finish, choose Apply to save your changes and Close to return to the Set Physical Port Attributes dialog box.

5. Choose Apply and then OK to save the physical port attributes and send an SNMP SET command to the switch. Choose Cancel to exit.

B

Implementing CBX 500 ATM Flow Control

The CBX 500 ATM Flow-Control Processor supports ATM traffic management through binary, hop-by-hop, closed-loop flow-control algorithms that shift network congestion to the edge of the network. In addition, the CBX 500 ATM Flow-Control Processor uses several per-Virtual Circuit (VC) cell/packet queuing and discarding mechanisms for additional network congestion control.

Based on the ATM Forum's *Traffic Management Specification*, Version 4.0, the ATM Flow-Control Processor delivers a fair, deterministic service for bursty ATM traffic, including:

- Dynamically adjusting the Allowable Cell Rate (ACR) in response to Resource Management (RM) cell feedback
- Reducing congestion in the network by adjusting the data rate at which a VC sends cells
- Fair resource allocation based on the Minimum Cell Rate (MCR)
- Per VC-queuing with EPD/PPD capability

Supported ATM Service Classes

The ATM Flow-Control Processor supports three ATM service classes:

Enhanced Unspecified Bit Rate (UBR+) Class — The ATM Flow-Control Processor provides a UBR+ service for the UBR Quality of Service (QoS) class by applying:

- Closed-loop flow control
- Dynamic cell rate adjustment
- Minimum Cell Rate (MCR) guarantee

The MCR is set at the minimum rate of the ATM Flow-Control Processor. The Allowable Cell Rate (ACR) is adjusted by the Rate Increase Factor (RIF) and the Rate Decrease Factor (RDF). Both the RIF and the RDF are configurable through NavisCore. Refer to "Rate Decrease Factor (RDF) and Rate Increase Factor (RIF)" on page B-12 for more information about configuring the RDF and RIF.

Available Bit Rate (ABR) Class — The MCR is configured during circuit admission. The ACR is adjusted by the RDF and RIF. The RDF and RIF can be configured in proportion to the MCR. Refer to "Rate Decrease Factor (RDF) and Rate Increase Factor (RIF)" on page B-12 for more information about configuring the RDF and RIF.

Variable Bit Rate-Non-Real Time (VBR-nrt) Class — The ATM Flow-Control Processor can manage the VBR-nrt QoS class. VBR-nrt is selectable through NavisCore. The Sustainable Cell Rate (SCR) is configured during circuit admission. The SCR is used in the same way as the MCR during ACR adjustments. The ACR is adjusted by the RIF and RDF. The RIF and RDF can be configured in proportion to the SCR. Refer to "Rate Decrease Factor (RDF) and Rate Increase Factor (RIF)" on page B-12 for more information about configuring the RDF and RIF.

ATM Flow-Control Processor Architecture

The ATM Flow-Control Processor provides per-VC queuing, and supports the CBX 500 quad-plane buffer architecture. Figure B-1 shows the ATM Flow-Control Processor output buffers relative to the CBX 500 quad-plane output buffers.

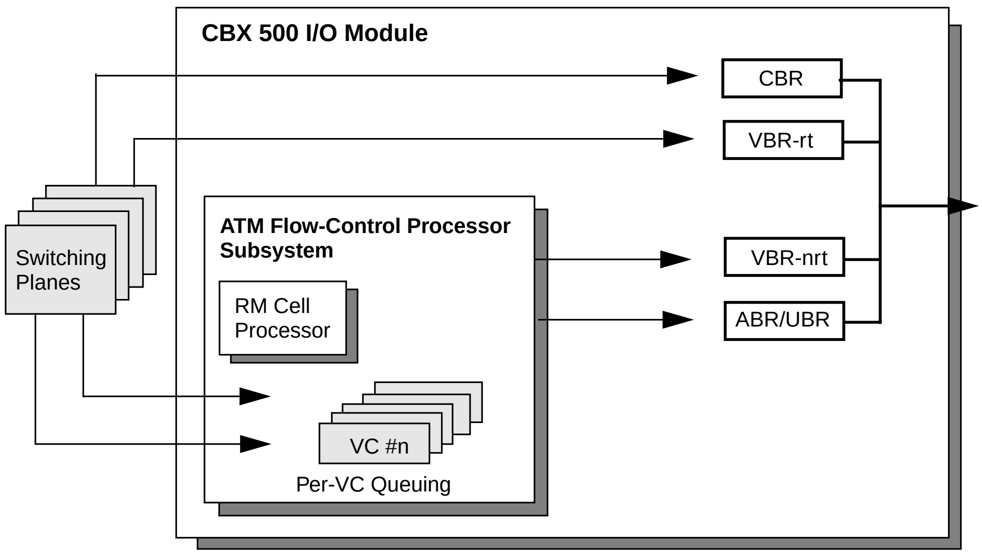


Figure B-1. CBX 500 Queues and the ATM Flow-Control Processor

Cells from the CBX 500 switching fabric are queued at the ATM Flow-Control Processor queues. Note that the ATM Flow-Control Processor only queues non-real time QoS VCs.

Cells are queued and dequeued based on the configured rate for the VC. Each VC is subject to discard mechanisms. Cells entering the output CBX 500 quad-plane queues are scheduled based on the Connection Admission Control (CAC) scheduling algorithm. Refer to *NavisCore ATM Configuration Guide* for more information about the CAC.

Closed-Loop Flow Control

Ascend's closed-loop flow-control architecture is based on hop-by-hop control loops with binary feedback. The hop-by-hop control loops push congestion at central nodes to switches at the edge of the network, thereby providing more efficient use of network bandwidth. In addition, with less network congestion at central nodes, there is increased network throughput.

Flow Control Mechanisms

The ATM Flow-Control Processor supports three, closed-loop flow-control mechanisms:

1. Cascade Communications Resource Management (CCRM) Cells — CCRM cells are a subset of the ATM Forum's *ATM Traffic Management Specification*, Version 4.0, ABR RM cells. The Protocol ID field in each RM cell is defined as the CCRM ID, indicating that it is a CCRM cell. The default value for the CCRM ID is 6. You can change the Protocol ID in the event that another switch vendor is using the default value for their proprietary loops. Refer to the "Configuring the Flow-Control Processor" on page 7-20 for information about provisioning CCRM cells.

2. Backward Congestion Message (BCM) Cells — BCM cells provide a different RM cell mechanism and may also provide interoperability with other manufacturers' ATM switches. The Protocol ID field in each BCM cell is defined as the BCM ID. The default value for the BCM ID is 5. You can change the Protocol ID in the event that another switch vendor is using the default value for their proprietary loops. Refer to the "Configuring the Flow-Control Processor" on page 7-20 for information about provisioning BCM cells.

Because the CBX 500 communicates with either CCRM or BCM cells for hop-by-hop control loops, both CCRM and BCM cells can be configured within a single network, allowing conversion between one closed-loop, flow-control algorithm to another.

3. Available Bit Rate (ABR) RM Cells — The ATM Flow-Control Processor marks ABR RM cells with binary notification as defined in the ATM Forum's *Traffic Management Specification*, Version 4.0. The Protocol ID for an ABR RM cell is 1. The ATM Flow-Control Processor identifies any RM cell with a Protocol ID of 1 as an ABR RM cell.

RM Cell Generation (General)

You can configure any port on an IOM to generate:

- CCRM cells
- BCM cells
- No RM-type cells

This allows for different closed-loop, flow-control algorithms to be implemented on the same IOM.

> Because RM cells are generated in the backward direction, the type of RM cells generated depends on the configuration of the logical port through which they are transmitted.

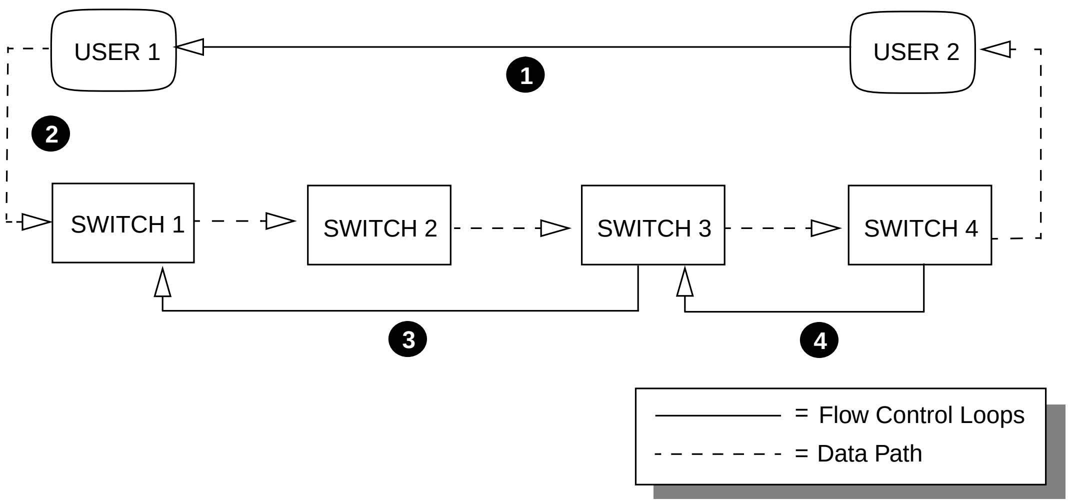
In general, RM-type cells can be generated at 30 to 250 millisecond (ms) intervals per VC. The default value for this parameter is 100 ms.

Table B-1 shows a suggestion for the maximum number of circuits to be configured when using a particular RM Cell Interval.

Table B-1. Minimum RM Cell Intervals

RM Cell Interval	Maximum Supported VCs
100 ms	12K
50 ms	6K
30 ms	4K

Figure B-2 shows hop-by-hop, closed-loop flow control between four CBX 500 switches. The flow-control loops are shown as solid lines. The data paths are shown as dotted lines.



1 End-to-End User Control Loops

End-to-end user flow-control loops are "outer" loops. The switches do not change their cell rates in response to this flow-control loop. Rather, they mark the Congestion Indication (CI) and No Increase (NI) bits based on the local congestion state, as defined in the ATM Forum's *Traffic Management Specification*, Version 4.0.

2 Different Logical Port Types on the same I/O Module

The ATM Flow-Control Processor supports different types of flow-control loops on the same I/O module. USER 1 has a User-Network Interface (UNI) connection. SWITCH 2 has a trunk connection to a different port on the same I/O module in SWITCH 1. Enabling and disabling of loop control is provisioned per port.

3 Switches without Flow-Control Loops

SWITCH 2 does not generate or terminate flow-control loops to the other switches. SWITCH 2 generates a forward notification of congestion to SWITCH 3 (Explicit Forward Congestion Indication (EFCI) marking can be configured on a CBX 500 switch through NavisCore. Refer to the *NavisCore ATM Configuration Guide* for information). When SWITCH 2 marks EFCI in the data cells, SWITCH 3 can be configured to include EFCI notification in the decision of the backward notification to SWITCH 1.

4 Rate Control at the Output Switch

SWITCH 4's cell rate fills the available bandwidth and is adjusted based on local congestion. The flow-control loop between SWITCH 4 and USER 2 can be configured as either BCM or CCRM termination. If configured as BCM, SWITCH 4 will adjust rates according to the port congestion. If configured as CCRM, SWITCH 4 will perform traffic shaping to the ICR of each VC.

Figure B-2. Closed-Loop Flow Control

CCRM Closed-Loop Flow Control

Ascend's closed-loop, flow-control architecture can use CCRM cells to notify CBX 500 switches of network congestion or availability.

CCRM Closed-Loop Flow Control on a Trunk

Figure B-3 shows an example of CCRM closed-loop flow control between two CBX 500 switches.

