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Configuring WAN Line Services

NORTEL NETWORKS™

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Preface

This guide describes WAN line services and what you do to start and customize WAN line services on a Nortel Networks router.

You can use the Bay Command Console (BCC™) or Site Manager to configure WAN line services on a router. In this guide, you will find instructions for using both the BCC and Site Manager.

Before You Begin

Before using this guide, you must complete the following procedures. For a new router:

- Install the router (see the installation guide that came with your router).
- Connect the router to the network and create a pilot configuration file (see *Quick-Starting Routers*, *Configuring BayStack Remote Access*, or *Connecting ASN Routers to a Network)*.

Make sure that you are running the latest version of Nortel Networks BayRS™ and Site Manager software. For information about upgrading BayRS and Site Manager, see the upgrading guide for your version of BayRS.

Text Conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is: **ping** <*ip_address*>, you enter: **ping 192.32.10.12**
bold text	Indicates command names and options and text that you need to enter. Example: Enter **show ip** {**alerts** | **routes**}. Example: Use the **dinfo** command.
braces ({})	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command. Example: If the command syntax is: **show ip** {**alerts** | **routes**}, you must enter either: **show ip alerts** or **show ip routes**, but not both.
brackets ([ ])	Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is: **show ip interfaces** [**-alerts**], you can enter either: **show ip interfaces** or **show ip interfaces -alerts**.
ellipsis points (. . .)	Indicate that you repeat the last element of the command as needed. Example: If the command syntax is: **ethernet/2/1** [<*parameter*> <*value*>] **. . .** , you enter **ethernet/2/1** and as many parameter-value pairs as needed.

italic text	Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is: **show at** <*valid_route*> *valid_route* is one variable and you substitute one value for it.
`screen text`	Indicates system output, for example, prompts and system messages. Example: `Set Trap Monitor Filters`
separator (>)	Shows menu paths. Example: Protocols > IP identifies the IP option on the Protocols menu.
vertical line (|)	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is: **show ip** {**alerts** | **routes**}, you enter either: **show ip alerts** or **show ip routes**, but not both.

Acronyms

This guide uses the following acronyms:

AMI	alternate mark inversion
ANSI	American National Standards Institute
ATM	asynchronous transfer mode
AUI	attachment unit interface
B8ZS	bipolar with 8 zero substitution
BCC	Bay Command Console
BERT	bit error rate test

BofL	Breath of Life (message)
BRI	Basic Rate Interface
CC	clear channel
CCITT	International Telegraph and Telephone Consultative Committee (now ITU-T)
CPE	customer premise equipment
CRC	cyclic redundancy check
CSMA/CD	carrier sense multiple access/collision detection
CTS	clear to send
DCE	data communications equipment
DDS	digital data system
DLSw	data link switching
DMCT1	Nortel Networks Dual-Port Multichannel T1 link or net module
DS0	digital signal, level zero (0)
DS0A	digital signal, level zero, subrate A
DS01	digital signal, level one
DSR	data set ready
DSU/CSU	data service unit/channel service unit
DSX-1	digital system cross-connect, level 1
DTE	data terminal equipment
ESF	extended superframe format
FCS	frame check sequence
FDDI	Fiber Distributed Data Interface
FDL	facility data link
FT1	fractional T1
GOSIP	Government Open Systems Interconnection Protocol
HDB3	high-density bipolar coding
HDLC	high-level data link control
HSSI	high-speed serial interface

IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU-T	International Telecommunications Union–Telecommunications (formerly CCITT)
LAPB	Link Access Procedure Balanced
LAN	local area network
MAC	media access control
MAU	media access unit
MCE1	Multichannel E1
MCT1	Multichannel T1
MTU	maximum transmission unit
NBMA	nonbroadcast multi-access
NCP	Network Control Protocol
NLPID	network layer protocol identifier
NRZ	nonreturn to zero
NRZI	nonreturn to zero inverted
NSAP	network service access point
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First (protocol)
PCM	Physical Connection Management (FDDI)
PDU	protocol data unit
PHY	physical layer
PMD	physical layer media dependent (FDDI)
PPP	Point-to-Point Protocol
PTT	Post Telephone and Telegraph
QMCT1	Nortel Networks Quad-Port Multichannel T1 link module
RMT	Ring Management (FDDI)
RR	receiver ready

RTS	request to send
SCC	serial communications controller
SDLC	synchronous data link control
SF	superframe format
SMDS	switched multimegabit data service
SMT	Station Management (FDDI)
SNMP	Simple Network Management Protocol
STP	shielded twisted pair
TCP/IP	Transmission Control Protocol/Internet Protocol
Telnet	Telecommunication network
TFTP	Trivial File Transfer Protocol
TPE	twisted pair Ethernet
UTP	unshielded twisted pair
WAN	wide area network

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- The “CD ROMs” section lists available CDs.
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Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5402-7041

Chapter 1
Getting Started

This chapter describes how to access the physical and data link layer (*line*) services for the configured WAN circuits on a Nortel Networks router.

Note: In the OSI internetworking model, the *physical layer* manages the transmission of bits across the physical media (for example, cable or modem interface); a physical layer protocol defines the electrical and mechanical interface. The *data link layer* defines the procedures for transferring data accurately and reliably across the physical layer.

This chapter contains the following sections:

What's the Default Configuration?

With the exception of multichannel circuits (MCE1 and MCT1), router software automatically sets default values for line service parameters when you add a network circuit.

Line defaults are suitable for most networks; however, you can use the BCC or Site Manager to customize these settings based on your network composition and requirements.

Summary of WAN Line Configuration Services

After completing a basic configuration, you can use this guide to customize line services, as defined in the following table. A check mark (✓) indicates whether you can perform a task using the tool named at the top of the column.

WAN Line Services Configuration Tasks		
Task	**BCC**	**Site Manager**
Configuring synchronous and LAPB services	✓	✓
Configuring BayStack AN and ANH asynchronous services		✓
Configuring BayStack DSU/CSU services	✓	✓
Configuring HSSI services	✓	✓
Configuring E1 and T1 services		✓
Configuring MCE1 and MCT1 services	✓	✓
Configuring FT1 services	✓	✓
Configuring FE1 services		✓
Configuring multiline services		✓

Starting the Configuration Tools

Before configuring WAN line services, refer to the following user guides for instructions on how to start and use the Nortel Networks configuration tool of your choice.

Configuration Tool	**User Guide**
Bay Command Console (BCC™)	*Using the Bay Command Console (AN/BN Routers)*
Site Manager	*Configuring and Managing Routers with Site Manager*
NETarchitect	*Getting Started with Optivity Network Management System 8.0* *Configuring and Maintaining Networks with the NETarchitect System*

These guides also describe generically how to create or modify a device configuration.

Accessing Line Parameters

You can use the BCC or Site Manager to access WAN line services.

Using the BCC

To access line parameters, complete the following tasks.

1. **In configuration mode, navigate to the top-level `box` or `stack` prompt and type:**

   `box#` **show config**

   The console displays the current router configuration, including installed modules and protocols.

2. **At the `box` or `stack` prompt, choose a slot number and connector number from the configuration. For example, type:**

   `box#` **serial slot 2 connector 1**

   OR

   `box#` **serial 2/1**

   The prompt changes to `serial/2/1#`.

3. **Refer to the appropriate chapter for instructions on customizing a line service.**

Using Site Manager

Note: This guide assumes that you are working with a router configuration file that already contains the appropriate WAN circuits for the hardware configuration. See *Configuring and Managing Routers with Site Manager* for information about adding circuits to a configuration file.

To access line parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Site Manager main window, choose **Tools** > **Configuration Manager**; then, select the local or remote configuration file for the router.	The Configuration Manager window opens.
2. Choose **Circuits** > **Edit Circuits**.	The Circuit List window opens.

Note: For many circuit types, you can simply click on the configured connector in the Configuration Manager window, and then click on Edit Line in the window.

The Circuit List identifies all circuits in the configuration file using an abbreviated name and number. Table 1-1 lists the Configuration Manager abbreviation for each circuit type.

Table 1-1. Site Manager Abbreviations for Circuit Types

Letter Designator	Circuit Type
E1	E1
H	HSSI
MCE1	MCE1
MCT1	MCT1
S	Synchronous
T1	T1
E	Ethernet *

(continued)

Table 1-1. Site Manager Abbreviations for Circuit Types *(continued)*

Letter Designator	Circuit Type
F	FDDI *
O	Token ring *

* See *Configuring Ethernet, FDDI, and Token Ring Services.*

To edit a circuit, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Circuit List window, select the circuit and click on **Edit**.	The Circuit Definition window opens.
2. Choose **Lines** > **Edit Lines**.	The Edit Lines window opens, listing the selected circuit's lines by slot number and connector name.
3. Select the line you want to edit and click on **Edit**.	The Configuration Manager displays the appropriate Edit Lines window for the circuit type. Only multichannel and multiline circuits have more than one line listed in the Edit Lines window.
4. Edit the line parameters.	

The circuit type determines how you edit line services. Table 1-2 shows where to go for information for each circuit type.

Table 1-2. WAN Line Types

Line Type	Go To
Synchronous, LAPB	Chapter 2
Asynchronous	Chapter 3
DSU/CSU (BayStack routers only)	Chapter 4
HSSI	Chapter 5
E1, T1	Chapter 6
MCE1, MCT1	Chapter 7

(continued)

Table 1-2. WAN Line Types *(continued)*

Line Type	Go To
FT1	Chapter 8
FE1	Chapter 9
Multiline synchronous, HSSI, T1/E1, or MCT1/MCE1	Chapter 10
ATM DXI	Chapter 2 (COM line) or Chapter 5 (HSSI line)
ATM FRE®-2, ATM ARE	*Configuring ATM Services*
Ethernet, FDDI, Token Ring	*Configuring Ethernet, FDDI, and Token Ring Services*

Chapter 2
Configuring Synchronous Services

You configure and customize line services for synchronous WAN circuits and the Link Access Procedure Balanced (LAPB) protocol by setting synchronous and LAPB parameters as described in the following sections:

Note: Throughout this chapter, we use *synchronous* and *serial* interchangeably to refer to an interface or service. However, in the BCC, we use *serial* exclusively.

Overview of Synchronous Services

Each synchronous interface:

- Connects a Nortel Networks router or switch to data communications equipment (DCE) devices, such as DSUs, CSUs, and modems.
- Supports a range of physical connections, including V.35, X.21, RS-232, and RS-449/422 balanced.
- Supports both leased and dial-up circuits. See *Configuring Dial Services* for information about configuring dial-up circuits.
- Supports many WAN software services, including PPP, X.25, frame relay, SMDS, HDLC encapsulation, and ATM DXI.
- Operates from 1200 b/s to a maximum of 2.048 Mb/s, full duplex.

You can configure synchronous interfaces to integrate IBM SDLC traffic in an internetwork. Traffic is integrated by connecting local or remote IBM equipment directly to the synchronous interface and configuring either DLSw for SDLC or Transparent Sync Pass-Thru features.