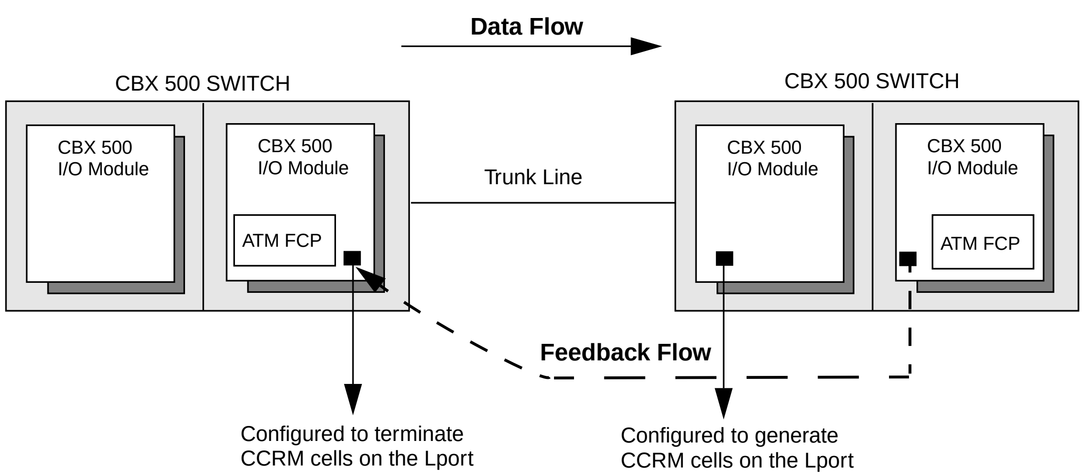


Figure B-3. CCRM Closed-Loop Flow Control

CCRM Closed-Loop Flow Control on a UNI (Traffic Shaping)

For information on CCRM Closed-Loop Flow Control on a UNI, see "Per-VC Traffic Shaping" on page B-13.

Generating CCRM Cells

When a CCRM cell is generated:

1. The Direction (DIR) and Backward Indicator (BI) bits are set, indicating that this is a switch-generated backward RM cell.
2. The Congestion Indication (CI) and No Increase (NI) bits are set according to the current congestion status of the VC.

The destination ATM switch periodically sends backward binary notification through CCRM cells to the source ATM switch, indicating the state of the destination ATM switch's queue for a VC. The binary notification is reflected in the CI and NI bits of the CCRM cell. The CCRM cell indicates a cell rate increase, decrease, or no change. The source ATM switch then responds by adjusting the cell rate accordingly for that VC and terminates the CCRM cell.

BCM Closed-Loop Flow Control

The CBX 500 can also utilize a BCM closed-loop, flow-control algorithm. Unlike CCRM cells, BCM cells only indicate cell rate decreases. BCM cells are sent on periodic intervals only when congestion exists.

During the RM cell generation interval, the Allowed Cell Rate (ACR) for a VC is increased if:

- A BCM cell is not received over the previous RM cell interval.
- The port is not congested.

BCM Closed-Loop Flow Control on a Trunk

Figure B-4 shows an example of BCM closed-loop flow-control between two CBX 500 switches.

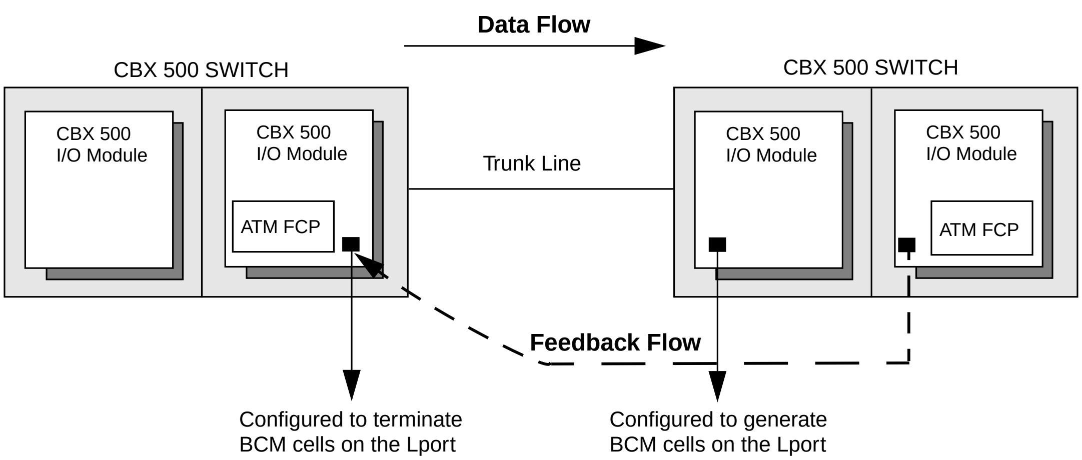


Figure B-4. BCM Closed-Loop Flow Control

BCM Closed-Loop Flow Control on a UNI

You can configure an output UNI logical port to allow ATM Flow-Control Processor-managed VCs going through that logical port to increase their cell rates. This enables the logical port to use all available non-real time bandwidth. This is done by setting the RM termination type on that logical port to BCM, as shown in Figure B-5.

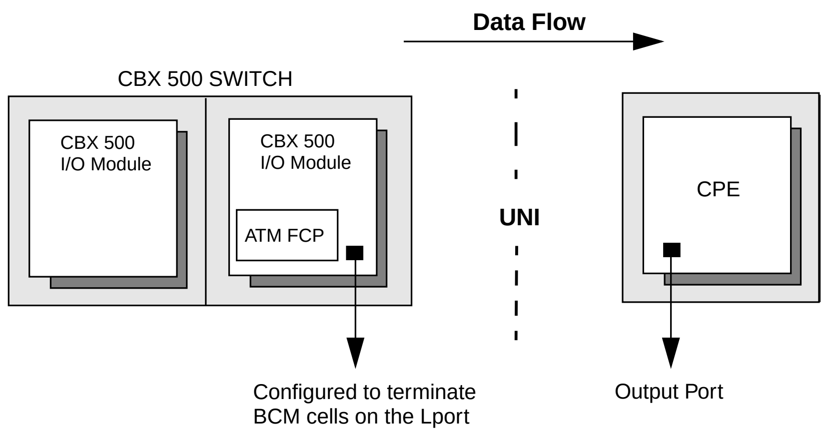


Figure B-5. Output UNI Logical Port RM Termination

Because the logical port does not receive any BCM cells from the UNI, the ACR of the VCs keeps increasing until the logical port becomes congested. The ACR will increase fairly, corresponding to the RIF and PCR values of the VCs. Refer to *NavisCore ATM Configuration Guide* for information on setting the RM termination type.

Generating BCM Cells

You can configure any port on an I/O module to generate BCM cells. If you select the BCM generation option when configuring the ATM Flow-Control Processor, BCM cells are generated when the port is congested. Refer to Table B-1 on page B-5 for the RM cell intervals and the number of supported VCs. Refer to the *"Configuring the Flow-Control Processor" on page 7-20* for information on the BCM generation option.

Terminating CCRM and BCM Cells

When the CBX 500 terminates either a CCRM or BCM cell, the CBX 500 makes a decision on whether or not to increase or decrease the ACR. This decision is based upon one or more of the following:

- The local port congestion state
- The current ACR being above the fair bandwidth for the VC
- The Congestion Indicator (CI) and No Increase (NI) state in the CCRM cell
- If no BCM cells were received within the RM generation interval (if the port is configured for BCM termination)
- If BCM cells are received (if the port is configured for BCM termination)

If BCM cells are received, but the port is not configured for BCM termination, the BCM cells are forwarded.

The fair bandwidth for a VC is the proportional allocation of the total bandwidth for managed (non-real time) circuits, based on the MCR of the VC relative to all of the managed VCs. The total, non-real time bandwidth is the total port bandwidth, less the bandwidth allocated to unmanaged (real-time) circuits.

Note that the ATM Flow-Control Processor can increase the ACR well beyond its fair bandwidth. Once other circuits attempt to use that bandwidth, hence causing a congestion condition, the ATM Flow-Control Processor will throttle back the ACR towards the fair bandwidth for the circuit until the congestion condition is removed.

ABR RM Closed-Loop Flow Control

ABR RM closed-loop flow control is an additional flow-control loop for switches that generate ABR RM cells. Because the ABR RM flow-control loop is an end-to-end loop, the CBX 500 does not generate or terminate ABR RM cells. Instead, the ATM Flow-Control Processor marks the CI and NI bits in the ABR RM cell based on the local ATM Flow-Control Processor congestion state. The ATM Flow-Control Processor then forwards the ABR RM cells through the network.

Cell Rate Adjustment

When a VC initially becomes active, its Allowable Cell Rate (ACR) is set to its Initial Cell Rate (ICR). The ICR for a VC is determined by its:

- Peak Cell Rate (PCR)
- Minimum Cell Rate (MCR)
- ICR Constant

ICR Constant

The ICR Constant is configurable through NavisCore. The default value is 0. The following formula shows how to calculate the ICR Constant:

$$ICR = MCR + \frac{PCR-MCR}{2^{ICR\ CONSTANT}}$$

Refer to the "Configuring the Flow-Control Processor" on page 7-20 for information on configuring the ICR Constant.

Idle VC Factor

The specified number of RM intervals for a VC to go idle is configurable through NavisCore. This is called the Idle VC Factor. The default value for the Idle VC Factor is 8. Refer to the "Configuring the Flow-Control Processor" on page 7-20 for information about configuring the Idle VC Factor.

> If no cells are received for a specified number of RM cell intervals, the VC is marked "idle," and the ACR is set to the ICR. RM cells are not generated for idle VCs.

Rate Decrease Factor (RDF) and Rate Increase Factor (RIF)

The cell rate of a VC is decreased according to the following formula:

```
ACR = ACR - (RDF x ACR)
```

Where: 1/32768 ≤ RDF ≤ 1

The ACR is lower-bounded by the MCR.

The rate of a VC is increased according to the following formula:

```
ACR = ACR + (RIF x PCR)
```

Where: 1/32768 ≤ RIF ≤ 1

The ACR is upper-bounded by the PCR.

The RDF and the RIF values are configurable through NavisCore. Refer to "Rate Profile Tables" and "Downloading Buffer Threshold and Rate Profile Tables" on page 7-22 for information on configuring RDF and RIF values.

Table B-2 lists the minimum allocated MCR for ABR and UBR circuits.

Table B-2. Cell Scheduling

Port Bandwidth	Max. Port Cell Rate (cells/sec)	Max. Number of Circuits (connections/port)	Min. Allocated MCR (cells/sec)
OC12	1412830	16K	88
OC3	353207	4K	88
DS3	96000	2K	48
E3	8000	2K	40
DS1	3622	2K	1.8
E1	4528	2K	2.4

Rate Profile Tables

You can load two rate profile tables into the ATM Flow-Control Processor. The ATM Flow-Control Processor uses these tables to determine the Rate Increase Exponent (RIE) and the Rate Decrease Exponent (RDE) for each VC on a port. These, in turn, are used to compute the RIF and the RDF. Each table consists of 256 entries. Refer to the "Downloading Buffer Threshold and Rate Profile Tables" on page 7-22 for information on downloading the tables using NavisCore.

The following define the RIE and RDE:

Rate Increase Exponent (RIE) — The RIE is a provisionable value that is the negative exponent for the RIF calculation (RIF=2^{-RIE}). For example, a RIE of 3 translates to a RIF of 1/8. The RIE must be less than 16.

Rate Decrease Exponent (RDE) — The RDE is a provisionable value that is the negative exponent for the RDF calculation (RDF=2^{-RDE}). For example, a value of 3 translates to a RDF of 1/8. The RDE must be less than 16.

The RIF and RDF value for any VC is obtained from indexing the corresponding rate profile table with the VC's MCR class. The MCR (SCR for VBR-nrt VCs) of any VC is mapped to one of 256 MCR classes. Note that MCR class 0 is reserved for UBR VCs. Refer to the "Configuring the Flow-Control Processor" on page 7-20 for information about MCR class mappings per I/O module.

Per-VC Traffic Shaping

You can configure the ATM Flow-Control Processor to perform traffic shaping for ATM Flow-Control Processor-managed VCs on a trunk or UNI port by turning off the control loops for these VCs. For any direction of data flow, you can:

1. Configure the RM cell generation of all input logical ports the VC passes through to "no loop." Refer to NavisCore ATM Configuration Guide for information.
2. Configure all output logical ports the VC passes through to terminate CCRM cells. Refer to NavisCore ATM Configuration Guide for information.

VCs are shaped at their Initial Cell Rate (ICR). Refer to "ICR Constant" on page B-11 for a description of the ICR Constant. Because control loops are disabled, the ACR will stay at the ICR. Note that there is no guarantee of ICR if it is overbooked.

ATM Flow-Control Processor Queues

The ATM Flow-Control Processor provides per-VC queueing. Per-VC queuing provides independent buffer allocation to each VC, thereby isolating congestion on one VC from other VCs. Each per-VC queue has two configurable thresholds:

- Local congestion threshold
- Local discard threshold

The congestion and discard thresholds for a specific VC are obtained by indexing the congestion and discard tables with the MCR class of the VC. The MCR class of the VC is obtained from its MCR. Refer to the *Appendix C, "MCR Class Parameters"* for information about MCR classes.

> MCR class 0 is reserved for UBR VCs.

The congestion and discard threshold tables are configurable through NavisCore. Refer to the "Configuring the Flow-Control Processor" on page 7-20 for information.

In addition to the local thresholds, each port on an IOM is assigned one:

- Global congestion threshold
- Global discard threshold
- Global CLP0+1 threshold

All of the above thresholds are configurable through NavisCore. Refer to *NavisCore ATM Configuration Guide* for information.

Both local and global thresholds are used for congestion notification and discarding. A VC is considered congested only if its queue is above the local congestion threshold, and the global queue length on the port is above the global congestion threshold.

Similarly, a VC enters a discard state only if the VC queue length is greater than the VC discard threshold, and the port queue length is greater than the global discard threshold.

Figure B-6 shows the five ATM Flow-Control Processor buffer thresholds.

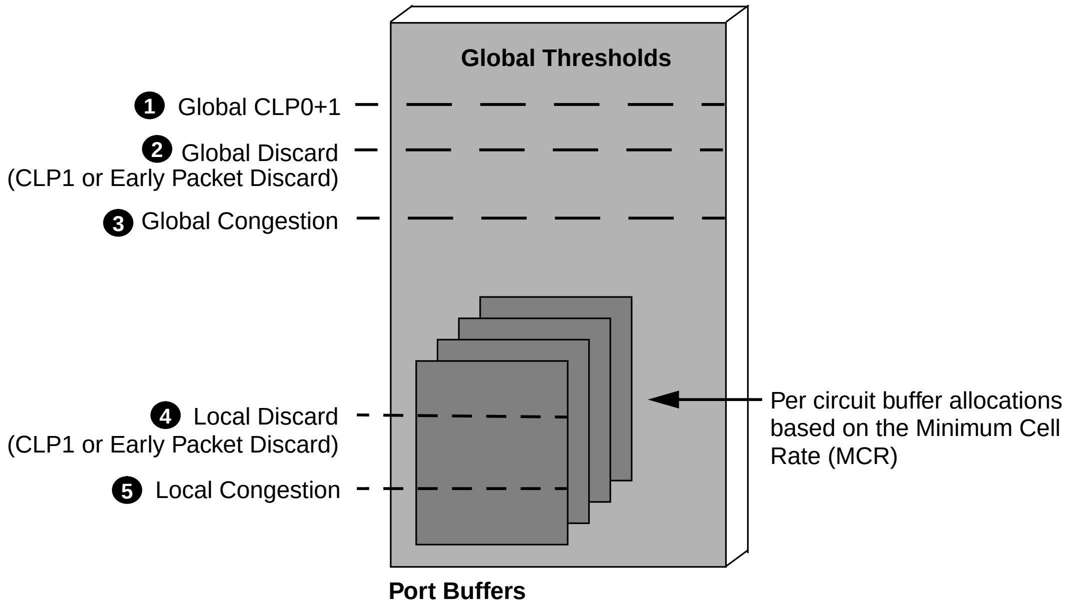


Figure B-6. ATM Flow-Control Processor Buffers

The difference between the EPD and CLP0+1 threshold allows the VCs to continue to queue cells due to the EPD state. When the EPD threshold is exceeded, cells are queued on the current packet, and the next packet is discarded for the same VC.

The CLP0+1 threshold enables you to reserve buffers before the maximum buffer capacity is reached. It is recommend that you reserve a sufficient number of buffers to allow idle circuits to get access to buffers. Idle circuits are those that have temporarily stopped sending traffic.

ATM Flow-Control Discard Mechanisms

The ATM Flow-Control Processor supports three mechanisms for discarding cells:

Early Packet Discard (EPD) — The ATM Flow-Control Processor performs EPD for UBR, ABR, and VBR-nrt VCs. If a cell causes the queue for a VC to exceed the discard thresholds, the VC enters the EPD state. The cells in the current packet of the VC are admitted to the queue. However, when the end of the current packet is detected, all of the cells in the next packet are discarded for that VC.

Selective Discard (CLP1) — Selective CLP1 discard can be provisioned for UBR, ABR, and VBR-nrt VCs. If the current cell causes the queue for a VC to exceed the discard thresholds, and the cell has CLP set to 1, the cell is discarded. Note that EPD is not performed in this case.

Partial Packet Discard (PPD) — If the global CLP0+1 threshold for a port is reached, PPD is performed for circuits that are configured for EPD. Unlike EPD, however, all of the remaining cells in the current packet are discarded. Note that the EOF cell is discarded as well. This results in the loss of the next packet even if the packet is transmitted.

> If:
>
> – A circuit is set for EPD and does not send AAL5 PDUs (e.g. AAL0 data), and
>
> – A port becomes sufficiently congested (CLP 0+1 threshold is reached)
>
> PPD results in no further throughput for this circuit.
> To regain service, you must re-establish the circuit.

Multicast Cells

All Multicast cells are placed into a single queue. There is one queue per I/O module. Multicast cells are discarded when the ATM Flow-Control Processor multicast queue length reaches a certain threshold. You can configure this threshold for each installed I/O module. Refer to "Configuring the Flow-Control Processor" on page 7-20 for information.

Multicast cells are dequeued at the assigned Multicast cells shaping rate. This rate is configurable using NavisCore. Refer to "Configuring the Flow-Control Processor" on page 7-20 for information.

C

MCR Class Parameters

This appendix describes the Minimum Cell Rate (MCR) class parameter values for the Virtual Connections (VCs) subject to ATM flow control.

Overview

ATM Flow-Control Processor parameters operating on a per-VC basis are organized into 256 classes. The classes are numbered 0, 1, 2, 3 … 255, and correspond to the MCR values of the VCs subject to ATM flow control. These per-class parameters include:

- Rate Increase Factor (RIF)
- Rate Decrease Factor (RDF)
- Discard Threshold
- Congestion Threshold

The above per-class parameters are provisionable as a file, and can be downloaded to the ATM Flow-Control Processor using NavisCore. Refer to “Downloading Buffer Threshold and Rate Profile Tables” on page 7-22 for more information.

Table C-1 shows the MCR class parameter default values. Keep in mind that the Discard Threshold and Congestion Threshold are expressed as a percentage of the total port buffer size.

In general, VCs belonging to an MCR class with a lower RIF will obtain more bandwidth under congestion. VCs belonging to an MCR class with a higher RDF will obtain more bandwidth under congestion.

> The Discard Threshold parameter value should not be less than 100 cells. The Congestion Threshold value equals 20% of the Discard Threshold.

Table C-1. MCR Class Parameters

MCR Class	RIE	RDE	Discard Threshold (percentage of buffer)	Congestion Threshold (percentage of buffer)
0	6	3	0.5%	0.1%
1-27	11	3	0.5%	0.1%
28-55	10	4	1%	0.2%
56-83	9	5	2%	0.4%
84-110	8	5	3%	0.6%
111-138	7	6	5%	1%
139-166	6	6	10%	2%
167-194	5	7	20%	4%
195-221	4	8	40%	8%
222-255	3	8	80%	16%

DS3 IOM MCR Class Mapping

The following list shows the MCR range and the corresponding MCR class for the DS3 IOM.

MCR Range	MCR Class
100 - 127	3
128 - 159	4
160 - 191	5
192 - 223	6
224 - 255	7
256 - 287	8
288 - 319	9
320 - 351	10
352 - 383	11
384 - 415	12
416 - 447	13
448 - 479	14
480 - 511	15
512 - 543	16
544 - 575	17
576 - 607	18
608 - 639	19
640 - 671	20
672 - 703	21
704 - 735	22
736 - 767	23
768 - 799	24

MCR Range	MCR Class
800 - 831	25
832 - 863	26
864 - 895	27
896 - 927	28
928 - 959	29
960 - 991	30
992 - 1023	31
1024 - 1055	32
1056 - 1087	33
1088 - 1119	34
1120 - 1151	35
1152 - 1183	36
1184 - 1215	37
1216 - 1247	38
1248 - 1279	39
1280 - 1311	40
1312 - 1343	41
1344 - 1375	42
1376 - 1407	43
1408 - 1439	44
1440 - 1471	45
1472 - 1503	46
1504 - 1535	47
1536 - 1567	48
1568 - 1599	49

MCR Range	MCR Class
1600 - 1631	50
1632 - 1663	51
1664 - 1695	52
1696 - 1727	53
1728 - 1759	54
1760 - 1791	55
1792 - 1823	56
1824 - 1855	57
1856 - 1887	58
1888 - 1919	59
1920 - 1951	60
1952 - 1983	61
1984 - 2015	62
2016 - 2047	63
2048 - 2111	64
2112 - 2175	65
2176 - 2239	66
2240 - 2303	67
2304 - 2367	68
2368 - 2431	69
2432 - 2495	70
2496 - 2559	71
2560 - 2623	72
2624 - 2687	73
2688 - 2751	74

MCR Range	MCR Class
2752 - 2815	75
2816 - 2879	76
2880 - 2943	77
2944 - 3007	78
3008 - 3071	79
3072 - 3135	80
3136 - 3199	81
3200 - 3263	82
3264 - 3327	83
3328 - 3391	84
3392 - 3455	85
3456 - 3519	86
3520 - 3583	87
3584 - 3647	88
3648 - 3711	89
3712 - 3775	90
3776 - 3839	91
3840 - 3903	92
3904 - 3967	93
3968 - 4031	94
4032 - 4095	95
4096 - 4223	96
4224 - 4351	97
4352 - 4479	98
4480 - 4607	99

MCR Range	MCR Class
4608 - 4735	100
4736 - 4863	101
4864 - 4991	102
4992 - 5119	103
5120 - 5247	104
5248 - 5375	105
5376 - 5503	106
5504 - 5631	107
5632 - 5759	108
5760 - 5887	109
5888 - 6015	110
6016 - 6143	111
6144 - 6271	112
6272 - 6399	113
6400 - 6527	114
6528 - 6655	115
6656 - 6783	116
6784 - 6911	117
6912 - 7039	118
7040 - 7167	119
7168 - 7295	120
7296 - 7423	121
7424 - 7551	122
7552 - 7679	123
7680 - 7807	124

MCR Range	MCR Class
7808 - 7935	125
7936 - 8063	126
8064 - 8191	127
8192 - 8447	128
8448 - 8703	129
8704 - 8959	130
8960 - 9215	131
9216 - 9471	132
9472 - 9727	133
9728 - 9983	134
9984 - 10239	135
10240 - 10495	136
10496 - 10751	137
10752 - 11007	138
11008 - 11263	139
11264 - 11519	140
11520 - 11775	141
11776 - 12031	142
12032 - 12287	143
12288 - 12543	144
12544 - 12799	145
12800 - 13055	146
13056 - 13311	147
13312 - 13567	148
13568 - 13823	149

MCR Range	MCR Class
13824 - 14079	150
14080 - 14335	151
14336 - 14591	152
14592 - 14847	153
14848 - 15103	154
15104 - 15359	155
15360 - 15615	156
15616 - 15871	157
15872 - 16127	158
16128 - 16383	159
16384 - 16895	160
16896 - 17407	161
17408 - 17919	162
17920 - 18431	163
18432 - 18943	164
18944 - 19455	165
19456 - 19967	166
19968 - 20479	167
20480 - 20991	168
20992 - 21503	169
21504 - 22015	170
22016 - 22527	171
22528 - 23039	172
23040 - 23551	173
23552 - 24063	174

MCR Range	MCR Class
24064 - 24575	175
24576 - 25087	176
25088 - 25599	177
25600 - 26111	178
26112 - 26623	179
26624 - 27135	180
27136 - 27647	181
27648 - 28159	182
28160 - 28671	183
28672 - 29183	184
29184 - 29695	185
29696 - 30207	186
30208 - 30719	187
30720 - 31231	188
31232 - 31743	189
31744 - 32255	190
32256 - 32767	191
32768 - 33791	192
33792 - 34815	193
34816 - 35839	194
35840 - 36863	195
36864 - 37887	196
37888 - 38911	197
38912 - 39935	198
39936 - 40959	199

MCR Range	MCR Class
40960 - 41983	200
41984 - 43007	201
43008 - 44031	202
44032 - 45055	203
45056 - 46079	204
46080 - 47103	205
47104 - 48127	206
48128 - 49151	207
49152 - 50175	208
50176 - 51199	209
51200 - 52223	210
52224 - 53247	211
53248 - 54271	212
54272 - 55295	213
55296 - 56319	214
56320 - 57343	215
57344 - 58367	216
58368 - 59391	217
59392 - 60415	218
60416 - 61439	219
61440 - 62463	220
62464 - 63487	221
63488 - 64511	222
64512 - 65535	223
65536 - 67583	224

MCR Range	MCR Class
67584 - 69631	225
69632 - 71679	226
71680 - 73727	227
73728 - 75775	228
75776 - 77823	229
77824 - 79871	230
79872 - 81919	231
81920 - 83967	232
83968 - 86015	233
86016 - 88063	234
88064 - 90111	235
90112 - 92159	236
92160 - 94207	237
94208 - 96000	238

T1 IOM MCR Class Mapping

The following list shows the MCR range and the corresponding MCR class for the T1 IOM.