Customizing Synchronous Services Using the BCC or Site Manager

Table 2-1 lists the synchronous line configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 2-1. Synchronous Line Configuration Tasks

Task	BCC	Site Manager	Page
Enabling and Disabling Synchronous Services	✓	✓	2-4
Enabling or Disabling BofL Messages	✓	✓	2-5
Setting the BofL Timeout	✓	✓	2-6
Setting the MTU	✓	✓	2-6
Enabling or Disabling Remote Address Filtering	✓	✓	2-7
Setting the Clock Source	✓	✓	2-8
Setting the Internal Clock Speed	✓	✓	2-9

(continued)

Table 2-1. Synchronous Line Configuration Tasks *(continued)*

Task	BCC	Site Manager	Page
Setting the External Clock Speed	✓	✓	2-10
Setting the Signal Mode	✓	✓	2-10
Enabling and Disabling RTS Signals	✓	✓	2-11
Enabling and Disabling Burst Count	✓	✓	2-12
Specifying the Link-Level Protocol	✓	✓	2-12
Setting the Transmit Window Size		✓	2-13
Setting Minimum Frame Spacing	✓	✓	2-14
Specifying Point-to-Point Addresses	✓	✓	2-14
Viewing the Configured WAN Protocol	✓	✓	2-17
Setting Pass-Thru Addresses	✓	✓	2-17
Setting the CRC Size	✓	✓	2-19
Setting the Signaling Method	✓	✓	2-19
Enabling and Disabling DSR Polling		✓	2-20
Setting the Line Coding	✓	✓	2-21
Configuring the KG84A Security		✓	2-21
Specifying the Network Link Level		✓	2-24
Setting the Retry Count		✓	2-25
Setting the Link Idle Timer		✓	2-25
Enabling and Disabling Extended Control		✓	2-25
Enabling and Disabling Receiver Ready Signals		✓	2-26
Setting the Cable Type		✓	2-26
Setting the Retry Timer		✓	2-27
Enabling and Disabling Extended Addressing		✓	2-27
Enabling and Disabling Remote Loopback Detection	✓	✓	2-28
Setting a Priority	✓	✓	2-28
Setting the Hold Down Time	✓	✓	2-29
Setting the B Channel Override	✓	✓	2-29
Setting the IFTF Pattern		✓	2-30
Setting the WAN Serial Interface Type	✓	✓	2-31

(continued)

Table 2-1. Synchronous Line Configuration Tasks *(continued)*

Task	BCC	Site Manager	Page
Setting the Asynchronous Baud Rate		✓	2-32
Setting the Pasync Parity Type		✓	2-33
Setting the Pasync Data Bits		✓	2-33
Setting the Pasync Stop Bits		✓	2-33
Setting the Pasync Baud Rate		✓	2-34

Note: Although there are several line parameters common to all synchronous (COM) ports, many parameters apply only to certain hardware modules or WAN protocols.

Enabling or Disabling Synchronous Services

The router enables synchronous line services when you add the circuit. You can disable and reenable the line without moving the cables.

Using the BCC

To enable or disable a serial line, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

state *variable*

For example:

```
serial/2/1# state enabled
serial/2/1# state disabled
```

Using Site Manager

See the Enable parameter on page A-69 for information.

Enabling or Disabling BofL Messages

The Breath of Life (BofL) parameter enables or disables the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer. The exchange of BofL messages provides a level of confidence in the point-to-point connection. If you enable BofL locally, you must also configure the remote peer to enable BofL.

Nortel Networks recommends that you enable BofL for point-to-point connections between Nortel Networks peers. However, if such a connection is accomplished through a wide area transport service such as frame relay, X.25, or SMDS, you must disable BofL.

The router enables BofL messages by default.

Using the BCC

To enable or disable BofL messages, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

bofl *variable*

For example:

```
serial/2/1# bofl enabled
serial/2/1# bofl disabled
```

Using Site Manager

See the BofL parameter on page A-70 for information.

Setting the BofL Timeout

The BofL Timeout parameter specifies the time between transmissions of BofL messages from this synchronous interface. This parameter is valid only when BofL is enabled.

By default, the BofL timeout period is 5 seconds. Timeout occurs when five periods elapse without both a successful frame transmission and a successful reception. When timeout occurs, the router disables and reenables the synchronous line. For example, with this parameter set to 5 seconds, the interface must successfully transmit and receive a frame within 25 seconds. Timeout occurs in 25 seconds.

Set the BofL timeout to a value from 1 to 60 seconds on the interface.

Using the BCC

To set BofL timeout, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

bofl-timeout *integer*

For example:

`serial/2/1#` **bofl-timeout 20**

Using Site Manager

See the BofL Timeout parameter on page A-70 for information.

Setting the MTU

The maximum transmission unit (MTU) is the largest frame that the router can transmit on this line.

For X.25, specify a value of at least 5 bytes more than the maximum packet size for the packet level.

The MTU is 1600 bytes by default. Set the MTU from 3 to 4608 bytes on the interface.

Using the BCC

To set the MTU size, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

mtu *integer*

For example:

`serial/2/1#` **mtu 2000**

Using Site Manager

See the MTU parameter on page A-71 for information.

Enabling or Disabling Remote Address Filtering

Set the Promiscuous parameter to specify whether the interface filters packets for addresses other than its own local address, or whether address filtering is based on both the local and remote addresses.

With this parameter set to enabled, the interface receives all frames. By default, address filtering is disabled: the interface receives only frames destined for its local address. Enable or disable local and remote (promiscuous) address filtering on the interface.

Using the BCC

To enable or disable address filtering, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

promiscuous *variable*

For example:

`serial/2/1#` **promiscuous disabled**
`serial/2/1#` **promiscuous enabled**

Using Site Manager

See the Promiscuous parameter on page A-71 for information.

Configuring Clocking Signals

By default, the synchronous interface operates with an external clock source at 64102 b/s. You can configure the source and speed of synchronous timing signals by:

- Setting the Clock Source
- Setting the Internal Clock Speed
- Setting the External Clock Speed

Setting the Clock Source

The Clock Source parameter specifies whether the origin of the synchronous timing signals are supplied by the router (Internal) or by a network device (External).

With this parameter set to Internal, the router supplies the required timing signals. If you set the Clock Source parameter to Internal, set the Internal Clock Speed parameter as described in "Setting the Internal Clock Speed" on page 2-9.

With this parameter set to External (the default), an external network device supplies the required timing signals. In most cases, you should set this parameter to External. See "Setting the External Clock Speed" on page 2-10.

Using the BCC

To set the clock source, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

clock-source *variable*

For example:

```
serial/2/1# clock-source internal
serial/2/1# clock-source external
```

Using Site Manager

See the Clock Source parameter on page A-72 for information.

Setting the Internal Clock Speed

The Internal Clock Speed parameter sets the clock speed of an internally supplied clock when the Clock Source parameter is set to Internal. You cannot set this parameter when the Clock Source parameter is set to External.

By default, the internal clock speed is 64 Kb/s. Set the clock speed for the internal clock to the desired data transmission rate across the synchronous line.

You can set the internal clock to:

- 1200, 2400, 4800, 7200, 9600, 19200, 32000, or 38400 b/s
- 56, 64, 125, 230, 420, 625, or 833 Kb/s
- 1.25, 2.5, or 5 Mb/s

Certain routing protocols use this parameter value for route selection. If you configure protocol prioritization, the router uses this parameter to calculate line delay. See *Configuring Traffic Filters and Protocol Prioritization* for information about protocol prioritization, latency, and queue depth.

Set the internal clock speed for the interface.

Using the BCC

To set internal clock speed, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

internal-clock-speed *variable*

For example:

```
serial/2/1# internal-clock-speed clk32000b
serial/2/1# internal-clock-speed clk625k
serial/2/1# internal-clock-speed clk1mb
```

Using Site Manager

See the Internal Clock Speed parameter on page A-72 for information.

Setting the External Clock Speed

The External Clock Speed parameter sets the clock speed of an externally supplied clock when the Clock Source parameter is set to External. You cannot set this parameter when the Clock Source parameter is set to Internal.

By default, the external clock speed is 64102 b/s. Set the clock speed for the external clock to the data transmission rate that most closely corresponds to the speed of the external clock. You can set the external clock to a value from 1200 to 6000000 b/s.

Certain routing protocols use this parameter value for route selection. If you configure protocol prioritization, the router uses this parameter to calculate line delay. See *Configuring Traffic Filters and Protocol Prioritization* for information about protocol prioritization, latency, and queue depth.

Using the BCC

To set external clock speed, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

external-clock-speed *integer*

For example:

`serial/2/1#` **external-clock-speed 1200**

Using Site Manager

See the External Clock Speed parameter on page A-84 for information.

Setting the Signal Mode

You use the Signal Mode parameter to set either balanced or unbalanced transmission on an interface, depending on the signaling mode of the connected device.

Balanced transmission uses two conductors to carry signals; *unbalanced transmission* uses one conductor to carry a signal, with a ground providing the return path.

Using the BCC

To set the signal mode, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

signal-mode *variable*

For example:

```
serial/2/1# signal-mode balanced
serial/2/1# signal-mode unbalanced
```

Using Site Manager

See the Signal Mode parameter on page A-73 for information.

Enabling or Disabling RTS Signals

The RTS Enable parameter enables or disables the detection of request to send (RTS) signals on this interface.

Set this parameter to Enable if the connected device (for example, a modem or a KG84A cryptographic device) uses RTS/CTS flow control.

Enable or disable RTS signals for the interface.

Using the BCC

To enable or disable RTS signals, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

rts-enable *variable*

For example:

```
serial/2/1# rts-enable enabled
serial/2/1# rts-enable disabled
```

Using Site Manager

See the RTS Enable parameter on page A-73 for information.

Enabling or Disabling Burst Count

The Burst Count parameter provides performance tuning. Enable sets single-word DMA burst cycles; Disable sets eight-word burst cycles. You should keep the Burst Count parameter set to Enable. Disable the Burst Count parameter when excessive TxUflo or RxOflo errors occur on the Ethernet ports of the following:

- DSDE (5430 - Dual Synchronous, Dual Ethernet) link module
- DSE (5420 - Dual Synchronous, Single Ethernet) link module

Disable this parameter on the synchronous interface that is either running at a lower clock speed or carrying lower-priority traffic. If disabling Burst Count on only one DSDE interface does not eliminate errors on both Ethernet interfaces, then disable the Burst Count parameter on both interfaces.

Using the BCC

To enable or disable burst count, navigate to the serial prompt (for example, **box; serial/2/1**) and type:

burst-count *variable*

For example:

```
serial/2/1# burst-count enabled
serial/2/1# burst-count disabled
```

Using Site Manager

See the Burst Count parameter on page A-74 for information.

Specifying the Link-Level Protocol

The Service parameter specifies the link-level protocol for this interface. You can set the link-level protocol to one of the following:

- Transparent
- LLC1
- LAPB

The synchronous interface is configured for LLC1 by default.

Setting this parameter to Transparent enables raw HDLC mode. LLC1 specifies connectionless datagram service; it inserts the HDLC address and control fields at the beginning of the frame.

If X.25 is enabled on this line, this parameter must be set to LAPB. See “Setting the IFTF Pattern” on page 2-30.

Set the link-level protocol for the interface.

Using the BCC

To specify the link-level protocol, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

service *variable*

For example:

```
serial/2/1# service llc1
serial/2/1# service transparent
serial/2/1# service llc2
serial/2/1# service lapb
```

Using Site Manager

See the Service parameter on page A-74 for information.

Setting the Transmit Window Size

The Transmit Window Size parameter controls the number of I-frames that can be transmitted without acknowledgment. The default is 1 frame.

Set the transmit window size to a value from 1 to 7 I-frames.

Using Site Manager

See the Transmit Window Size parameter on page A-76 for information.

Setting Minimum Frame Spacing

The Minimum Frame Spacing parameter specifies the minimum number of flags transmitted between adjacent frames on this interface. The interface transmits 1 frame by default.

Set frame spacing to a value from 1 to 32 flags for the interface.

Using the BCC

To set frame spacing, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

minimum-frame-space *integer*

For example:

`serial/2/1#` **minimum-frame-space 3**

Using Site Manager

See the Minimum Frame Spacing parameter on page A-77 for information.

Specifying Point-to-Point Addresses

One end of a point-to-point circuit is designated as data communications equipment (DCE) and is assigned an address of 01; the other end of the circuit is designated as data terminal equipment (DTE) and is assigned an address of 03.

Note: The remote and local addresses *must* be 1 (DCE) or 3 (DTE) if you configure X.25 on a line.

If you configure a device with a local address of 1 and remote address of 3, you must configure the device at the other end of the point-to-point circuit with a local address of 3 and remote address of 1.

Conventional DCE/DTE addressing is inadequate, however, for multiple communication channels enabled by a common satellite link. As illustrated in Figure 2-1, a common satellite relay link provides a virtual point-to-point link between routers A and X, B and Y, and C and Z.