MCR Range	MCR Class
100 - 111	6
112 - 127	7
128 - 143	8
144 - 159	9
160 - 175	10
176 - 191	11
192 - 207	12
208 - 223	13
224 - 239	14
240 - 255	15
256 - 271	16
272 - 287	17
288 - 303	18
304 - 319	19
320 - 335	20
336 - 351	21
352 - 367	22
368 - 383	23
384 - 399	24
400 - 415	25
416 - 431	26
432 - 447	27

MCR Range	MCR Class
448 - 463	28
464 - 479	29
480 - 495	30
496 - 511	31
512 - 527	32
528 - 543	33
544 - 559	34
560 - 575	35
576 - 591	36
592 - 607	37
608 - 623	38
624 - 639	39
640 - 655	40
656 - 671	41
672 - 687	42
688 - 703	43
704 - 719	44
720 - 735	45
736 - 751	46
752 - 767	47
768 - 783	48
784 - 799	49
800 - 815	50
816 - 831	51
832 - 847	52

MCR Range	MCR Class
848 - 863	53
864 - 879	54
880 - 895	55
896 - 911	56
912 - 927	57
928 - 943	58
944 - 959	59
960 - 975	60
976 - 991	61
992 - 1007	62
1008 - 1023	63
1024 - 1055	64
1056 - 1087	65
1088 - 1119	66
1120 - 1151	67
1152 - 1183	68
1184 - 1215	69
1216 - 1247	70
1248 - 1279	71
1280 - 1311	72
1312 - 1343	73
1344 - 1375	74
1376 - 1407	75
1408 - 1439	76
1440 - 1471	77

MCR Range	MCR Class
1472 - 1503	78
1504 - 1535	79
1536 - 1567	80
1568 - 1599	81
1600 - 1631	82
1632 - 1663	83
1664 - 1695	84
1696 - 1727	85
1728 - 1759	86
1760 - 1791	87
1792 - 1823	88
1824 - 1855	89
1856 - 1887	90
1888 - 1919	91
1920 - 1951	92
1952 - 1983	93
1984 - 2015	94
2016 - 2047	95
2048 - 2111	96
2112 - 2175	97
2176 - 2239	98
2240 - 2303	99
2304 - 2367	100
2368 - 2431	101
2432 - 2495	102

MCR Range	MCR Class
2496 - 2559	103
2560 - 2623	104
2624 - 2687	105
2688 - 2751	106
2752 - 2815	107
2816 - 2879	108
2880 - 2943	109
2944 - 3007	110
3008 - 3071	111
3072 - 3135	112
3136 - 3199	113
3200 - 3263	114
3264 - 3327	115
3328 - 3391	116
3392 - 3455	117
3456 - 3519	118
3520 - 3583	119
3584 - 3647	120
3648 - 3711	121
3712 - 3775	122
3776 - 3839	123
3840 - 3903	124
3904 - 3967	125
3968 - 4031	126
4032 - 4095	127

MCR Range	MCR Class
4096 - 4223	128
4224 - 4351	129
4352 - 4479	130
4480 - 4534	131

OC3 IOM MCR Class Mapping

The following list shows the MCR range and the corresponding MCR class for the OC3 IOM.

MCR Range	MCR Class
100 - 255	1
256 - 383	2
384 - 511	3
512 - 639	4
640 - 767	5
768 - 895	6
896 - 1023	7
1024 - 1151	8
1152 - 1279	9
1280 - 1407	10
1408 - 1535	11
1536 - 1663	12
1664 - 1791	13
1792 - 1919	14
1920 - 2047	15
2048 - 2175	16
2176 - 2303	17
2304 - 2431	18
2432 - 2559	19
2560 - 2687	20
2688 - 2815	21
2816 - 2943	22

MCR Range	MCR Class
2944 - 3071	23
3072 - 3199	24
3200 - 3327	25
3328 - 3455	26
3456 - 3583	27
3584 - 3711	28
3712 - 3839	29
3840 - 3967	30
3968 - 4095	31
4096 - 4223	32
4224 - 4351	33
4352 - 4479	34
4480 - 4607	35
4608 - 4735	36
4736 - 4863	37
4864 - 4991	38
4992 - 5119	39
5120 - 5247	40
5248 - 5375	41
5376 - 5503	42
5504 - 5631	43
5632 - 5759	44
5760 - 5887	45
5888 - 6015	46
6016 - 6143	47

MCR Range	MCR Class
6144 - 6271	48
6272 - 6399	49
6400 - 6527	50
6528 - 6655	51
6656 - 6783	52
6784 - 6911	53
6912 - 7039	54
7040 - 7167	55
7168 - 7295	56
7296 - 7423	57
7424 - 7551	58
7552 - 7679	59
7680 - 7807	60
7808 - 7935	61
7936 - 8063	62
8064 - 8191	63
8192 - 8447	64
8448 - 8703	65
8704 - 8959	66
8960 - 9215	67
9216 - 9471	68
9472 - 9727	69
9728 - 9983	70
9984 - 10239	71
10240 - 10495	72

MCR Range	MCR Class
10496 - 10751	73
10752 - 11007	74
11008 - 11263	75
11264 - 11519	76
11520 - 11775	77
11776 - 12031	78
12032 - 12287	79
12288 - 12543	80
12544 - 12799	81
12800 - 13055	82
13056 - 13311	83
13312 - 13567	84
13568 - 13823	85
13824 - 14079	86
14080 - 14335	87
14336 - 14591	88
14592 - 14847	89
14848 - 15103	90
15104 - 15359	91
15360 - 15615	92
15616 - 15871	93
15872 - 16127	94
16128 - 16383	95
16384 - 16895	96
16896 - 17407	97

MCR Range	MCR Class
17408 - 17919	98
17920 - 18431	99
18432 - 18943	100
18944 - 19455	101
19456 - 19967	102
19968 - 20479	103
20480 - 20991	104
20992 - 21503	105
21504 - 22015	106
22016 - 22527	107
22528 - 23039	108
23040 - 23551	109
23552 - 24063	110
24064 - 24575	111
24576 - 25087	112
25088 - 25599	113
25600 - 26111	114
26112 - 26623	115
26624 - 27135	116
27136 - 27647	117
27648 - 28159	118
28160 - 28671	119
28672 - 29183	120
29184 - 29695	121
29696 - 30207	122

MCR Range	MCR Class
30208 - 30719	123
30720 - 31231	124
31232 - 31743	125
31744 - 32255	126
32256 - 32767	127
32768 - 33791	128
33792 - 34815	129
34816 - 35839	130
35840 - 36863	131
36864 - 37887	132
37888 - 38911	133
38912 - 39935	134
39936 - 40959	135
40960 - 41983	136
41984 - 43007	137
43008 - 44031	138
44032 - 45055	139
45056 - 46079	140
46080 - 47103	141
47104 - 48127	142
48128 - 49151	143
49152 - 50175	144
50176 - 51199	145
51200 - 52223	146
52224 - 53247	147

MCR Range	MCR Class
53248 - 54271	148
54272 - 55295	149
55296 - 56319	150
56320 - 57343	151
57344 - 58367	152
58368 - 59391	153
59392 - 60415	154
60416 - 61439	155
61440 - 62463	156
62464 - 63487	157
63488 - 64511	158
64512 - 65535	159
65536 - 67583	160
67584 - 69631	161
69632 - 71679	162
71680 - 73727	163
73728 - 75775	164
75776 - 77823	165
77824 - 79871	166
79872 - 81919	167
81920 - 83967	168
83968 - 86015	169
86016 - 88063	170
88064 - 90111	171
90112 - 92159	172

MCR Range	MCR Class
92160 - 94207	173
94208 - 96255	174
96256 - 98303	175
98304 - 100351	176
100352 - 102399	177
102400 - 104447	178
104448 - 106495	179
106496 - 108543	180
108544 - 110591	181
110592 - 112639	182
112640 - 114687	183
114688 - 116735	184
116736 - 118783	185
118784 - 120831	186
120832 - 122879	187
122880 - 124927	188
124928 - 126975	189
126976 - 129023	190
129024 - 131071	191
131072 - 135167	192
135168 - 139263	193
139264 - 143359	194
143360 - 147455	195
147456 - 151551	196
151552 - 155647	197

MCR Range	MCR Class
155648 - 159743	198
159744 - 163839	199
163840 - 167935	200
167936 - 172031	201
172032 - 176127	202
176128 - 180223	203
180224 - 184319	204
184320 - 188415	205
188416 - 192511	206
192512 - 196607	207
196608 - 200703	208
200704 - 204799	209
204800 - 208895	210
208896 - 212991	211
212992 - 217087	212
217088 - 221183	213
221184 - 225279	214
225280 - 229375	215
229376 - 233471	216
233472 - 237567	217
237568 - 241663	218
241664 - 245759	219
245760 - 249855	220
249856 - 253951	221
253952 - 258047	222

MCR Range	MCR Class
258048 - 262143	223
262144 - 270335	224
270336 - 278527	225
278528 - 286719	226
286720 - 294911	227
294912 - 303103	228
303104 - 311295	229
311296 - 319487	230
319488 - 327679	231
327680 - 335871	232
335872 - 344063	233
344064 - 352255	234
352256 - 353208	235

OC12 IOM MCR Class Mapping

The following list shows the MCR range and the corresponding MCR class for the OC12 IOM.