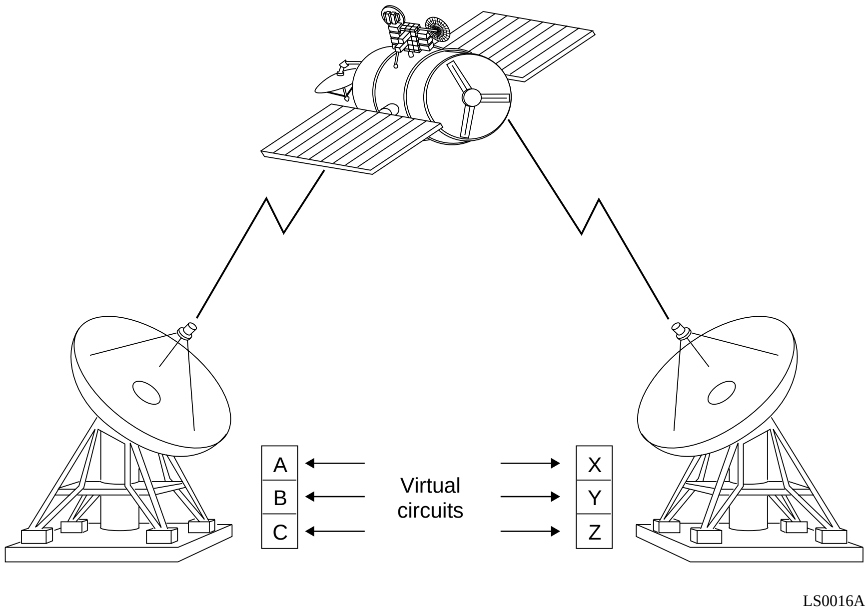

Figure 2-1. Satellite Broadcast (Sample Topology)

Conventional addressing designates routers A, B, and C as DCE (address = 01) and routers X, Y, and Z as DTE (address = 03). If router A transmits a frame across the virtual point-to-point circuit to X, X (the intended recipient), Y, and Z all monitor the satellite broadcast. Because X, Y, and Z all perceive a properly addressed frame, all three accept delivery and attempt to process the frame contents, with unpredictable results.

To avoid such confusion, assign unique addresses to each end of a point-to-point circuit using the Local Address and Remote Address parameters. Be sure to reverse the local and remote addresses when you configure the other end of the point-to-point circuit.

Local Address

The local interface receives only frames whose HDLC addresses match the Local Address parameter.

Using the BCC

To specify a local address, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

local-address *variable*

For example:

`serial/2/1#` **local-address 3**

Using Site Manager

See the Local Address parameter on page A-77 for information.

Remote Address

The router uses the remote address as the HDLC address for all frames transmitted by this interface.

Using the BCC

To specify a remote address, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

remote-address *variable*

For example:

`serial/2/1#` **remote-address 1**

Using Site Manager

See the Remote Address parameter on page A-78 for information.

Viewing the Configured WAN Protocol

You can view the WAN protocol that is enabled on a synchronous circuit. However, do not change the current value.

Caution: Changing the WAN protocol does not reconfigure the interface, and could disable the interface.

Using the BCC

To view the configured WAN protocol, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

`serial/2/1#` **wan-protocol ?**

The configured WAN protocol is listed as the current value.

Using Site Manager

See the WAN Protocol parameter on page A-79 for information.

Setting Pass-Through Addresses

You can assign a local media access control (MAC) address to the local interface using the Pass Thru Local Address parameter. This address becomes the source address of packets that are bridged to the destination MAC address.

You assign the destination MAC address using the Pass Thru Remote Address parameter. This address becomes the destination MAC address of packets that are bridged to the local MAC address.

Always reverse the local and remote MAC addresses at the remote synchronous pass-through interface.

When assigning addresses, use any unique MAC address of exactly 12 hexadecimal digits. Make sure that the second digit in the address is a zero (for example, 10fffabc5432).

Setting the Pass Thru Remote Address

Using the BCC

To set the pass thru remote address, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

passthru-remote *mac-address*

For example:

`serial/2/1#` **passthru-remote 10fffabc5431**

Using Site Manager

See the Pass Thru Remote Address parameter on page A-79 for information.

Setting the Pass Thru Local Address

Using the BCC

To set the pass thru local address, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

passthru-local *mac-address*

For example:

`serial/2/1#` **passthru-local 10fffabc5432**

Using Site Manager

See the Pass Thru Local Address parameter on page A-78 for information.

Setting the CRC Size

The cyclic redundancy check (CRC) size specifies an error-detection scheme. You can choose either 16 bit (standard ITU-T) or 32 bit (extended) frame check sequence (FCS) to detect errors in the packet.

Set a CRC size for the interface. The local and remote ends of the synchronous connection must be configured for the same CRC size.

Using the BCC

To set the CRC size, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

crc-size *variable*

For example:

`serial/2/1#` **crc-size crc16bit**
`serial/2/1#` **crc-size crc32bit**

Using Site Manager

See the CRC Size parameter on page A-79 for information.

Setting the Signaling Method

You can specify the signaling method that the router uses for this line using the Sync Media Type parameter. Available media types are as follows:

- Default
- T1
- E1
- RAISEDTR
- V25BIS
- ISDN BRI
- ISDNLEASEDLINE
- HAYES

Using the BCC

To set the media type, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

media-type *variable*

For example:

`serial/2/1#` **media-type t1**

Using Site Manager

See the Sync Media Type parameter on page A-80 for information.

Enabling or Disabling DSR Polling

By default, a synchronous interface does not monitor the data set ready (DSR) signal. If you set this parameter to Enable, the synchronous driver is enabled when the DSR is detected. When the DSR is no longer detected, the driver is disabled. Enable this parameter only if you plan to use dial-up services.

Enable or disable synchronous polling of DSR for the interface.

Using Site Manager

See the Sync Polling parameter on page A-82 for information.

Setting the Line Coding

On AN, ASN, or System 5000 routers, and on a router with an Octal Sync link module, you can specify the line coding of the physical synchronous line to match the line coding of a device at the other end of the line. Specify the line coding as follows:

Table 2-2. Line Coding Options

BCC Option	Site Manager Option	Description
nrz	NRZ	The default; used for nonreturn to zero coding
nrzi	NRZI	Used for nonreturn to zero inverted coding
nrzimark	NRZI Mark	Used for nonreturn to zero inverted mark coding

Using the BCC

To set the line coding for this interface, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

sync-line-coding *variable*

For example:

`serial/2/1#` **sync-line-coding nrzimark**

Using Site Manager

See the Sync Line Coding parameter on page A-84 for information.

Configuring KG84A Security

KG84A is a cryptographic device used to secure data transmitted over a point-to-point synchronous line.

Nortel Networks KG84A support allows the router to use the encryption services of a KG84A device. In a KG84A configuration, the KG84A device is usually placed between the router and a modem. The KG84A device acts as the DCE for the attached router. Another KG84A device must be located at the other end of the point-to-point connection so that encrypted data can be decrypted (Figure 2-2).

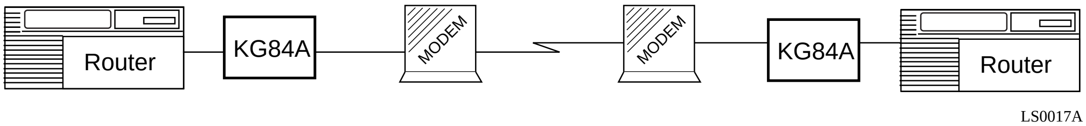

Figure 2-2. KG84A Network Configuration

The Nortel Networks router attaches to the KG84A device using a modified V.35 synchronous cable. The encryption/decryption process is usually transparent to the router. However, occasionally, two KG84A devices can lose cryptographic synchronization. When this occurs, the modified cable allows the router to initiate cryptographic resynchronization. The modified cable also allows the router to detect and monitor the local KG84A device resynchronization, whether the resynchronization is initiated locally or remotely by a KG84A device.

The router detects the loss of synchronization between KG84A devices by monitoring the number of FCS errors and valid frames received. If the router detects FCS errors and it does not receive a valid frame within a time period you specify, the router requests resynchronization. The router also requests resynchronization if it determines that the previous resynchronization request was not completed in the specified time period.

You can also force a resynchronization of the local KG84A device by pressing its RESYNC button. The router can detect this type of remote resynchronization and can request a new one if resynchronization is not completed in the specified time period.

Use the following parameters in the Edit SYNC Parameters window to configure KG84A support on synchronous lines that connect to KG84A cryptographic devices:

- KG84A Cycle
- KG84A Sync Loss Interval
- KG84A Remote Resync Wait
- KG84A Sync Pulse

➡ **Note:** Be sure to also set the RTS Enable parameter to Enable.

KG84A Cycle

By default, the timer cycle is set to 100 milliseconds (ms). This cycle value is used by the timers on the other KG84A devices on the network. This value also becomes the polling cycle for monitoring FCS errors.

Set the KG84A timer cycle to 5, 10, 25, 50, 100, 200, or 500 ms on this interface.

Using Site Manager

See the KG84A Cycle parameter on page A-80 for information.

KG84A Sync Loss Interval

By default, the router waits 50 cycles after detecting an FCS error to receive a valid frame before declaring a loss of synchronization.

Set the KG84A loss interval to 5, 10, 25, 50, 100, 200, or 500 cycles on this interface.

Using Site Manager

See the KG84A Sync Loss Interval parameter on page A-81 for information.

KG84A Remote Resync Wait

By default, the router waits 200 cycles when synchronization is lost and a remotely initiated resynchronization has been detected. You can set the number of cycles that the router waits for the remote KG84A device to complete a resynchronization operation to 2, 5, 10, 25, 50, 100, 200, or 500. After this number of cycles, the router determines that the resynchronization failed and initiates another resynchronization.

Note that if you press the RESYNC button on the local KG84A device, the router responds as if it detected a remotely initiated resynchronization.

Use different settings at each end of the point-to-point link to avoid a possible race condition.

Configure the KG84A remote resynchronization wait on this interface.

Using Site Manager

See the KG84A Remote Resync Wait parameter on page A-81 for information.

KG84A Sync Pulse

By default, the router transmits a 10 ms pulse to the KG84A device when it needs to initiate KG84A resynchronization. The router uses the RTS signal of the V.35 interface, which connects to the KG84A device's synchronous signal via a special cable, to initiate KG84A resynchronization. When the router needs to initiate KG84A resynchronization, it changes the value of the synchronous signal from low to high.

The KG84A pulse length is the number of milliseconds that the synchronous signal retains its high value. Set the pulse length from 2 to 4096 ms on this interface.

Using Site Manager

See the KG84A Sync Pulse parameter on page A-82 for information.

Specifying the Network Link Level

By default, the network link level for a synchronous point-to-point connection is NET2.

Change this parameter to GOSIP when the synchronous point-to-point connection is part of a Government Open Systems Interconnection Protocol (GOSIP)-compliant network (such as the Department of Defense network).

Change this parameter to SYNC_TYPE_C03 when you are running X.25 on the QSYNC, DST, or ESAF synchronous link module.

Set the network link level for the interface.

Using Site Manager

See the Network Link Level parameter on page A-83 for information.

Setting the Retry Count

By default, the router makes 16 attempts to retransmit a frame before a line is declared down. Specify the number of retransmission attempts, from 1 to 64, for the interface.

Using Site Manager

See the Retry Count parameter on page A-75 for information.

Setting the Link Idle Timer

By default, the router determines that a synchronous interface is idle after 9 seconds. The router disables an idle line.

Set the Link Idle Timer parameter to a value from 1 to 9999 seconds.

Using Site Manager

See the Link Idle Timer parameter on page A-75 for information.

Enabling or Disabling Extended Control

By default, the control fields of all S- and I-frames are 1 octet in length, and I-frame numbering is Modulo 8. With the Extended Control (S and I frames) parameter, you can extend the control fields of S- and I-frames to 2 octets in length, and numbering of all I-frames to Modulo 128.

Enable or disable extended control of S- and I-frames for the interface.

Using Site Manager

See the Extended Control (S and I frames) parameter on page A-76 for information.

Enabling or Disabling Receiver Ready Signals

By default, the synchronous interface does not send a receiver ready (RR) signal when the Link Idle Timer expires. Enable the Idle RR Frames parameter if you want the router to send RR signals.

Enable or disable idle RR signals for the interface.

Using Site Manager

See the Idle RR Frames parameter on page A-80 for information.

Setting the Cable Type

If the synchronous interface is connected to a dial-up device for switched services, you can specify the cable interface type of the device that connects the dial unit. You can select one of the following cable types:

- Null
- RS232
- RS422
- V35
- X21

By default, the cable type is set to Null. If you start SDLC on your interface, the system sets the cable type to RS232.

Using the BCC

To set the cable type, navigate to the serial prompt (for example, **box**; **serial/2/1**) and enter:

cable-type <type>

type is one of the following:

null
rs232
rs422
v35
x21

For example, the following command sets the cable type to V35:

`serial/2/1#` **cable-type v35**

Using Site Manager

See the Cable Type parameter on page A-83 for information.

Setting the Retry Timer

By default, the router waits 3 seconds for a response from the interface. When the timer expires, the router:

1. Sends link control frames.
2. Resends the frames up to the value of the Retry Count parameter.
3. Disconnects the link.

Set the Retry Timer parameter to a value from 1 to 9999 seconds.

Using Site Manager

See the Retry Timer parameter on page A-75 for information.

Enabling or Disabling Extended Addressing

By default, the router does not test the address length of frames on a synchronous interface. With the Extended Address parameter enabled, the router tests the first bit of the address to determine the length of the address, in octets.

Enable or disable extended addressing for the interface.

Using Site Manager

See the Extended Address parameter on page A-76 for information.

Enabling or Disabling Remote Loopback Detection

By enabling remote loopback detection on an interface, you can configure the router to automatically disable the interface upon detecting its own BofL messages. If BofL is enabled, the device driver disables the interface upon receiving its own BofL packets, assuming that the link has been put into loopback mode. This function is disabled by default.

Using the BCC

To enable or disable remote loopback detection, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

remote-loopback-detection *variable*

For example:

`serial/2/1#` **remote-loopback-detection enabled**
`serial/2/1#` **remote-loopback-detection disabled**

Using Site Manager

See the Remote Loopback Detection parameter on page A-84 for information.

Setting a Priority

On a synchronous interface configured for dial or switched services, you can assign a priority number (1 to 50) to each line in the same demand or backup pool.

The lower the number, the higher the priority. For example, the router uses a line of priority 1 before it uses a line of priority 2.

Set the priority for the interface.

Using the BCC

To set a priority number, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

priority *integer*

For example:

`serial/2/1#` **priority 4**

Using Site Manager

See the Sync Priority parameter on page A-86 for information.

Setting the Hold Down Time

On a synchronous interface configured for dial services, you can specify a time period (0 to 9999 seconds) for the router to wait before bringing down a backup line. This delay allows time for the primary line to fully recover before deactivating the backup line.

For a dial-on-demand interface, the Hold Down Time parameter is set to 3 seconds by default.

For other interfaces, the Hold Down Time parameter is set to 0 by default. Set this parameter to a value from 0 to 9999 seconds.

Using the BCC

To set the hold down time, navigate to the serial prompt (for example, **box**; **serial/ 2/1**) and type:

hold-down-time *integer*

For example:

`serial/2/1#` **hold-down-time 0**

Using Site Manager

See the Hold Down Time parameter on page A-83 for information.

Setting the B Channel Override

On AN and ANH routers with ISDN support only, you can connect the ISDN B channel to a specific serial communications controller (SCC). By default, the B channel is determined by the connector.

You can use the Sync B Channel Override parameter to specify which B channel this interface is using for ISDN. Select BCHANNEL1 or BCHANNEL2 to explicitly assign the B channel.

You can set the B channel to one of the following:

- DEFAULT
- BCHANNEL1
- BCHANNEL2
- FLOATINGB

If your ISDN service provider offers only 2B + D service, the FLOATINGB option enables you to use only one B channel for dial service applications. Floating B is an alternative if you cannot purchase 1B + D service.

Select FLOATINGB to use only one B channel of ISDN, which becomes BCHANNEL1 or BCHANNEL2, depending on the call setup procedures. COM1 and COM2 become available in this mode.

Configure the B channel on an AN or ANH ISDN interface.

Using the BCC

To specify the B channel override, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

bchannel-override *variable*

For example:

`serial/2/1#` **bchannel-override bchannel2**

Using Site Manager

See the Sync B Channel Override parameter on page A-85 for information.

Setting the IFTF Pattern

The router transmits an interframe time fill (IFTF) pattern when there is no data to transmit on a synchronous line. There are two IFTF patterns:

- HDLC Flags, an 0x7E pattern (0 1 1 1 1 1 1 0)
- Idles, an 0xFF pattern (1 1 1 1 1 1 1 1)

HDLC Flags is the default IFTF pattern for all synchronous media types except ISDN BRI. For ISDN BRI, the default pattern is Idles. To use these defaults, leave the Sync Force IFTF parameter set to Default. Or, you can override the defaults by setting this parameter to Force Flags or Force Idles.

For a dial-on-demand interface, set the Sync Force IFTF parameter to Force Idles.

Using Site Manager

See the Sync Force IFTF parameter on page A-85 for information.

Configuring Asynchronous Services

The implementation of asynchronous services differs among Nortel Networks routers. On Octal Sync link modules, all synchronous net modules, and BayStack router COM ports, you can configure asynchronous communication from the Edit SYNC Parameters window by:

- Setting the WAN Serial Interface Type
- Setting the Asynchronous Baud Rate

For all other synchronous link modules, these parameters are not available. See Chapter 3 for information about additional asynchronous services on BayStack AN and ANH routers.

Setting the WAN Serial Interface Type

The serial interface is set for synchronous operation by default. Set this parameter to Async to select asynchronous communication; set it to Pasync for polled asynchronous communication.

Using the BCC

To set the WAN serial interface type, navigate to the serial prompt (for example, **box**; **serial/2/1**) and type:

wan-type *variable*

For example:

`serial/2/1#` **wan-type asynchronous**

Using Site Manager

See the WAN Serial Interface Type parameter on page A-86 for information.

Setting the Asynchronous Baud Rate

With the WAN Serial Interface Type parameter set to Async, you can set the transmission speed (in bits per second) between the router and the modem. You control the baud rate for asynchronous PPP using the Async Baud Rate parameter.

Set this parameter to a value that is greater than or equal to the speed at which the modem connects, but that is independent of that speed. For example, you set a V.34 modem to its maximum modular connection speed of 28800 Kb/s or higher. However, you could set the baud rate for a V.42bis or MNP 5 data compression modem with a high (4 to 1) compression ratio to 115200 baud.

By default, the asynchronous baud rate is 9600. Select a baud rate from 1200 to 115200 baud.

Using Site Manager

See the Async Baud Rate parameter on page A-86 for information.

Configuring Polled Asynchronous over TCP/IP Line Parameters

The implementation of polled asynchronous over TCP/IP (AOT) uses the following line parameters:

- Pasync Parity Type
- Pasync Data Bits
- Pasync Stop Bits
- Pasync Baud Rate

For more information about configuring polled AOT, see *Configuring Polled AOT Transport Services*.

Setting the Pasync Parity Type

The Pasync Parity Type parameter sets the error-detection method for isolating AOT packets that were altered or damaged during transmission. Asynchronous equipment typically adds a parity bit to the end of a packet before transmission. This allows the receiving router to detect a transmission error if it receives a packet with an unexpected parity.

The parity type options are Odd, Even, High (1), Low (0), or None.

Using Site Manager

See the Pasync Parity Type parameter on page A-87 for information.

Setting the Pasync Data Bits

The Pasync Data Bits parameter sets the length of a polled AOT packet to a specific number of data bits. The parameter options are five, six, seven, and eight. Select the number of data bits that is appropriate for your network. The default setting is eight.

Using Site Manager

See the Pasync Data Bits parameter on page A-87 for information.

Setting the Pasync Stop Bits

The Pasync Stop Bits parameter sets the interval at the end of a transmitted polled AOT packet, allowing the receiving router to pause before accepting the next packet. More stop bits create a longer pause at the receiving router. Specify either one or two stop bits. The default setting is two.

Using Site Manager

See the Pasync Stop Bits parameter on page A-87 for information.

Setting the Pasync Baud Rate

The Pasync Baud Rate parameter sets the transmission speed for polled AOT packets between primary and secondary routers over a TCP connection. The parameter options are 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, and 57600. The default setting is 600.

Using Site Manager

See the Pasync Baud Rate parameter on page A-88 for information.

Editing LAPB Protocol Services

The Link Access Procedure Balanced (LAPB) protocol is a version of the high-level data link control (HDLC) protocol, which is an OSI data link layer standard. This section describes the following:

- LAPB Implementation on Nortel Networks Routers
- LAPB Parameters

LAPB Implementation on Nortel Networks Routers

The implementation of the LAPB protocol differs among Nortel Networks routers. On the AN, ANH, ARN, ASN, and System 5000 routers, and on the BN® and LN® routers with the Octal Sync link module, LAPB is implemented in the software. For all other link modules, LAPB is implemented in the hardware, and you cannot configure LAPB line parameters.

Nortel Networks routers use LAPB services to initialize the link between the router and the local DCE, and to frame X.25 data packets before transmitting them to the DCE. X.25 uses the LAPB protocol at the data link layer to:

- Initialize the link between the DTE and the local DCE
- Frame X.25 data packets before transmitting them to the DCE

The LAPB information field contains the X.25 packets.When an X.25 packet reaches the destination router, the LAPB protocol strips away the LAPB frame and delivers the packet to the network layer for further processing. For detailed information on X.25, see *Configuring X.25 Services*.

LAPB Parameters

This section describes how to edit LAPB parameters using Site Manager. It covers the following topics:

- Enabling or Disabling LAPB Services
- Setting the Station Type
- Setting the Control Field
- Setting the Maximum N1 Frame Size
- Setting the Window Size
- Setting the Maximum N2 Retry Count
- Setting the Maximum T1 Acknowledge Timer
- Setting the Maximum T2 Acknowledge Timer
- Setting the Maximum T3 Disconnect Timer
- Setting the Link Setup Action
- Enabling or Disabling Test Exchange Identification (XID) Frames
- Enabling or Disabling Receiver Ready (RR) Frames
- Selecting the Local Command or Response Address
- Viewing the WAN Protocol

When you edit an Octal Sync link module line, or any synchronous line on Nortel Networks AN, ANH, ARN, ASN, or System 5000 routers, the router automatically configures the LAPB protocol if you configure a circuit for the X.25 protocol. The Edit SYNC Parameters window for these lines includes an additional button for editing LAPB parameters. Click on the LAPB button to display the Edit LAPB Parameters window (Figure 2-3).

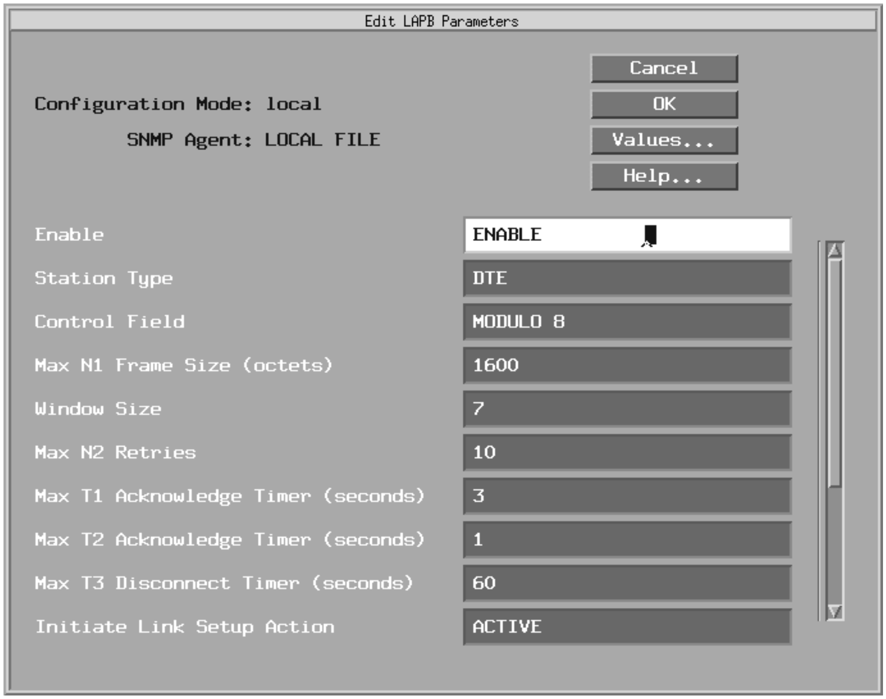

Figure 2-3. Edit LAPB Parameters Window

Enabling or Disabling LAPB Services

The router enables LAPB line services when you configure a synchronous circuit for the X.25 protocol. You can disable and reenable LAPB services on the interface without moving any cables.