MCR Range	MCR Class
100 - 1023	1
1024 - 1535	2
1536 - 2047	3
2048 - 2559	4
2560 - 3071	5
3072 - 3583	6
3584 - 4095	7
4096 - 4607	8
4608 - 5119	9
5120 - 5631	10
5632 - 6143	11
6144 - 6655	12
6656 - 7167	13
7168 - 7679	14
7680 - 8191	15
8192 - 8703	16
8704 - 9215	17
9216 - 9727	18
9728 - 10239	19
10240 - 10751	20
10752 - 11263	21
11264 - 11775	22

MCR Range	MCR Class
11776 - 12287	23
12288 - 12799	24
12800 - 13311	25
13312 - 13823	26
13824 - 14335	27
14336 - 14847	28
14848 - 15359	29
15360 - 15871	30
15872 - 16383	31
16384 - 16895	32
16896 - 17407	33
17408 - 17919	34
17920 - 18431	35
18432 - 18943	36
18944 - 19455	37
19456 - 19967	38
19968 - 20479	39
20480 - 20991	40
20992 - 21503	41
21504 - 22015	42
22016 - 22527	43
22528 - 23039	44
23040 - 23551	45
23552 - 24063	46
24064 - 24575	47

MCR Range	MCR Class
24576 - 25087	48
25088 - 25599	49
25600 - 26111	50
26112 - 26623	51
26624 - 27135	52
27136 - 27647	53
27648 - 28159	54
28160 - 28671	55
28672 - 29183	56
29184 - 29695	57
29696 - 30207	58
30208 - 30719	59
30720 - 31231	60
31232 - 31743	61
31744 - 32255	62
32256 - 32767	63
32768 - 33791	64
33792 - 34815	65
34816 - 35839	66
35840 - 36863	67
36864 - 37887	68
37888 - 38911	69
38912 - 39935	70
39936 - 40959	71
40960 - 41983	72

MCR Range	MCR Class
41984 - 43007	73
43008 - 44031	74
44032 - 45055	75
45056 - 46079	76
46080 - 47103	77
47104 - 48127	78
48128 - 49151	79
49152 - 50175	80
50176 - 51199	81
51200 - 52223	82
52224 - 53247	83
53248 - 54271	84
54272 - 55295	85
55296 - 56319	86
56320 - 57343	87
57344 - 58367	88
58368 - 59391	89
59392 - 60415	90
60416 - 61439	91
61440 - 62463	92
62464 - 63487	93
63488 - 64511	94
64512 - 65535	95
65536 - 67583	96
67584 - 69631	97

MCR Range	MCR Class
69632 - 71679	98
71680 - 73727	99
73728 - 75775	100
75776 - 77823	101
77824 - 79871	102
79872 - 81919	103
81920 - 83967	104
83968 - 86015	105
86016 - 88063	106
88064 - 90111	107
90112 - 92159	108
92160 - 94207	109
94208 - 96255	110
96256 - 98303	111
98304 - 100351	112
100352 - 102399	113
102400 - 104447	114
104448 - 106495	115
106496 - 108543	116
108544 - 110591	117
110592 - 112639	118
112640 - 114687	119
114688 - 116735	120
116736 - 118783	121
118784 - 120831	122

MCR Range	MCR Class
120832 - 122879	123
122880 - 124927	124
124928 - 126975	125
126976 - 129023	126
129024 - 131071	127
131072 - 135167	128
135168 - 139263	129
139264 - 143359	130
143360 - 147455	131
147456 - 151551	132
151552 - 155647	133
155648 - 159743	134
159744 - 163839	135
163840 - 167935	136
167936 - 172031	137
172032 - 176127	138
176128 - 180223	139
180224 - 184319	140
184320 - 188415	141
188416 - 192511	142
192512 - 196607	143
196608 - 200703	144
200704 - 204799	145
204800 - 208895	146
208896 - 212991	147

MCR Range	MCR Class
212992 - 217087	148
217088 - 221183	149
221184 - 225279	150
225280 - 229375	151
229376 - 233471	152
233472 - 237567	153
237568 - 241663	154
241664 - 245759	155
245760 - 249855	156
249856 - 253951	157
253952 - 258047	158
258048 - 262143	159
262144 - 270335	160
270336 - 278527	161
278528 - 286719	162
286720 - 294911	163
294912 - 303103	164
303104 - 311295	165
311296 - 319487	166
319488 - 327679	167
327680 - 335871	168
335872 - 344063	169
344064 - 352255	170
352256 - 360447	171
360448 - 368639	172

MCR Range	MCR Class
368640 - 376831	173
376832 - 385023	174
385024 - 393215	175
393216 - 401407	176
401408 - 409599	177
409600 - 417791	178
417792 - 425983	179
425984 - 434175	180
434176 - 442367	181
442368 - 450559	182
450560 - 458751	183
458752 - 466943	184
466944 - 475135	185
475136 - 483327	186
483328 - 491519	187
491520 - 499711	188
499712 - 507903	189
507904 - 516095	190
516096 - 524287	191
524288 - 540671	192
540672 - 557055	193
557056 - 573439	194
573440 - 589823	195
589824 - 606207	196
606208 - 622591	197

MCR Range	MCR Class
622592 - 638975	198
638976 - 655359	199
655360 - 671743	200
671744 - 688127	201
688128 - 704511	202
704512 - 720895	203
720896 - 737279	204
737280 - 753663	205
753664 - 770047	206
770048 - 786431	207
786432 - 802815	208
802816 - 819199	209
819200 - 835583	210
835584 - 851967	211
851968 - 868351	212
868352 - 884735	213
884736 - 901119	214
901120 - 917503	215
917504 - 933887	216
933888 - 950271	217
950272 - 966655	218
966656 - 983039	219
983040 - 999423	220
999424 - 1015807	221
1015808 - 1032191	222

MCR Range	MCR Class
1032192 - 1048575	223
1048576 - 1081343	224
1081344 - 1114111	225
1114112 - 1146879	226
1146880 - 1179647	227
1179648 - 1212415	228
1212416 - 1245183	229
1245184 - 1277951	230
1277952 - 1310719	231
1310720 - 1343487	232
1343488 - 1376255	233
1376256 - 1409023	234
1409024 - 1440000	235

Glossary

A

absolute congestion

In Frame Relay, a congested condition in the network that occurs when the queue length reaches a third threshold (64 buffers full), and there is no more room on the queue for any packets, regardless of the type of packet.

access rate

The data rate of the user access channel. The speed of the access channel determines how quickly (maximum rate) the end user may inject data into the network. See also *bandwidth*.

active hub

A device that amplifies LAN transmission signals in a network, enabling signals to be sent over a much greater distance than is possible with a passive hub. Compare with *passive hub*.

address

The logical location or identifier of a network node, terminal, pc, peripheral device, or location in memory where information is stored. See also *NavisCore*.

address mask

A bit combination used to describe which portion of an SMDS address refers to the network (or subnet) and which part refers to the host. Sometimes referred to as mask. See also *subnet mask*.

administration tool

A system administration utility, such as Solaris, that allows system administrators to maintain and monitor system database files, printers, user accounts, and hosts through a graphical user interface (GUI).

AIS

See *Alarm Indication Signal*.

alarm

Message notifying an operator or administrator of a network problem.

Alarm Indication Signal

An error or alarm signal transmitted in lieu of the normal signal to maintain transmission continuity to the receiving node indicating that there is a transmission fault located either at the sending node or upstream of the sending node.

Alterable Mark Inversion

A signaling format used in T1 lines that provides for the "one" pulses to have an alternating priority. Thus, if the nth-one bit is represented by a positive pulse, the nth T1 line would be a negative pulse.

alternate path

An optional automatic feature of OSPF (Open Shortest Path First) that reroutes the PVC should a trunk fail within a manually defined path.

amber frames

Ascend's own class of packet frames used to identify packets as they travel through the Frame Relay network. The network forwards amber frames with the Discard Eligible bit set; therefore the packet is eligible for discard if it passes through a congested node.

American National Standards Institute

A private, non-governmental, non-profit organization, which develops US standards required for commerce.

American Standard Code for Information Interchange

A code representing characters in binary form.

AMI

See *Alterable Mark Inversion*.

analog

A method that transmits electrical signals at varying amplitudes. Analog often refers to transmission methods developed to transmit voice signals rather than high speed digital signals. Compare with *digital*.

Annex D

A synchronous polling scheme used for the link management of a Frame Relay channel, where the user polls the network to obtain status information on the PVCs configured on the channel. Annex D exchanges this information using DLCI 0.

ANSI

See *American National Standards Institute*.

area id

See *area number*.

area number

One of two portions of the SMDS address, which can start at any digit and the length can be up to eight digits (4 bytes long for BCD encoding).

ASCII

See *American Standard Code for Information Interchange*.

ASCII text file

A file that contains only text characters from the ASCII character set. An ASCII file can include letters, numbers, and punctuation symbols, but does not contain any hidden text-formatting codes.

asynchronous communications server

A LAN server that enables a network user to dial out of the network into the public-switched telephone system, or to accessed leased lines for asynchronous communications. This device also is called a dial-in/dial-out server or modem server.

Asynchronous Transfer Mode

A method used for transmitting voice, video, and data over high-speed LAN and WAN networks. See also *cell relay*.

AT command set

A set of standard instructions used to activate features on a modem. Originally developed by Hayes Microcomputer Products, most modem manufacturers now use the AT command set.

ATM

See *Asynchronous Transfer Mode*.

ATM Service Interworking Feeder

A service that enables Frame Relay network traffic to be fed into an ATM network, enabling a Frame Relay end user to communicate with an ATM end user.

ATM/DXI trunk

See *OPTimum PVC trunk*.

ATM/DXI trunk interface

An ATM circuit used as a trunk between two Frame Relay networks that are built with Ascend switches.

attenuation

The decrease in power of a signal over distance, measured in decibels (dB).

auto-ranging

The ability for a power supply to detect the correct voltage that is being received from the power source.

B

B8ZS

See *Bipolar with 8 Zero Substitution*.

backbone

The part of a network that carries the bulk of the network traffic, e.g. over Ethernet cabling, fiber-optic cabling.

background diagnostics

Programs that run continuously in the background of the NMS to provide current operating status for all active switches. These programs do not interfere with switch operations.

Backward Explicit Congestion Notification

A bit in the Frame Relay header that indicates the frame has passed through a congested node from traffic traveling in the opposite direction.

balun

A small device used to connect a balanced line (such as a twisted-pair cable) to an unbalanced line (such as a coaxial cable).

bandwidth

The transmission capacity of a computer or a communications channel.

bandwidth-on-demand

A WAN feature that enables users to dial up additional bandwidth as their applications demand.

baud rate

The number of bits per second (bps) on a serial link.

Bc

See *Committed Burst Size*.

Be

See *Excess Burst*.

BECN

See *Backward Explicit Congestion Notification*.

best-effort packets

Packets delivered to the best of the network's ability, after the requirements for delivering the guaranteed packets are met. See also *guaranteed packets*.

Bipolar with 8 Zero Substitution

A T1 encoding scheme where eight consecutive zeros are replaced with the sequence 000-+0+-if the preceding pulse was+, and with the sequence 000-+0+-if the preceding value was-, where+ represents a positive pulse, -represents a negative pulse, and 0 represents no pulse.

bit

A binary unit of measurement, which may be either a one or a zero.

bits per second

The number of bits transmitted every second during a data transfer.

blue alarm

An alarm signal, both on the NMS and switch, indicating that all one pulses are being received.

BNC connector

A small connector with a half-turn locking shell for coaxial cable. Normally used with thin Ethernet cabling.

Boot Programmable Read-Only Memory

A chip mounted on a printed circuit board used to provide executable boot instructions to a computer device.

Boot PROM

See *Boot Programmable Read-Only Memory*.

bps

See *bits per second*.

broadband network

A type of network that allows for the transmitting of large amounts of information, including voice, data, and video over long distances using the same cable.

broadcast

A message that is sent to all users currently logged into the network.

burst mode

A method of data transmission in which information is collected and then sent in a single high-speed transmission, rather than one character at a time.

byte

A series of consecutive binary digits that are operated upon as a unit (for example, an eight-bit byte).

C

Carrier Sense Multiple Access Collision Detect

Media-access mechanism wherein devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all transmitting devices. This collision subsequently delays retransmissions from those devices for some random length of time. CMSA/CD access is used by Ethernet and IEEE 802.3.

CBR

See *Constant Bit Rate*.

cell

Any fixed-length data packet. For example, ATM uses fixed-length, 53-byte cells. See also *cell relay*.

Cell Loss Priority

A field in the ATM cell header that indicates the eligibility of the cell for discard by the network under congested conditions.

cell relay

A form of packet transmission that uses a fixed-length, 53-byte cell over a packet-switched network; also known as Asynchronous Transfer Mode (ATM).

cell switching

An operational feature of cellular networks that enables callers to move from one location to another without losing the call connection. The cellular system is designed to switch calls to a new cell with no noticeable drop in the conversation. Cell switching is sometimes called "handing off." While not noticeable in voice communications, the approximate 300 milliseconds this switching requires can be a problem in data transmission.

channel

Any connecting path that carries information from a sending device to a receiving device. May refer to a physical medium (e.g., coaxial cable) or a specific frequency within a larger channel.

channel bank

Equipment that converts multiple voice signals to time division multiplexed (TDM) signals for transmission over a T1 or E1 line.