Using Site Manager

See the Enable parameter on page A-18 for information.

Setting the Station Type

The Station Type parameter identifies whether the device is a DTE or DCE for this interface.

If you have DTE devices, select DTE. If you have DCE devices, select DCE.

If you do not want to assign a specific station type, and instead want the network to determine the station type, select DXE. This value indicates that the router is in unassigned mode; it is neither a DTE nor a DCE. If you select DXE, the router will send an exchange identification (XID), but negotiation will not occur until the network assigns a station type.

By default, the station type is DTE. Set the station type of the interface to DCE or DTE.

Using Site Manager

See the Station Type parameter on page A-18 for information.

Setting the Control Field

The Control Field parameter specifies the desired window size, or modulo, of the sequence numbering the router uses to number frames. The parameter options are as follows:

- Modulo 8
- Modulo 128

By default, the Control Field parameter is set to Modulo 8. Set the control field on the interface.

Using Site Manager

See the Control Field parameter on page A-19 for information.

Setting the Maximum N1 Frame Size

The Max N1 Frame Size parameter specifies the frame size, in bytes, for a frame that the router or network transmits. This number excludes flags and 0 bits inserted for transparency.

By default, the Max N1 Frame Size parameter is set to 1600 bytes.

Select a frame size from 3 to 4500 bytes to suit your network configuration.

Using Site Manager

See the Max N1 Frame Size parameter on page A-19 for information.

Setting the Window Size

The Window Size parameter specifies the default transmit and receive window size for the interface. This value is the maximum number of unacknowledged frames that you allow from the router or network at any one time.

By default, the window size is 7 frames. Select a window size from 1 to 127 frames to suit your network configuration.

Using Site Manager

See the Window Size parameter on page A-19 for information.

Setting the Maximum N2 Retry Count

The Max N2 Retries parameter determines the value of the N2 retry count, which is the number of retransmission attempts the router makes, per frame, before it considers the line to be down. The retry count is the maximum number of attempts following the expiration of the T1 timer.

By default, the number of times the router tries to retransmit is 10. Set the number of retries from 1 to 64 on this interface.

Using Site Manager

See the Max N2 Retries parameter on page A-20 for information.

Setting the Maximum T1 Acknowledge Timer

The Max T1 Acknowledge Timer parameter specifies the time, in seconds, that the router waits for an acknowledgment of a frame that it has sent to the network.

By default, this timer is set to 3 seconds. Set the maximum time that the router should wait for a frame acknowledgment from the network to a value from 1 to 9999 seconds.

Using Site Manager

See the Max T1 Acknowledge Timer parameter on page A-20 for information.

Setting the Maximum T2 Acknowledge Timer

The Max T2 Acknowledge Timer parameter specifies the time, in seconds, that the router waits before sending an acknowledgment for a sequenced frame.

The default value of 1 means that the router does not delay before generating an acknowledgment.

Set the amount of time that you want the router to wait before acknowledging a sequenced frame to a value from 1 to 9999 seconds.

Using Site Manager

See the Max T2 Acknowledge Timer parameter on page A-21 for information.

Setting the Maximum T3 Disconnect Timer

The Max T3 Disconnect Timer specifies the time, in seconds, that the router waits before determining that the link is disconnected.

By default, this timer is set to 60 seconds. A value of 1 indicates that once the router completes the frame exchange to bring down the link, it considers the link disconnected.

Set the amount of time that you want the router to wait before it decides that the link is disconnected to a value from 1 to 9999 seconds.

Using Site Manager

See the Max T3 Disconnect Timer parameter on page A-21 for information.

Setting the Link Setup Action

The Initiate Link Setup Action parameter identifies whether the router initiates link setup or waits for the network to initiate link setup.

Select Active if you want the router to initiate link setup, or select Passive if you want the network to initiate link setup. Link setup is active by default.

Set the Initiate Link Setup Action parameter to Active or Passive.

Using Site Manager

See the Initiate Link Setup Action parameter on page A-22 for information.

Enabling or Disabling Test Exchange Identification (XID) Frames

The Enable Rx/Tx of XID Frames parameter enables or disables the transmission and reception of test XID frames by the router.

Select Enable to allow the router to send XID frames. Select Disable to prevent the router from sending XID frames.

Enable or disable the transmission of XID frames on this interface.

Using Site Manager

See the Enable Rx/Tx of XID Frames parameter on page A-22 for information.

Enabling or Disabling Receiver Ready (RR) Frames

The Idle RR Frames parameter enables or disables the transmission and reception of receiver ready (RR) frames during periods when there are no information frame exchanges.

By default, the router does not transmit RR frames on the LAPB interface. When this parameter is set to On, an RR frame is transmitted when no traffic is present on the physical media.

Enable or disable transmission of RR frames on this interface.

Using Site Manager

See the Idle RR Frames parameter on page A-23 for information.

Selecting the Local Command or Response Address

The Command/Response Address parameter specifies the local command or response address, which is the DTE or DCE value.

Select DTE for the DTE address; select DCE for the DCE address. The address is set to DTE by default.

Set the local address on this interface.

Using Site Manager

See the Command/Response Address parameter on page A-22 for information.

Viewing the WAN Protocol

You can see which protocol, Standard (PPP) or X.25, is enabled on this interface. Do not change the current value.

Caution: Changing the WAN protocol does not reconfigure the interface, and could disable it. To change the configured WAN protocol, delete and re-create the WAN circuit. See *Configuring and Managing Routers with Site Manager* for instructions.

Using Site Manager

See the WAN Protocol parameter on page A-23 for information.

Displaying EIA Signals

You can display Electronic Industries Association (EIA) signals on the serial ports of Nortel Networks AN®, ARN™, ASN™, and BN® routers. You can display request to send (RTS), clear to send (CTS), data send ready (DSR), data terminal ready (DTR), and data carrier detect (DCD) signals on any serial port including RS-232-C, RS-422, and V.35 interfaces.

Note: Only the true status of the EIA signals at the serial port are displayed, and they are not interpreted based on the cable type. For cable types other than straight-through cables, such as crossover cables, you must interpret the signals.

You can display the EIA signals on a specific serial port by using the **show** command of either the Technician Interface (TI) or the BCC.

For information on using show commands with the TI, see *Using Technician Interface Scripts*.

For the BCC, use the command **show serial eia-status**. An active signal is displayed as “H,” an inactive signal is displayed as “L.” An asterisk (*) denotes a signal whose state has changed since the last time the signal status was reset.

Example

```
serial/1/1# show serial eia-status
Slot   Conn   Circuit RTS    CTS    DSR    DCD    DTR
------ ------ ------  ------ ------ ------ ------ ------
1      2      S11     H      L*     L      H*     L
1 entry(s) found
```

Resetting EIA Signal Status

You can reset the state change status of the EIA signals being monitored using the BCC. Use the BCC command **eia-reset** to reset EIA signal change status on a specific serial port.

Example

```
serial/1/1/# eia-reset
Slot   Conn   Circuit RTS    CTS    DSR    DCD    DTR
------ ------ ------  ------ ------ ------ ------ ------
1      2      S11     H      L      L      H      L
1 entry(s) found
```

Chapter 3
Configuring BayStack AN and ANH Asynchronous Services

This chapter describes how to edit asynchronous services for BayStack AN or ANH serial circuits using Site Manager.

On AN and ANH COM2 circuits only, the Configuration Manager displays the Edit ASYNC Parameters window (Figure 3-1) when you select the asynchronous protocol from the WAN Protocols window.

This chapter contains the following sections:

For a description of all Site Manager parameters for asynchronous line, see Appendix A, “Site Manager Parameters.”

See Chapter 1 for information about accessing the Edit ASYNC Parameters window. Use the window's scroll bar to view all of the asynchronous line parameters.

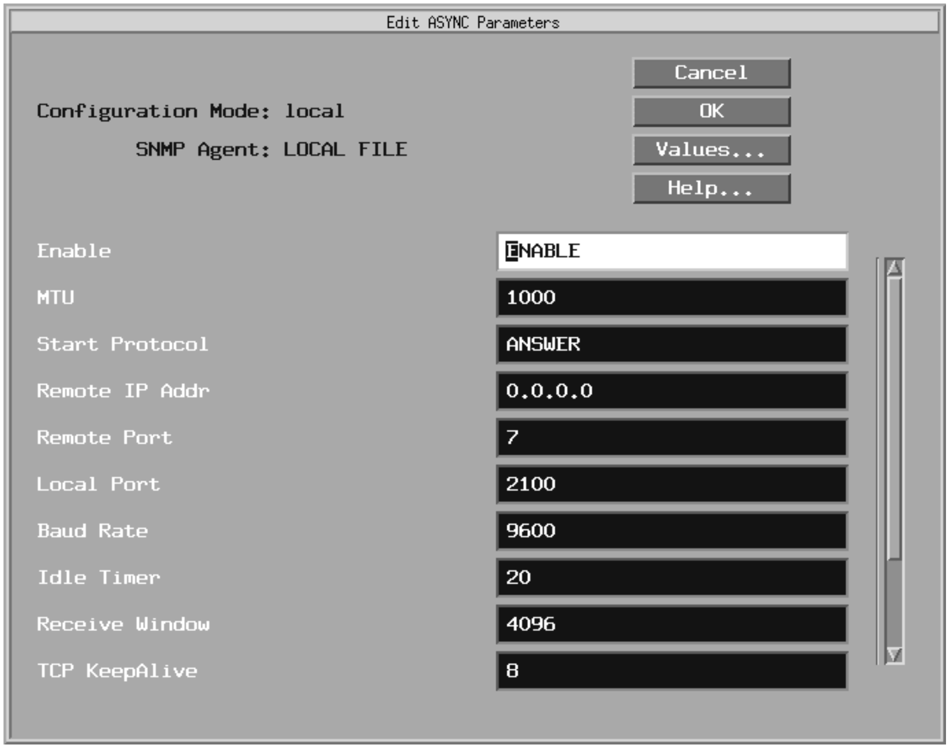

Figure 3-1. Edit ASYNC Parameters Window

Enabling or Disabling the Asynchronous Driver

The router enables asynchronous line services when you add the asynchronous WAN protocol on AN and ANH COM2 circuits. You can disable and reenable the interface without moving any cables.

See the Enable parameter on page A-2 for information.

Setting the MTU

The largest packet size that this interface can transmit over TCP is the maximum transmission unit (MTU).

By default, the MTU is 1000 bytes. Set the MTU from 3 to 1580 bytes.

See the MTU parameter on page A-2 for information.

Specifying the TCP Start Protocol

There are three options for the TCP start protocol:

- Answer -- Advises local TCP to wait for a connection request
- Loop -- Tests the asynchronous cable
- Originate -- Advises local TCP to initialize a connection to the specified remote IP address, specified in the Remote IP Address parameter

Select the start protocol for this interface.

With the Start Protocol parameter set to Originate, you must also configure the following:

- Remote IP address
- Remote port
- Local port

See the Start Protocol parameter on page A-3 for information.

Setting the Remote IP Address

The router uses the remote IP address only when the asynchronous Start Protocol parameter is set to Originate.

The Remote IP Addr parameter specifies a remote TCP host with which the router communicates using the asynchronous interface. You can specify any valid 32-bit IP address in dotted-decimal notation as the remote IP address for this interface.

See the Remote IP Addr parameter on page A-3 for information.