Channel Service Unit

A device that functions as a certified safe electrical circuit, acting as a buffer between the customer's equipment and a public carrier's WAN.

CIR

See *Committed Information Rate*.

circuit

A communications channel or path between two devices.

circuit switching

A temporary communications connection that is established as needed between a sending node and a receiving node.

Clear To Send

A hardware signal defined by the RS-232-C standard, indicating that the transmission can proceed.

client

A device that makes use of the services provided by a server.

CLP

See *Cell Loss Priority*.

coldboot

A reboot enabling the user to restart the switch as if it were powered off, then on. Compare with *warmboot*.

collision detection

See *Carrier Sense Multiple Access Collision Detect*.

Committed Burst Size

The maximum amount of data, in bits, that the network agrees to transfer under normal conditions, during a time interval Tc. Committed Burst Size is defined for each PVC.

Committed Information Rate

The rate at which the network agrees to transfer information under normal conditions. The rate is averaged over a minimum increment of time, Tc. See also *bandwidth*.

Committed Rate Measurement Interval

The time interval during which the user is allowed to send only Bc committed amount of data and Be excess amount of data. In general, the duration of Tc is proportional to the burstiness of the traffic. Tc is computed from CIR and Bc as Tc=Bc/CIR.

communications protocol

A standard way of communicating between computers, or computers and terminals; also a hardware interface standard, such as RS-232C for communication between DTE and DCE devices.

community names

The name given to an SNMP community for purposes of identification. A member has associated access rights: read-only or read/write. The Ascend switch has the following default community names: public (read-only) and cascade (read/write).

concentrator

A repeater or hub that joins communications channels from several different network nodes. Concentrator devices provide bridging, routing, and other management functions.

congestion

The point at which devices in the network are operating at their highest utilization. Congestion is handled by employing a congestion avoidance mechanism. See also *mild congestion*, *absolute congestion*, and *severe congestion*.

connectivity

The degree to which any given computer or application can cooperate with other network components in a shared-resource network environment.

console commands

SNMP protocol supports three important commands: Get, Set, and Next. Get enables an NMS to query one or more objects or variables in an agent MIB. Set enables an NMS to modify a value of a MIB object or variable and may be used to boot or reboot devices. Next enables an NMS to query agent MIB tables and lists.

Constant Bit Rate

A Quality of Service class defined by the ATM Forum for ATM networks. CBR is used for connections that depend on precise clocking to ensure undistorted delivery of bits.

Control Processor

A module that makes up the hardware architecture of a B-STDX 9000 switch. A CP provides network and system management and routing functions in support of the real-time switching functions provided by the multiple, IO Processor modules (IOPs).

CP

See *Control Processor*.

CRC

See *Cyclic Redundancy Check*.

CRC error

A condition that occurs when the CRC in a frame does not agree with the CRC frame received from the network.

CSMA/CD

See *Carrier Sense Multiple Access Collision Detect*.

CSU

See *Channel Service Unit*.

CTS

See *Clear To Send*.

Cyclic Redundancy Check

A calculation method used to check the accuracy of digital transmission over a communications link.

D

D4-format

In T1 transmission, 24 channels per T1 line, where channels are assigned sequentially.

daemon

A special type of program that, once activated, starts itself and carries out a specific task without user intervention. Daemons typically handle tasks that run repeatedly, such as printing, mail, and communications.

data bits

In asynchronous transmission, the bits that actually contain the data being sent. Also called "payload" in some transmission methods.

Data Bus (DB) connector

A cable connector used to connect devices to parallel or serial ports. The number following DB indicates the number of pins in the connector (e.g., DB-25 connectors have 25 pins).

Data Carrier Detect

A hardware signal, defined by the RS-232-C standard, that indicates the device is on-line and ready for transmission.

Data Communications Equipment

Any device that connects a computer or terminal to a communications channel or public network.

Data Exchange Interface

A specification, described in RFC 1483, that defines how a network device can be used to convert data for interworking between different network services (i.e., Frame Relay to ATM).

Data Link Connection Identifier

A 10-bit address that identifies PVCs. See also *Local Management Interface* and *globally significant DLCI*.

data-link layer

The second of seven layers of the ISO/OSI model for computer-to-computer communications. This layer ensures data flow and timing from one node to another by synchronizing blocks of data and controlling the flow of data.

data packet

One unit of information transmitted as a discrete entity from one network node to another. In packet-switched networks, a data packet is a transmission unit of a fixed maximum length that contains a header, a set of data, and error control information.

Data Service Unit

A device that connects DTE to digital communications lines. A DSU formats the data for transmission on the public carrier WAN, and ensures that the carrier's requirements for data formats are met.

Data Set Ready

A hardware signal, defined by the RS-232-C standard, that indicates the device is ready to operate.

Data Terminal Equipment

Any device, such as a terminal or computer, that is connected to a communications device, channel, or public network.

Data Terminal Ready

A hardware signal, defined by the RS-232 standard, exchanged between devices. For example, an RS-232-C circuit that alerts a DCE device that the DTE device is ready to send and receive data.

data transfer rate

The speed at which data is transferred, usually measured in megabits per second (Mbps) or megabytes (MB) per second.

datagram

A message unit that contains source- and destination-address information, as well as the data itself, which is routed through a packet-switched network.

DCD

See *Data Carrier Detect*.

DCE

See *Data Communications Equipment*.

D-Channel

The data channel in ISDN used for control signals and customer data. In Primary Rate Interface (PRI) ISDN, the D-Channel operates at 64 Kbps.

DE

See *Discard Eligible (DE)*.

dedicated line

A communications circuit used for one specific purpose, and not used by or shared between other users.

dedicated server

A computer on the network that functions only as a server performing specific network tasks.

define path

A function that allows a manual path to be defined for the PVC, thereby bypassing the OSPF (Open Shortest Path First) algorithm to make PVC routing decisions.

delay

In communications, a pause in activity, representing the time that a message must wait for transmission-related resources to become available.

destination address

The address portion of a packet or datagram that identifies the destination node.

digital

A method of storing, processing, and transmitting information through use of distinct electronic or optical pulses that represent the binary digits (bits) 0 and 1. Digital transmission/switching technologies employ a sequence of discrete, individually distinct pulses to represent information, as opposed to the continuously variable signal of analog technologies. Compare with *analog*.

Digital Signal (Digital Service)

A classification of digital circuits. The DS defines the level of common carrier digital transmission service. DS-0 = 64 Kbps (Fractional T1), DS-1 = 1.544 Mbps (T1), DS-2 = 6.312 Mbps (T2), DS-3 = 44.736 Mbps (T3), and DS-4 =274-176 Mbps (T4).

DIP switch

See *Dual In-line Position switch*.

direct Ethernet

A connection method used by the NMS to the network. The NMS communicates directly to the gateway switch through the Ethernet port on the NMS to the Ethernet port on the switch.

Discard Eligible (DE)

A bit in the Frame Relay header used to indicate that a frame is eligible for discard by a congested node.

disk partitions

A portion of a disk that is configured during software installations on a system or workstation.

DLCI

See *Data Link Connection Identifier*.

domain

A network community of users sharing the same database information.

DS

See *Digital Signal (Digital Service)*.

DS0

A 64-Kbps channel used in T1 transmission. There are 24 DS0 channels in a T1 line.

DS1

A standard digital transmission facility, operating at 1.544 Mbps.

DSR

See *Data Set Ready*.

DSU

See *Data Service Unit*.

DSX-1

A T1 specification that indicates the physical and electrical characteristics of the standard T1 cross-connection.

DTE

See *Data Terminal Equipment*.

DTR

See *Data Terminal Ready*.

Dual In-line Position switch

A small switch used to select the operating mode of a device.

duplex channel

The ability to transmit and receive on the same channel at the same time. Also known as full duplex.

DXI

See *Data Exchange Interface*.

dynamic routing

A routing technique that allows a message's route to change "en route" through the network.

E

E1

The European counterpart to the North American T1 transmission speed. Adopted by the Conference of European Posts and Telecommunications Administrations, the E1 standard carries data at the rate of 2.048 Mbps.

EDAC

See *error detection and correction*.

encapsulation

The wrapping of data in a particular protocol header. For example, Ethernet data is wrapped in a specific Ethernet header before being transmitted. Also, when bridging dissimilar networks, the entire frame from one network is simply placed in the header used by the data link layer protocol of the other network.

environment variable

A system- or user-defined variable that provides information to the UNIX shell about the operating environment.

error detection and correction

A feature used to determine whether transmission errors have occurred, and if so, to correct those errors. See also *Carrier Sense Multiple Access Collision Detect*.

error rate

In communications, the ratio between the number of bits received incorrectly and the total number of bits in the transmission.

ESF

See *Extended Superframe Format*.

Ethernet

A popular LAN protocol and cabling scheme with a transfer rate of 10 Mbps.

Ethernet address

A 48-bit number physical address. Each Ethernet address is unique to a specific network card or PC on a LAN, which forms the basis of a network-addressing scheme. Compare with *Internet Protocol address*.

Ethernet packet

A variable-length unit of data transmitted on an Ethernet LAN.

Excess Burst

The maximum allowed amount of uncommitted data (in bits) in excess of Bc that the network attempts to deliver during time interval Tc. In general, this data (Be) is delivered with a lower probability than Bc.

Extended Superframe Format

In Frame Relay, a frame structure that extends the DS1 superframe structure from 12 to 24 frames, for a total of 4632 bits. This format redefines the 8-Kbps channel consisting of framing bits previously used only for terminal and robbed-bit signaling synchronization.

external testing

A loopback test that tests the ability of the port to send and receive data. This test requires an external loopback connector installed on the physical port.

fail count

A statistic that displays the number of tests that produced an error condition.

failed LED

A red status indicator that indicates a fatal system fault (such as a system crash).

fault-tolerant PVCs

In Frame Relay, a set of backup ports (Permanent Virtual Circuits) on the B-STDX 9000 switch used to restore connections from a failed data center to the backup data center. When enabled, a fault-tolerant PVC automatically reroutes all affected Frame Relay circuits to the set of backup ports.

F

FCS

See *Frame Check Sequence*.

FDDI

See *Fiber Distributed Data Interface*.

FDM

See *Frequency-Division Multiplexing*.

FECN

See *Forward Explicit Congestion Notification bit*.

Fiber Distributed Data Interface

An ANSI standard for fiber-optic links with a data transmission rate up to 100 Mbps.

File Transfer Protocol

A method of transferring information from one computer to another, either over a modem and telephone line, or over a network. FTP is a TCP/IP application utility.

foreground diagnostics

A set of tests used to check for non-fatal errors indicated by background diagnostics or statistics. Foreground tests may also run at start up to test new equipment functions.

Forward Explicit Congestion Notification bit

A bit in the Frame Relay header that indicates the frame has passed through a node that is experiencing congestion in the same direction in which the frame is traveling.

fractional T1

One channel of a T1 circuit. T1 circuits consist of 24, 64-Kbps channels. Customers can lease as many of these channels as needed; they are not required to lease all 24 channels in one circuit.

FRAD

See *Frame Relay Assembler/Disassembler*.

frame

In Frame Relay, a block of data that can be transmitted as a single unit.

Frame Check Sequence

In a frame, a field that contains the standard 16-bit cyclic redundancy check used to detect errors in HDLC and LAPD frames. See also *Cyclic Redundancy Check*.

Frame Relay

A type of data transmission based on a packet-switching protocol, with transmission rates up to 2 Mbps. Frame Relay provides for bandwidth-on-demand.

Frame Relay Assembler/Disassembler

A function that enables a logical port to perform Frame Relay encapsulation/de-encapsulation for HDLC/SDLC-based protocols. The FRAD function encapsulates HDLC/SDLC traffic entering an Ascend Frame Relay network and de-encapsulates it upon exiting the network. This function is restricted to one point-to-point PVC.

Frame Relay RFC1294 Multi-protocol Encapsulation

A specification allowing for a single circuit to be established between two devices.

Frequency-Division Multiplexing

A method of sharing a transmission channel by dividing the total bandwidth of the circuit into several smaller channels. This is accomplished by allocating specific frequency ranges to each channel. All signals are carried simultaneously. Compare with *Time Division Multiplexing*.

FTP

See *File Transfer Protocol*.

full-duplex (FDX)

See *duplex channel*.

full status reporting

In Frame Relay, a link-management message function that provides the user device with a complete status of all PVCs configured on that link.

G

gateway

A shared connection between a LAN and a larger system (such as a mainframe computer), or a large packet-switched network whose communication protocols differ.

Generic Flow Control

The field in the ATM cell that controls the flow of traffic across the User-Network Interface (UNI) and into the network. The mechanisms for using this field are still under development.

GFC

See *Generic Flow Control*.

globally significant DLCI

A feature of the Local (or Link) Management Interface (LMI) enhancement to Frame Relay that enables DLCIs to use the same connection-identification scheme across the network (global values) to specify individual end devices.

good LED

A green status indicator on an Ascend switch that indicates normal system status and operation during the system-boot process.

graceful discard

When enabled, this function turns red frames into best-effort frames. When disabled, this function discards frames.

green frames

Ascend's own class of packet frames used to identify packets as they travel through the network. Green frames are never discarded by the network except under extreme circumstances, such as node or link failure.

group addressing

The ability to send a single datagram/packet to multiple locations.

guaranteed packets

Data delivered according to some time constraint with high reliability.

H

Hayes-compatible modem

Any modem that recognizes commands in the industry-standard AT command set.

HDLC

See *High-level Data Link Control*.

header

The initial part of a data block, packet, or frame, which provides basic information about the handling of the rest of the block, packet or frame.

Header Error Control

In ATM, a feature that provides protection against misdelivery of cells due to addressing errors.

HEC

See *Header Error Control*.

heartbeat polling process

An exchange of sequence numbers between the network and a user device to ensure that both are operational and communicating.

HELLO

A routing protocol used principally by NSFnet nodes (nodes in the National Science Foundation Network). Hello allows trusting packet switches to discover minimal delay routes.

Hello protocol

Protocol used by OSPF systems for establishing and maintaining neighbor relationships.

heterogeneous network

A network that consists of workstations, servers, network interface cards, operating systems, and applications from many different vendors, all operating together as a single unit. Compare with *homogeneous network*.

High-level Data Link Control

An international protocol defined by ISO. In HDLC, messages are transmitted in variable-length units known as frames.

High-Speed Serial Interface

A high-speed interface (up to 52 Mbps full duplex) between a DTE and a DCE. The DCE provides the timing for the interface. HSSI can operate over a 50 ft- (15m) shielded twisted-pair cable.

homogeneous network

A network that consists of one type of workstation, server, network interface card, and operating system, with a limited number of applications, all purchased from a single vendor. All nodes use the same protocol and the same control procedures. Compare with *heterogeneous network*.

hop (count)

The number of links that must be "jumped" to get from a source node to a destination node.

host name

A unique name identifying a host system.

hot swappable

A feature that allows the user to add, replace, or remove interface processors in an Ascend switch without interrupting switch operations.

HP OpenView

The UNIX-based network management application used with NavisCore on an NMS to manage an Ascend switch network.

HSSI

See *High-Speed Serial Interface*.

hub

A wiring device that contains multiple connections of network and internetworking modules. Active hubs amplify or repeat signals to extend a LAN (in terms of distance). Passive hubs do not repeat, but split the transmission signal, allowing the administrator to add users to a LAN.

I

ICMP

See *Internet Control Message Protocol*.

IEEE

See *Institute of Electrical and Electronic Engineers*.

IEEE standards

Various specifications defined by the Institute of Electrical and Electronic Engineers (such as Token Ring, Ethernet) to establish common networking standards among vendors.

indirect Ethernet

A LAN topology or an extended LAN where the NMS and the switch reside on different LANs and must use a router for access.

Input/Output Adapter

A module that connects the various IOP and IOP Plus modules in a switch. IOA configurations vary according to the specific IOP module they support.

Input/Output Processor

A module in a switch that manages the lowest level of a node's trunk or user interfaces. An IOP performs physical data link and multiplexing operations on external trunks and user links.

Institute of Electrical and Electronic Engineers

Professional organization that defines network standards.

Integrated Services Digital Network

A CCITT standard for a worldwide digital communications network, intended to replace all current systems with a completely digital transmission system.

internal clocking

A hardware function of the Ascend switch that provides the transmit and receive clocks to the user equipment.

internal testing

A hardware diagnostic that performs an internal loopback test on the I/O card and other cards.

International Standards Organization

An international standards group based in Geneva, Switzerland that establishes global standards for communications and information exchange.

International Telecommunication Union Telecommunication Standard Sector

An advisory committee established under the United Nations to recommend worldwide standards for voice and data. One of the four main organizations of the International Telecommunications Union.

Internet Control Message Protocol

The IP portion of TCP that provides the functions used for network layer management and control.

Internet Protocol

The TCP/IP session-layer protocol that regulates packet forwarding. See also *Internet Control Message Protocol*.

Internet Protocol address

A 32-bit address assigned to hosts using TCP/IP. The address is written as four octets separated with periods (dotted decimal format), which are made up of a network section, an optional subnet section, and a host section.

IOA

See *Input/Output Adapter*.

IOP

See *Input/Output Processor*.

IP

See *Internet Protocol*.

IP address

See *Internet Protocol address*.

ISDN

See *Integrated Services Digital Network*.

ISDN call setup

A procedure that establishes an ISDN backup trunk.

ISO

See *International Standards Organization*.

ITU-T

See *International Telecommunication Union Telecommunication Standard Sector*.

J

jitter

A type of distortion found on analog communications lines, resulting in data transmission errors.

K

Kbps

Kilobits per second.

keep-alives

A series of polling messages used in the Local (or Link) Management Interface (LMI) of a Frame Relay port to verify link integrity between devices.

L

LAN

See *Local Area Network*.

LAP

See *Link Access Protocol*.

LAP-B

A bit-oriented data-link protocol used to link terminals and computers to packet-switched networks.

LED

See *Light Emitting Diode*.

Light Emitting Diode

A semiconductor light source that emits light in the optical frequency band (visible light) or the infrared frequency band. A major light source for optical fiber transmission, LEDs are used with multimode optical fiber in applications that require a low-cost light source. See also *good LED*, *marginal LED*, and *failed LED*.

Link Access Protocol

The link-level protocol used for communications between DCE and DTE devices.

Link Management Interface

A set of enhancements to the basic Frame Relay specification. LMI dynamically notifies the user when a PVC is added or deleted. The LMI also monitors each connection to the network through a periodic heartbeat "keep alive" polling process.

Link Management Interface Rev 1

A synchronous polling scheme used for the link management of a Frame Relay channel where the user polls the network to obtain status information of the PVCs configured on the channel. LMI exchanges this information using DLCI 1023.

link-state routing protocol

A sophisticated method of determining the shortest paths through the network. See also *Open Shortest Path First*.

LMI

See *Link Management Interface*.

LMI Rev 1

See *Link Management Interface Rev 1*.

load balancing

A technique that distributes network traffic along parallel paths to maximize the available bandwidth while providing redundancy at the same time.

Local Area Network

Any physical network technology that connects a number of devices and operates at high speeds (10 Mbps through several gigabits per second) over short distances. Compare with *Wide Area Network*.

Local Management Interface

See *Link Management Interface*.

locally significant DLCI

In Frame Relay, an identifier or address that specifies a local router, PVC, SVC, or endpoint device. It is reusable at non-overlapping endpoints and allows for scalability. Compare with *globally significant DLCI*.

logical port

A configured circuit that defines protocol interaction.

loopback test

A diagnostic that directs signals back toward the transmitting source to test a communications path.

loss of frame

A T1 error condition when an out-of-frame condition exists for a normal period of 2 1/2 seconds.

loss of signal

A T1 error condition when j175+_75 consecutive zeros are received.

low level debugger

A state whereby the CP switch is powered on. If both positions on the CP switch are in the OFF position (pointing left), power up diagnostics are bypassed and the system debugger is enabled.

M

management DLCI

A value that specifies a PVC or SVC from a LAN connected via a router to a Ascend switch over a Frame Relay network.

Management Information Base

The set of variables forming a database contained in a CMIP or SNMP-managed node on a network. Network management stations can fetch/store information from/to this database.

marginal LED

An amber status indicator on a switch module that indicates a non-fatal system fault (such as low memory).

Mbps

Megabits per second.

MIB

See *Management Information Base*.

mild congestion

In Frame Relay, the state of a link when the threshold (more than 16 buffers by default) is exceeded.

mount point

A directory in a file hierarchy at which a mounted file system is added to the machine making the mount.

multicast

A type of broadcast transmission that sends copies of the message to multiple stations, but not to all possible stations.

multiplexer (mux)

A device that merges several lower-speed transmission channels into one high-speed channel at one end of the link. Another mux reverses this process at the opposite end.

multiplexing

A technique that transmits several signals over a single communications channel.

N

name server

A server connected to a network that converts network names into network addresses.

name service

A distributed database service that allows a single set of system configuration files to be maintained for multiple systems on a network.

NavisCore

The UNIX-based graphical user interface used to configure and monitor an Ascend switch network.

network address

A network layer address refers to a logical, rather than a physical network device; also called protocol address.

Network Interface Card

A card, usually installed in a pc, that enables you to communicate with other users on a LAN; also called adapter.

Network-to-Network Interface

The standard that defines the interface between ATM switches and between Frame Relay switches. In an SMDS network, an NNI is referred to as Inter-Switching System Interface (ISSI).

NIC

See *Network Interface Card*.

NNI

See *Network-to-Network Interface*.

node

Any device such as a pc, terminal, workstation, etc., connected to a network and capable of communicating with other devices.

node number

A unique number that identifies a device on the network.

noise

Extraneous signals on a transmission channel that degrade the quality or performance of the channel.

O

Open Shortest Path First

A routing protocol that takes into account network loading and bandwidth when routing information over the network. Incorporates least-cost routing, equal-cost routing, and load balancing.

Open Systems Interconnection

An international standard program created by ISO and ITU-T to develop standards for data networking, such as the OSI model, to facilitate multi-vendor operating environments.

OPTimum PVC trunk

A logical port configuration that optimizes interoperability in performance and throughput in networks where both ends are connected by Ascend switches.

OPTimum trunking

A software function that allows public data networks based on Frame Relay, SMDS, or ATM to be used as trunk connections between Ascend switches.

OSI

See *Open Systems Interconnection*.

OSPF

See *Open Shortest Path First*.

out of frame

A T1 error condition where two or three framing bits of any five consecutive frames are in error.

P

packet

Any block of data sent over a network. Each packet contains sender, receiver, and error-control information in addition to the actual message; sometimes called payload or data bits.

Packet Assembler/Disassembler

A device connected to a packet-switched network that converts a serial data stream from a character-oriented device (e.g., a bridge or router) into packets suitable for transmission. It also disassembles packets into character format for transmission to a character device.

packet processor

The Ascend switch module that performs the frame format validation, routing, queuing and protocol conversion for the STDX switch. This module is not hot swappable.

packet-switched network

A network that consists of a series of interconnected circuits that route individual packets of data over one of several routes and services.

packet switching

Type of networking in which nodes share bandwidth with each other by intermittently sending logical information units (packets). In contrast, a circuit-switching network dedicates one circuit at a time to data transmission.

PAD

See *Packet Assembler/Disassembler*.

Parameter Random Access Memory

The PRAM on a switch that contains the module's downloaded configuration file, and which is stored in battery backup.

pass count

A statistic that displays the number of background diagnostic tests that have passed without error.

passive hub

A wiring device used in some networks to split a transmission signal, allowing additional workstations to be added to the network. Compare with *active hub.*

path

The complete location of a directory or file in the file system. See *define path* and *alternate path*.

payload

The portion of a frame that contains the actual data.

PCR

See *Peak Cell Rate*.