Specifying the Remote Port

The router uses the remote port number only when the Start Protocol parameter is set to Originate. The remote port number specifies a remote port for the TCP connection.

By default, the remote port number is 7. You can specify any valid remote port number from 1 to 65535 for this interface.

See the Remote Port parameter on page A-3 for information.

Specifying the Local Port

The router uses the local port number only when the Start Protocol parameter is set to Originate. The local port number specifies a local port for the TCP connection for asynchronous communications.

By default, the local port number is 2100. You can specify any valid local port number from 1 to 65535 for this interface.

See the Local Port parameter on page A-4 for information.

Setting the Baud Rate

The Baud Rate parameter specifies the line speed for this asynchronous interface.

By default, the baud rate is 9600. Select one of the following valid baud rates:

- 300
- 1200
- 2400
- 4800
- 9600
- 19200

See the Baud Rate parameter on page A-4 for information.

Setting the Idle Timer

By default, the router determines that the asynchronous interface is idle after 20 seconds of inactivity. The router disables an idle line.

You can set the idle timer from 1 to 300 seconds.

See the Idle Timer parameter on page A-4 for information.

Setting the TCP Receive Window Size

By default, the router sets the TCP receive window size for asynchronous packets to 4096 bytes.

Set the Receive Window parameter to a value from 512 to 65535 bytes.

See the Receive Window parameter on page A-5 for information.

Setting the TCP Keepalive Message Interval

The TCP keepalive message interval specifies how often the local router sends TCP keepalive messages to a remote router. The default interval is 8 seconds.

When the local router sends a TCP keepalive message on the asynchronous interface, it expects an acknowledgment (ACK) from the remote router. The ACK then resets the inactive limit timer.

If the local router does not receive an ACK from the remote router within the time limit specified by the TCP Inactive Limit parameter, the TCP connection is disabled. To prevent an error or alarm condition, set the TCP Inactive Limit parameter to a value that allows enough time for multiple TCP keepalive messages.

Set the TCP KeepAlive parameter to a value from 3 to 180 seconds. The router uses this parameter with the TCP Inactive Limit parameter.

See the TCP KeepAlive parameter on page A-5 for information.

Setting the TCP Inactive Limit

When the TCP inactive limit timer expires, the TCP connection between the local router and the remote router is lost. By default, the TCP connection on an asynchronous interface times out in 300 seconds.

To prevent a TCP connection loss, set this parameter to a value that allows enough time for multiple TCP keepalive messages and ACKs from the remote TCP router.

If the interface is listening for an incoming connection request, you can specify a negative value for this parameter to mark the connection as inactive, and defer resetting the connection until a connection request is received.

Set the TCP Inactive Limit parameter to a value from -65536 to 65535 seconds.

See the TCP Inactive Limit parameter on page A-6 for information.

Setting the Maximum Transmit Queue Length

The Cfg TxQ Length parameter specifies the maximum length of the transmit queue for the asynchronous interface.

If the driver transmit queue length is larger than the value of this parameter, it is reduced to the value of this parameter.

Set the maximum transmit queue length for this interface to a value from 1 to 255 bytes.

See the Cfg TxQ Length parameter on page A-6 for information.

Setting the Maximum Receive Queue Length

The Cfg RxQ Length parameter specifies the maximum receive queue length for an asynchronous interface.

If the driver receive queue length is larger than the value of this parameter, it is reduced to the value of this parameter.

Set the maximum receive queue length for this interface to a value from 1 to 255 bytes.

See the Cfg RxQ Length parameter on page A-7 for information.

Chapter 4
Configuring BayStack DSU/CSU Services

You configure and customize services for an internal DSU/CSU installed in a BayStack AN, ANH, or ARN router by setting parameters as described in the following sections:

BayStack routers support an optional integrated DSU/CSU serial adapter module with one interface connector, for direct connection to Telco leased-line circuits.

Note: This guide assumes that you are working with a router configuration file that already contains the appropriate WAN circuits for the hardware configuration. See *Configuring and Managing Routers with Site Manager* for information about adding circuits to a configuration file.

Configuring DSU/CSU Services

You can configure DSU/CSU services using the BCC or Site Manager.

Note: The default serial line configuration is usually appropriate. See Chapter 2 for information about changing the default synchronous line parameters.

Using the BCC

To configure DSU/CSU services, navigate to the `box` prompt and type:

`box#` **dsucsu slot 1 connector 1**

OR

`box#` **dsucsu 1/1**

This command configures DSU/CSU services on slot 1 connector 1.

Note: You can configure DSU/CSU services only on slot 1 connector 1 or slot 1 connector 2.

Using Site Manager

To configure DSU/CSU services, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector for the DSU/ CSU circuit.	The Edit Connector window opens.
2. Click on **Edit DSU/CSU**.	The Edit Adapter Module DSU CSU Parameters window opens.
3. Click on **OK** to accept the default configuration, or edit the parameters before clicking on OK to initialize the changes.	

Customizing DSU/CSU Services Using the BCC or Site Manager

Table 4-1 lists the DSU/CSU configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 4-1. DSU/CSU Configuration Tasks

Task	BCC	Site Manager	Page
Setting the Option Mode	✓	✓	4-4
Selecting the Transmit Clock Source	✓	✓	4-4
Resetting the Router	✓		4-5
Enabling or Disabling the 64K Transmit Monitor	✓	✓	4-6
Configuring Line Availability	✓		4-6
Setting the Poll Rate	✓		4-7
Resetting the CQMS Counters	✓		4-7
Configuring the V.54 Loopback Test State	✓	✓	4-8
Configuring the V.54 Loopback Timer	✓	✓	4-9

Setting the Option Mode

The DSU/CSU module supports communication with either 56 Kb/s digital data system (DDS) or 64 Kb/s clear channel (CC) service. The data rate of the DSU/CSU must match the network service.

Use the Option Mode parameter to identify the type of Telco service to which the DSU/CSU is connected. Table 4-2 lists the Telco service options.

Table 4-2. Telco Service Options

BCC Option	Site Manager Option	Descriptions
dds156kbps	DDS1-56KBPS	The default; use when connected to a DDS1 56 Kb/s line.
cc64kbps	CC-64KBPS	Use when connected to a CC 64 Kb/s line.

Using the BCC

To change the option mode, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

telco-service *variable*

For example:

`dsucsu/1/1#` **telco-service cc64kbps**

Using Site Manager

See the Option Mode parameter on page A-8 for information.

Selecting the Transmit Clock Source

The Transmit Clock Source parameter determines the default transmit timing (clock) source for transmitting data to the network. You can set the DSU/CSU clock source as follows:

- Master (external, network)-- Indicates that the router sets the clock; an internal oscillator in the DSU creates the clock for a private-wire configuration.
- Slave (internal) -- Indicates that the incoming data stream sets the clock; a PLL internal to the DSU will recover and synchronize the DSU clock.

For a Telco network, set both ends to slave. For a private-wire configuration, set one end to Master and the other end to slave.

The Transmit Clock Source parameter is set to slave by default. Note that there can be only one clock source on a DDS line.

Using the BCC

To change the clock source, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

clock-master *variable*

For example:

`dsucsu/1/1#` **clock-master master**

Using Site Manager

See the Transmit Clock Source parameter on page A-8 for information.

Resetting the Router

In the BCC, the Unit Reset parameter enables you to reset the router remotely, causing it to terminate all connections. The Unit Reset parameter is disabled (cleared) by default.

Using the BCC

To reset the router, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

unit-reset *variable*

For example:

`dsucsu/1/1#` **unit-reset reset**

Enabling or Disabling the 64K Transmit Monitor

This parameter is valid only when the Option Mode (telco-service) parameter is set to cc64kbps. When enabled, the 64K Transmit Monitor parameter suppresses data to prevent unintended duplication of a network control code. For example, user data that includes the text of a loopback control code could place the remote end of the connection in a loop.

The 64K Transmit Monitor parameter is disabled by default. Keep the parameter disabled to allow all data; select Enabled to monitor and suppress user data.

Using the BCC

To enable or disable the 64K transmit monitor, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

suppress-64k-data *variable*

For example:

`dsucsu/1/1#` **suppress-64k-data enabled**

Using Site Manager

See the 64K Transmit Monitor parameter on page A-9 for information.

Configuring Line Availability

In the BCC, the Line Availability Time parameter indicates the number of minutes during which the system can calculate the availability of the line. Line availability is the percentage of time the line is in service.

Set line availability time to a value from 1 to 15 minutes. By default, the time is set to 15 minutes.

Using the BCC

To change the line availability time, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

line-availability-time *integer*

For example:

`dsucsu/1/1#` **line-availability-time 10**

Setting the Poll Rate

In the BCC, the Poll Rate parameter indicates the number of seconds between polls for DSU/CSU line status. A value of 1, which is the default, forces polling of the DSU/CSU interface every second. Specify a value from 1 to 60 seconds.

Using the BCC

To change the poll rate, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

poll-rate *integer*

For example:

`dsucsu/1/1#` **poll-rate 60**

Resetting the CQMS Counters

In the BCC, the CQMS Reset parameter resets the CQMS counters to their default values. By default, the CQMS Reset parameter is disabled (cleared).

Using the BCC

To reset the CQMS counters, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

cqms-reset *variable*

For example:

`dsucsu/1/1#` **cqms-reset reset**

Configuring V.54 Loopback Tests

You can use a set of supported loopback modes for testing both the router's DSU/CSU interface and the network/Telco circuit to the router. This section provides information about the following:

Configuring the V.54 Loopback Test State

You can configure one of the following V.54 loopback test states:

Table 4-3. Loopback Test State Options

BCC Option	Site Manager Option
no-loopback	NO LOOP
local-analog-loopback	ANALOG
local-digital-loopback	DIGITAL
remote-digital-loopback	REM DIGITAL
remote-digital-loopback-with-pattern	REM DIG/PATTERN
local-analog-loopback-with-pattern	ANALOG/PATTERN
pattern-2047-generate	PATTERN-2047

Select a test state or keep the default, no loopback. See "Loopback Test Modes," later in this chapter, for detailed information about the tests.

Caution: If the only connection with the remote router is through the DSU/CSU, selecting a loopback test state prevents the local router from communicating with the remote router for the duration of the test.

Using the BCC

To change the loopback test state, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

loopback-mode *variable*

For example:

`dsucsu/1/1#` **loopback-mode local-analog-loopback**

Using Site Manager

To configure DSU/CSU loopback testing, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector for the DSU/CSU circuit.	The Edit Connector window opens.
2. Click on **Edit DSU/CSU**.	The Edit Adapter Module DSU CSU Parameters window opens.
3. Edit the **V.54 Loopback** and **V.54 Timer** parameters. Click on **Help** or see the parameter descriptions beginning on page A-9.	
4. Click on **OK**.	

Selecting a loopback test state disrupts user data transmission through the DSU/CSU for a period specified by the V.54 Timer parameter.

Configuring the V.54 Loopback Timer

You must set the duration, in seconds, for the loopback testing specified in the V.54 Loopback parameter. The default value, zero (0), indicates that loopback testing runs indefinitely.

Caution: If the only connection with the remote router is through the DSU/CSU, be sure to specify a nonzero value, since loopback testing prevents the local router from communicating with the remote DSU/CSU.

Specify the number of seconds, from 1 to 255, for loopback testing to run, or keep the default, 0.

Using the BCC

To change the V.54 loopback timer, navigate to the dsucsu prompt (for example, **box**; **dsucsu/1/1**) and type:

loopback-test-timer *variable*

For example:

`dsucsu/1/1#` **loopback-test-timer 2**

Using Site Manager

See the V.54 Timer parameter on page A-10 for information.

Loopback Test Modes

You can activate DSU/CSU tests using the BCC or Site Manager, as described in the previous section, "Configuring V.54 Loopback Tests." The DSU/CSU module also responds to CCITT V.54 loop-up and loop-down codes.

The following sections describe the supported tests:

Digital Loopback (DL)

Digital Loopback mode tests the local DSU/CSU and the Telco circuit. The DSU/CSU enters Digital Loopback mode when it receives a CCITT V.54 loop-up code, or when configured.

In Digital Loopback mode, the DSU/CSU takes transmit data and converts it to receive data. The DSU/CSU retimes and reshapes the received data, then transmits the data back to the network. The remote facility transmits back to the router all data it receives from the router. Figure 4-1 illustrates the operation of a Digital Loopback test.

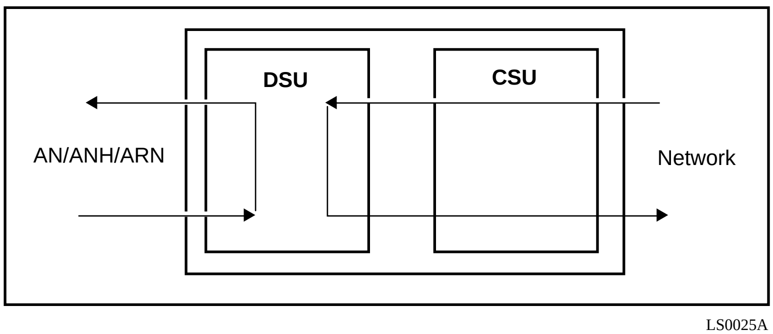

Figure 4-1. Digital Loopback

Remote Digital Loopback (RL)

Remote Digital Loopback (CCITT V.54 Loopback) tests the local DSU/CSU, the Telco circuit, and the remote DSU/CSU. The local DSU/CSU sends a V.54 loop-up code to the remote DSU/CSU to initiate a digital loop, and then sends a test pattern through the loop to check for returned data errors.When the remote DSU/CSU receives the V.54 loop-up code, it provides the loopback path shown in Figure 4-2.

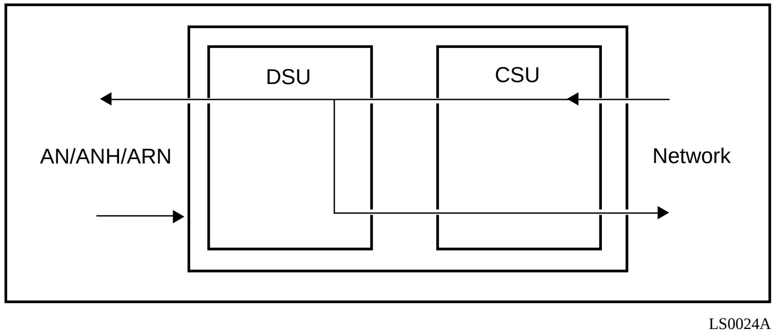

Figure 4-2. Remote Digital Loopback (CCITT V.54 Loopback)

Local Analog Loopback (AL)

Local Analog Loopback is a self-diagnostic local test (Figure 4-3).

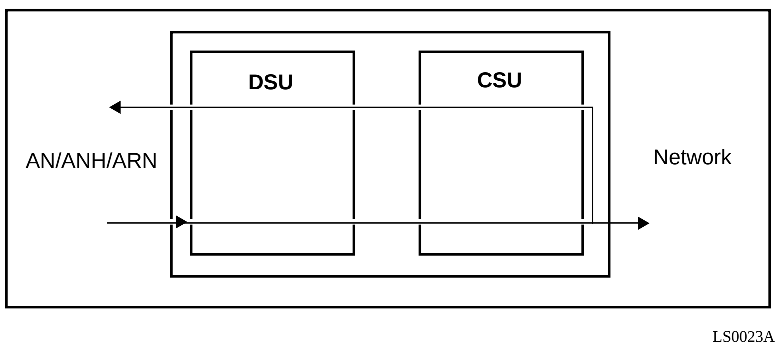

Figure 4-3. Local Analog Loopback

During the local loop test, the CSU transmits data to the network to avoid causing a carrier alarm.

Pattern-2047 BERT Test

In the Pattern-2047 BERT test, the DSU sends a 2047 bit error rate test (BERT) pattern to the carrier network without initiating loopback (Figure 4-4).

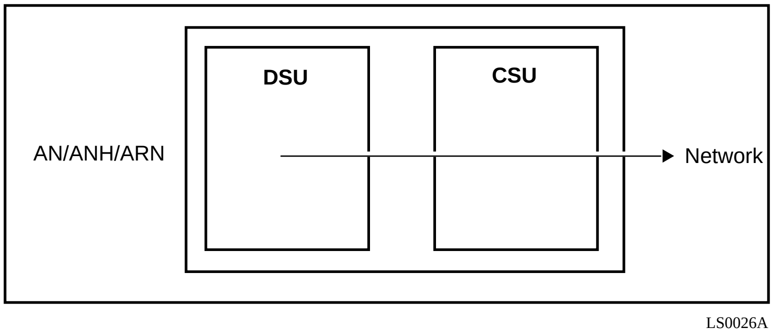

Figure 4-4. Pattern-2047 BERT Test

This test allows you to connect a BERT tester at the remote end of a DDS line to verify that data is passing over the line.

Telco-Activated Loopback

In addition to the tests you can initiate in the BCC or Site Manager, the DSU/CSU supports two standard DDS loopback conditions to test local loops and DDS termination equipment. The Telco facility initiates these tests upon customer request:

- CSU Loopback -- Isolates trouble in the network
- DSU Loopback -- Like Digital Loopback, tests the local DSU/CSU and the Telco circuit

Chapter 5
Configuring HSSI Services

You customize line services for high-speed serial interface (HSSI) link and net modules by setting parameters as described under the following topics:

Note: This guide assumes that you work with a router configuration file that already has the appropriate WAN circuits for the hardware configuration. See *Configuring and Managing Routers with Site Manager* for information about adding circuits to a configuration file.

Overview of HSSI Services

A Nortel Networks HSSI interface supports full-duplex synchronous bit rates from 66.3 Mb/s to 44.736 Mb/s. HSSI provides a connection to high-speed circuits such as T3/ES and SONET OC-1, and to high-speed WAN switching services such as frame relay, SMDS, and ATM DXI.

Customizing HSSI Services Using the BCC or Site Manager

Table 5-1 lists the HSSI line configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 5-1. HSSI Line Configuration Tasks

Task	BCC	Site Manager	Page
Enabling or Disabling HSSI Lines	✓	✓	5-3
Enabling or Disabling BofL	✓	✓	5-3
Setting the BofL Interval	✓	✓	5-4
Setting the MTU	✓	✓	5-5
Viewing the Configured WAN Protocol		✓	5-5
Setting the Transmission Interface	✓	✓	5-6
Setting the External Clock Speed	✓	✓	5-6
Setting the CRC Size	✓	✓	5-7
Setting the Carrier Loss Debounce Timeout	✓	✓	5-8
Setting Up DTE Loopback Testing		✓	5-8
Sending Traffic Across a HSSI Interface		✓	5-10

Using the BCC

To configure HSSI services, navigate to the `box` prompt and type:

`box#` **hssi slot 2 connector 1**

OR

`box#` **hssi 2/1**

This command configures HSSI services on slot 2, connector 1.

At the hssi/2/1 prompt, use the BCC commands that allow you to configure the HSSI parameters described in this chapter.

Using Site Manager

See Chapter 1 for information about accessing the Edit HSSI Parameters window using Site Manager.

Enabling or Disabling HSSI Lines

By default, the router enables HSSI line services when you add the circuit. You can enable or disable this interface without moving the cables.

Using the BCC

To enable or disable HSSI line services, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

state *variable*

For example:

`hssi/2/1#` **state enabled**

`hssi/2/1#` **state disabled**

Using Site Manager

See the Enable parameter on page A-13 for information.

Enabling or Disabling BofL

By default, the router transmits proprietary Ethernet-encapsulated BofL messages over a point-to-point connection between the local router and a remote peer. The exchange of BofL messages provides a level of confidence in the point-to-point connection.

With BofL enabled, the router sends periodic keepalive messages to the remote peer. If you enable BofL locally, you must also enable BofL on the remote peer.

Nortel Networks recommends that you enable BofL for point-to-point connections between Nortel Networks routers. However, you must disable BofL if such a connection occurs through a wide area transport service such as frame relay or SMDS.

Using the BCC

To enable or disable the transmission of BofL messages, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

bofl *variable*

For example:

`hssi/2/1#` **bofl enabled**

`hssi/2/1#` **bofl disabled**

Using Site Manager

See the BofL parameter on page A-13 for information.

Setting the BofL Interval

The BofL Frequency (timeout) parameter is valid only if BofL is enabled on the interface.

After sending a BofL message, the router starts a timer that has a value equal to five times the setting of this parameter. If the router does not receive a BofL message from the remote peer before the timer expires, the router disables the HSSI circuit, and then attempts to restart it.

Both ends of the point-to-point connection must be configured with the same frequency value.

Set this parameter to a value from 1 to 60 seconds. The default is 1 second.

Using the BCC

To set the BofL timeout, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

bofl-timeout *integer*

For example:

`hssi/2/1#` **bofl-timeout 20**

Using Site Manager

See the BofL Frequency parameter on page A-14 for information.

Setting the MTU

The default buffer size, or maximum transmission unit (MTU), determines the largest frame that can travel across the HSSI interface.

The default value is 4608 bytes. Specify an MTU from 3 to 4608 bytes on this interface.

Using the BCC

To set the MTU size, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

mtu *integer*

For example:

`hssi/2/1#` **mtu 2000**

Using Site Manager

See the MTU parameter on page A-14 for information.

Viewing the Configured WAN Protocol

The WAN Protocol parameter indicates which WAN protocol is enabled on a HSSI circuit. However, do not change the current value.

Caution: Changing the WAN protocol does not reconfigure the interface, and could disable it.

Using Site Manager

See the WAN Protocol parameter on page A-14 for information.

Setting the Transmission Interface

You can select the appropriate MIB for the local management interface (LMI) to use, provided you enable LMI and configure SMDS or frame relay on the HSSI interface. Select one of the following MIBs, depending on the carrier services that the attached DCE provides:

- DS1, at 1.54 MB/s (specified by RFC 1233)
- DS3, at 44.736 MB/s (specified by RFC 1232)

The HSSI driver enables the DS1 MIB by default, but provides no support for either the DS1 or DS3 MIB. Rather, the external DCE (for example, a DL3200 SMDS CSU/DSU from Digital Link) may provide MIB support.

Using the BCC

To select a MIB, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

media *variable*

For example:

`hssi/2/1#` **media dsone**

`hssi/2/1#` **media dsthree**

Using Site Manager

See the Transmission Interface parameter on page A-15 for information.

Setting the External Clock Speed

The HSSI specification requires that the DCE provide a transmit clock that times data transfer across the DTE/DCE interface. The External Clock Speed parameter specifies the bandwidth that the HSSI channel provides.

The External Clock Speed value does not affect hardware initialization. Certain routing protocols use this parameter value for route selection.

You can set the external clock speed to a rate from 307200 to 52638515 bytes. Select a value equal or close to the data transmission rate across the HSSI. By default, the HSSI clock rate is 46359642 (44.736 MB/s).

Using the BCC

To set external clock speed, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

external-clock-speed *integer*

For example:

`hssi/2/1#` **external-clock-speed 46359642**

Using Site Manager

See the External Clock Speed parameter on page A-15 for information.

Setting the CRC Size

The CRC Size parameter specifies an error-detection scheme. Choose either 16 bit (standard ITU-T) or 32 bit (extended) to detect errors in the packet. The remote end of the HSSI connection must be configured for the same CRC size.

Set the CRC size for this HSSI interface.

Using the BCC

To set the CRC size, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

crc-size *variable*

For example:

`hssi/2/1#` **crc-size crc32bit**

`hssi/2/1#` **crc-size crc16bit**

Using Site Manager

See the CRC Size parameter on page A-16 for information.

Setting the Carrier Loss Debounce Timeout

The Carrier Loss Debounce Time-out parameter determines how many seconds the line driver waits after losing the carrier signal before transitioning to the Carrier Lost state. If the carrier signal returns before reaching this threshold, the driver never enters the Carrier Lost state.

For most lines, you want the driver to immediately transition to the Carrier Lost state upon detecting carrier loss. For a problem line, however, you can specify a number of seconds for the router to detect carrier loss before entering the Carrier Lost state.