Peak Cell Rate

In ATM transmission, the maximum transmission rate that cells are transmitted. Equivalent to Be for Frame Relay, PCR is measured in cells per second and converted internally to bits per second. PCR defines the shortest time period between two cells.

PDN

See *Public Data Network*.

Permanent Virtual Circuit

A logical connection across a packet-switched network that is always in place and always available along a predetermined network path. See also *Virtual Circuit*.

Point-to-Point Protocol

A protocol that provides router-to-router and host-to-network connections.

polling

An access control method in which one master device, such as the NMS, polls or queries other network devices, requesting them to transmit one at a time.

PPP

See *Point-to-Point Protocol*.

PRAM

See *Parameter Random Access Memory*.

PRI

See *Primary Rate Interface*.

primary group

The main group to which associated users belong. The system identifies the primary group by the group field in the user account (stored in the /etc/password file) and by the group ID associated with a new file.

Primary Rate Interface

An ISDN interface to primary rate access, which consists of a single 64-Kbps D channel plus 23 (T1) or 30 (E1) B channels for voice or data.

protocol

A set of rules governing communication between two entities or systems to provide interoperability between services and vendors. Protocols operate at different layers of the network, e.g., data link, network, and session.

proxy service

A management service provided for one or more devices by another. For example, the Ascend SMDS Access Servers/switches are proxy-managed through the SMDS network.

Public Data Network

Any government-owned or controlled commercial packet-switched network, offering WAN services to data processing users.

PVC

See *Permanent Virtual Circuit*.

Q

QoS

See *Quality of Service*.

Quality of Service

A statistical report that specifies certain characteristics of network services, sessions, connections, or links. For example, a NavisCore statistics report describes the lost packets and round-trip delay measurements.

R

Random Access Memory

The main system memory in a computer used for the operating system, applications, and data.

RAM

See *Random Access Memory*.

rate enforcement

A process used to measure the actual traffic flow across a given connection and compare it to the total admissible traffic flow for that connection. Traffic outside of the acceptable level can be tagged and discarded en route if congestion develops. ATM, Frame Relay, and other types of networks use rate enforcement.

reboot

To restart the computer and reload the operating system, usually after a crash.

Receive Data

A hardware signal, defined by the RS-232-C standard, that carries data from one device to another. Compare with *Transmit Data*.

red alarm

A T1 alarm condition indicating a loss of signal or loss of frame at the device's local termination point.

red frames

In Frame Relay, a type of frame to be discarded. Color designators green, amber, and red identify packets as they travel through the network.

redundancy

The duplication of hardware or software within a network to ensure fault-tolerant or back-up operation.

remote connection

A workstation-to-network connection made using a modem and telephone line or other WAN services equipment. Remote connections enable you to send and receive data over greater distances than you can with conventional cabling methods.

repeater

A device that receives data on one communication link and transmits it, bit by bit, on another link as fast as it is received without buffering.

Request For Comment

A series of notes and documents available on-line that describe surveys, measurements, ideas, techniques, and observations, as well as proposed and accepted Internet protocol standards, such as Telnet and FTP.

Request To Send

A hardware signal, defined by the RS-232-C standard, that a device sends to request permission to transmit.

RFC

See *Request For Comment*.

RFC1294

A specification documenting multi-protocol access over Frame Relay.

RIP

See *Routing Information Protocol*.

route recovery

In Frame Relay, an OSPF routing function in the Ascend switch. When a tandem node or trunk is down, new shortest-path routes for those affected PVCs are recalculated immediately at the ingress nodes, due to fast convergence of the link-state updates. The PVCs are then rerouted to the new route. Recovery time is typically under four seconds. The network reports PVC rerouting as an event/alarm.

router

An intelligent LAN-connection device that routes packets to the correct LAN segment destination address(es). The extended LAN segments may or may not use the same protocols. Routers link LAN segments at the ISO/OSI network layer.

routing

The process of directing data from a source node to a destination node.

Routing Information Protocol

A routing protocol that maintains a list of accessible networks and calculates the lowest hop count from a particular location to a specific network.

routing protocol

A protocol that implements routing using a specific routing algorithm. Routing protocols include IGRP, OSPF, and RIP.

RTS

See *Request To Send*.

RXD

See *Receive Data*.

S

SCR

See *Sustainable Cell Rate*.

SEAL

See *Simple and Efficient Adaption Layer*.

Serial Line over Internet Protocol

A protocol that enables point-to-point serial communication over IP using serial lines or telephone connections and modems.

serial management port

A management port on the Packet Processor card in an Ascend switch.

severe congestion

In Frame Relay, a state or condition that occurs when the queue size is greater than a second predetermined threshold (32 buffers full). In this state, the continued forwarding of amber and red packets jeopardize the successful delivery of green packets.

shielded cable

Cable protected against electromagnetic and radio frequency interference.

shortest path routing

A routing algorithm that calculates the path distances to all network destinations. The shortest path is then determined by a cost assigned to each link. See also *OSPF*.

SIG

See *SMDS Interest Group*.

Simple and Efficient Adaption Layer

In ATM, an extension of the Type 3 AAL. It simplifies the SAR portion of the Adaption layer to pack all 48 bytes of the cell information field with data. This AAL makes ATM look like high-speed Frame Relay. It also assumes that only one message is crossing the UNI at a time. That is, multiple end users at one location cannot interleave messages on the same virtual circuit, but must queue them for sequential transmission.

Simple Network Management Protocol

A standard network management protocol used to manage and monitor nodes and devices on a network.

SIP

See *SMDS Interface Protocol*.

SLIP

See *Serial Line over Internet Protocol*.

smart hub

A concentrator with certain network management features built into the firmware. This capability enables the user to manage LAN configurations.

SMDS

See *Switched Multimegabit Data Services*.

SMDS In-Band Network Management

The NMS manages the SMDS network traffic using SMDS In-Band Network Management. To be managed from this NMS, all SMDS Access Servers/Switches must be in the same IP subnet.

SMDS Interest Group

A consortium of vendors and consultants committed to advancing worldwide SMDS as an open, interoperable solution for high-performance data connectivity.

SMDS Interface Protocol

The protocol defined at the network and end-user interface connection.

SNMP

See *Simple Network Management Protocol*.

static route

A route or path that is manually entered into the routing table. Static routes take precedence over routes or paths specified by dynamic routing protocols.

subnet address

An extension of the Internet addressing scheme that allows a site to use a single Internet address for multiple physical networks.

subnet mask

A 32-bit address mask used in IP to specify a particular subnet. See also *address mask.*

superuser (root)

In UNIX, a user (also known as root) with special privileges. Only the superuser, for example, can change the password file and edit major system administration files in the /etc directory.

Sustainable Cell Rate

The average cell transmission rate in ATM transmission. Equivalent to CIR for Frame Relay, SCR is measured in cells per second and converted internally to bits per second Usually, SCR is a fraction of the peak cell rate. Cells are sent at this rate if there is no credit.

SVC

See *Switched Virtual Circuit*.

Switched Multimegabit Data Services

A high-speed WAN service based on the 802.6 standard for use over T1 or T3 circuits.

Switched Virtual Circuit

A logical connection across a packet-switched network providing as-needed connections to any other node in the network. See also *Virtual Circuit*.

synchronization

The timing of separate elements or events to occur simultaneously. In communications, hardware and software must be synchronized so that file transfers can occur.

synchronous transmission

A data transmission method that uses a clock signal to regulate data flow.

T

T1

A long-distance, point-to-point circuit that provides 24 channels at 64 Kbps each (for a total of 1.544 Mbps). See also *E1*.

T3

A long-distance, point-to-point circuit that provides up to 28 T1 channels. T3 can carry 672 channels of 64 Kbps (for a total of 44.736 Mbps).

Tc

See *Committed Rate Measurement Interval*.

TCP

See *Transmission Control Protocol*.

TDM

See *Time Division Multiplexing*.

telnet

The Internet standard protocol for remote terminal-connection services.

throughput

The actual speed of the network.

Time Division Multiplexing

A timing mechanism that allocates bandwidth for multiple channels onto one channel based on preassigned time slots.

time interval "T"

The time interval over which the number of bits used to average the number of bits transmitted, is averaged. To calculate **T,** use the following formula: Bc/CIR=T.

topology

The map or configuration design of a network. Physical topology refers to the location of hardware. Logical topology refers to the paths that messages take to get from one node to another.

traffic shaping

In Frame Relay, a set of rules that describes traffic flow. The sender has a mechanism to ensure that the transmission of its guaranteed packets behaves in a certain way. The network knows what kind of traffic to expect, and can monitor the behavior of the traffic.

transceiver

A device that connects a host interface to a LAN. A transceiver transmits and receives data.

Transmission Control Protocol

The Internet standard, transport-level protocol that provides the reliable, full duplex, stream service on which many application protocols depend.

Transmit Data

A hardware signal, defined by the RS-232-C standard, used by the DTE to transmit data to the DCE. Compare with *Receive Data*.

trap

An unsolicited message generated by an SNMP agent on a network device (e.g. switch) due to a predefined event occurring or alarm threshold being exceeded, which triggers an alarm at the NMS.

trunk

The communications circuit between two switches.

trunk backup

A configuration setting specified by a network operator via the NMS. The network operator can initiate or terminate primary trunk backups at any time via the NMS. Trunk backups take over a connection should the primary trunk fail.

trunk failure

A condition (alarm) that occurs when the Ascend switch status indicates that a trunk is no longer available.

trunk restoration

A process that reroutes the PVCs carried on the backup trunk, and frees up the circuit on the backup trunk.

TXD

See *Transmit Data*.

twisted-pair cable

Cable that consists of two or more pairs of insulated wires twisted together. One wire carries the signal, and the other is grounded.

U

UIO module

See *Universal Input Output Module*.

UDP

See *User Datagram Protocol*.

unshielded cable

Any cable not protected from electromagnetic or radio frequency interference.

UNI

See *User-to-Network Interface*.

UNI DCE

See *User Network Interface Data Communications Equipment*.

UNI DTE

See *User Network Interface Data Terminal Equipment*.

Universal Input Output Module

In the Ascend switch, a module that has three 80-pin connectors and is used for redundancy, and also as an I/O module for X.21, RS449, V.35, EIA530, and EIA530A interfaces.

User Datagram Protocol

An unreliable transport-layer protocol from the TCP/IP protocol suite. It simply acts as an interface to various applications through the use of different ports.

User Network Interface Data Communications Equipment

A device that performs the Frame Relay DCE functions for link management and expects a Frame Relay DTE device (e.g., Ascend switch) to be attached to it.

User Network Interface Data Terminal Equipment

A device that performs the Frame Relay DTE functions for link management. The user specifies this option on the NMS to connect to a Frame Relay DCE, where the Ascend switch acts as the DTE.

User-to-Network Interface

A standard defined by the ATM Forum for public and private ATM network access. UNI connects an ATM end system (such as a router) and an ATM switch, and is also used in Frame Relay. UNI is called SNI (Subscriber Network Interface) in SMDS.

V

V.35

A standard module used for communication between a network access device and a packet network. It provides clocking from 19.2 Kbps to 4.0966 Mbps.

VC

See *Virtual Channel*; *Virtual Circuit*.

VCI

See *Virtual Circuit Identifier*.

virtual bandwidth

Channel capacity calculated to allow for oversubscription of channel usage.

Virtual Channel

A connection between two communicating ATM networks.

Virtual Circuit

A logical circuit set up to ensure reliable communication between two network devices. See also *PVC* and *SVC*.

Virtual Circuit Identifier

A 16-bit field in the ATM cell header that is used as an addressing identifier to route cell traffic.

Virtual Path

A group of VCs carried between two points that provides a way to bundle traffic headed in the same direction.

Virtual Path Identifier

An 8-bit field in the ATM cell header that is used as an addressing identifier to route cell traffic.

VPI

See *Virtual Path Identifier*.

VP

See *Virtual Path*.

W

WAN

See *Wide Area Network*.

warmboot

A reboot performed after the operating system has been running for a period of time. Compare with *coldboot*.

Wide Area Network

A network that usually consists of packet-switching nodes over a large geographical area.

Y

yellow alarm

A T1 alarm that is generated when the interface receives a red alarm signal from the remote end.

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