By default, the value is zero (0) seconds. Set this parameter to a value from 0 to 2147483647 for this HSSI interface.

Using the BCC

To set the carrier loss debounce timeout, navigate to the hssi prompt (for example, **box**; **hssi/2/1**) and type:

carrier-delay *integer*

For example:

`hssi/2/1#` **carrier-delay 100**

Using Site Manager

See the Carrier Loss Debounce Time-out parameter on page A-16 for information.

Setting Up DTE Loopback Testing

On ASN and System 5000 platforms, the DTE loopback diagnostic function provides loopback testing to the DCE. When the DTE (router) transmits a loopback signal to the DCE, the DTE waits for the DCE to acknowledge and return the signal. The DCE provides the transmit and receive clock signals over a full-duplex DTE-to-DCE connection. The DCE provides the transmit and receive clock signals.

There are four DTE loopback settings:

- No_Loopback -- Prevents the DTE from sending loopback signals to the DCE.
- Local_Digital (Loop A) -- Allows the DTE to check the DTE/DCE interface. In a Loop A test, the DTE transmission is returned to the DTE on the received local DCE data circuit. The CA LED (DCE Ready) must be on.
- Local_Line (Loop B) -- Allows the DTE to check the DTE/DCE interface and the transmit and receive sections of the local DCE. In a Loop B test, the output of the transmitting section of the DCE is returned to the receiving section of the DCE. The CA LED (DCE Ready) must be on.
- Remote_Line (Loop C) -- Allows the DTE to check the functions of the transmission path to the remote DCE interface.

Figure 5-2 illustrates how the DTE and DCE transmit loopback signals over Local_Digital (Loop A), Local_Line (Loop B), and Remote_Line (Loop C).

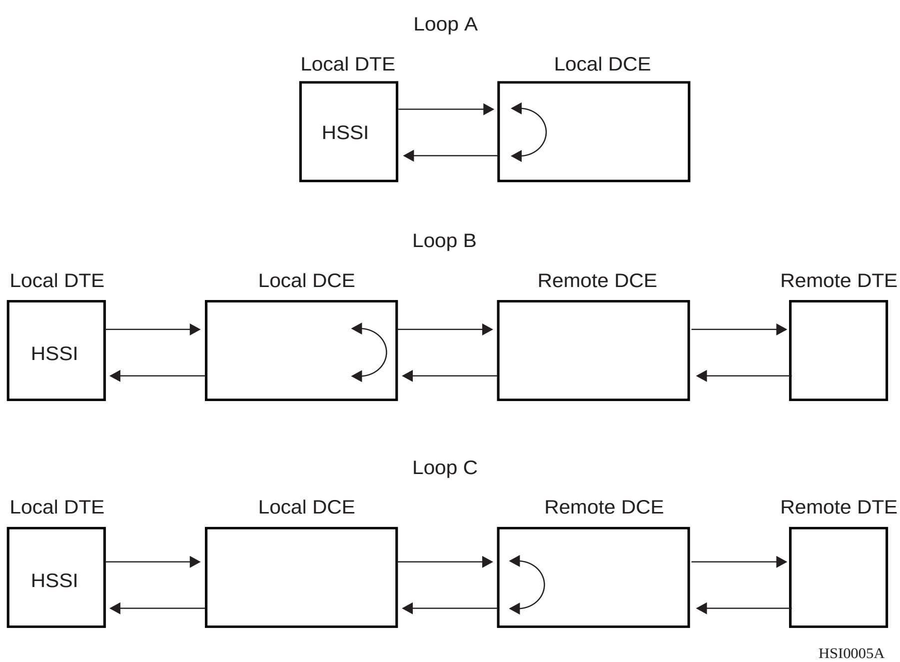

Figure 5-1. DTE-to-DCE Loopback Testing

Using Site Manager

See the Loopback Configuration parameter on page A-17 for information.

Sending Traffic Across a HSSI Interface

You can set priorities for traffic sent across a HSSI line interface by using a process called protocol prioritization. This protocol enables you to prioritize traffic so that the router transmits traffic with the highest priority first.

You must manually start protocol prioritization on a HSSI interface.

For information on how to configure protocol prioritization, see *Configuring Traffic Filters and Protocol Prioritization*.

Chapter 6
Configuring E1 and T1 Services

This chapter describes customizing line parameters for E1 and T1 WAN interfaces. It contains the following sections:

Overview of E1 and T1 Services

T1 services use digital signals to allow two pairs of wires to carry 24 voice or data transmissions.

E1 services use digital signals to allow two pairs of wires to carry 30 voice or data transmissions. E1 services (2.048 CEPT) are the European equivalent of T1 services.

Editing T1 Services

The following sections describe how to edit the line parameters for a T1 interface using Site Manager:

See Chapter 1 for information about accessing the T1 Line Entry window (Figure 6-1).

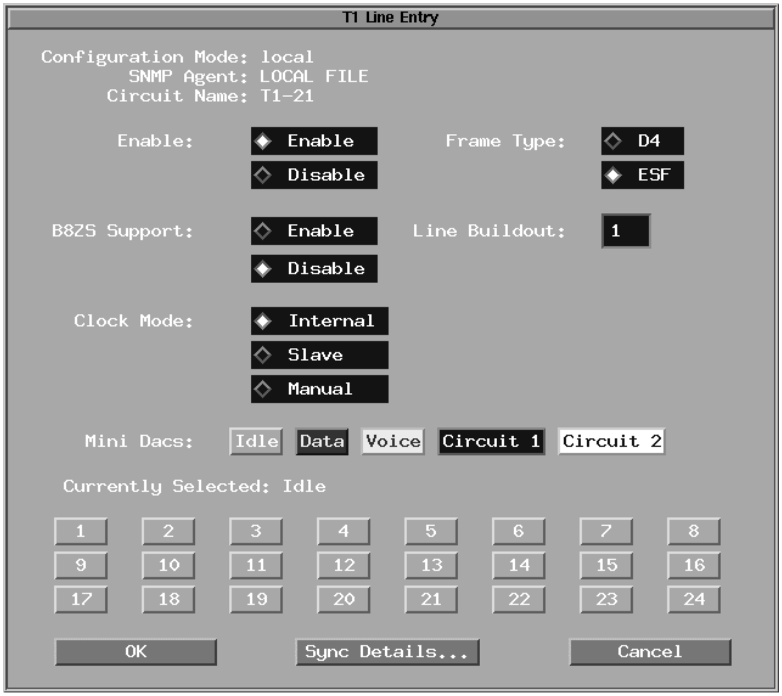

Figure 6-1. T1 Line Entry Window

See Chapter 2 for information about editing synchronous line parameters by clicking on Sync Details in the T1 Line Entry window.

Enabling or Disabling T1 Services

The router enables T1 line services when you add the circuit. You can enable or disable this interface without moving the cables.

See the Enable parameter on page A-88 for information.

Setting the T1 Frame Type

T1 framing digitizes analog signals to a digital signal, level zero (DS0) with 8-bit words. T1 uses two types of frame formats:

- D4 Format
- ESF Format

The frame format of the interface should match the frame format required by the associated T1 equipment.

D4 Format

The D4 format, or superframe format (SF), is the original T1 frame format. A D4 frame consists of:

- One framing bit.
- A DS0 timeslot for each channel on the line. A DS0 timeslot is an 8-bit sample from a channel.

A T1 line generates 8000 D4 frames per second.

ESF Format

The D4 format (SF) does not allow testing of a digital line while the line is in use. To allow such testing, you can use the extended superframe format (ESF).

An ESF frame comprises 24 D4 frames. A D4 frame contains one framing bit. An ESF frame contains 24 framing bits that it uses for the following purposes:

- Synchronization (6 bits)
- Error checking (6-bit CRC)
- Diagnostic data channel (12 bits)

By default, the T1 interface uses ESF format. Set the frame type for this interface.

See the Frame Type parameter on page A-88 for information.

Enabling or Disabling Bipolar with 8 Zero Substitution (B8ZS)

T1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (Figure 6-2).

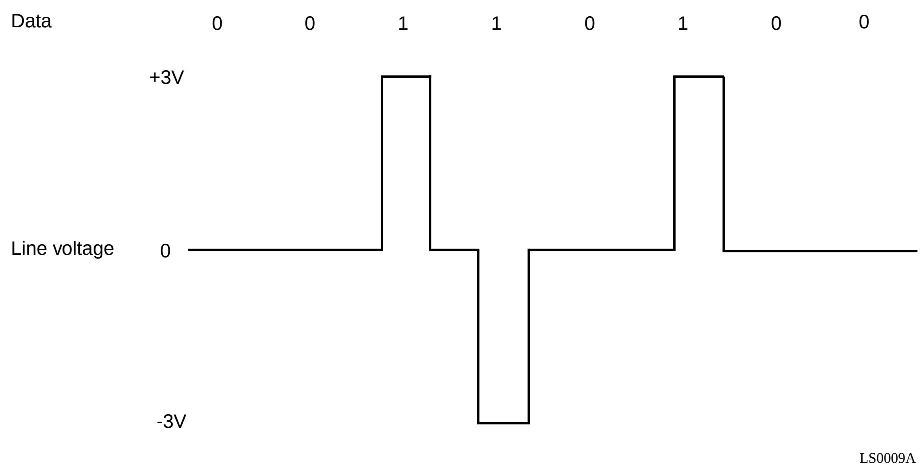

Figure 6-2. Bipolar Format

In bipolar format, a negative pulse must always follow a positive pulse, and vice versa. A long string of zeros on a T1 line would cause the line to lose synchronization due to lack of pulses. Nortel Networks offers B8ZS for T1 synchronization.

B8ZS substitutes a *bipolar violation* into a string of eight consecutive zeros at the transmitting end, and removes the bipolar violation at the receiving end. In a bipolar violation, the first pulse is in the same direction (positive or negative) as the previous pulse (Figure 6-3).

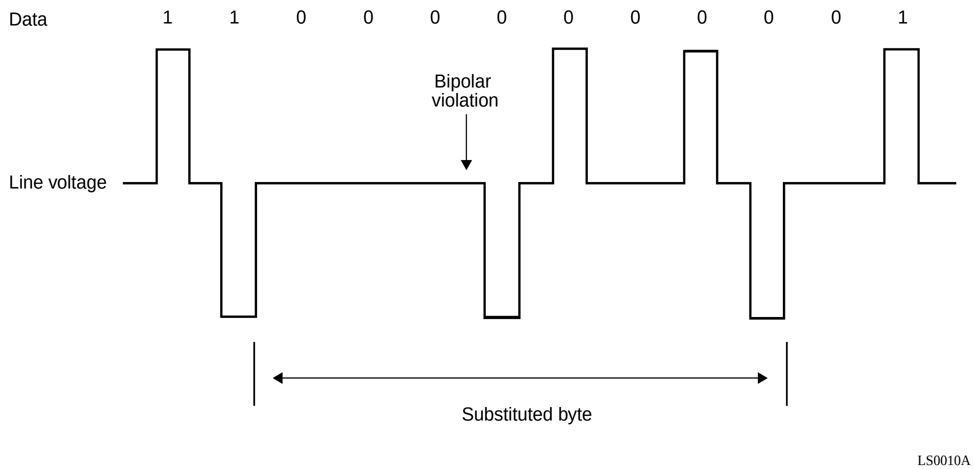

Figure 6-3. Bipolar with 8 Zero Substitution (B8ZS)

You can enable or disable B8ZS support on this interface, depending on whether the associated T1 equipment supports B8ZS.

See the B8ZS Support parameter on page A-89 for information.

Specifying Line Buildout

Line buildout conditions the router signals to mitigate attenuation. Line buildout depends on the physical length of the T1 line. The carrier determines line buildout for DS1 (*long-haul*). DSX-1 (*short-haul*) line buildout corresponds to the length of the cable.

By default, the T1 line buildout for DSX-1 is based on a physical line length of 1 ft. Configure a line length based on the approximate length of the cable connecting the router and the associated T1 equipment, from 1 to 655 ft.

See the Line Buildout parameter on page A-89 for information.

Setting the Internal Clock Mode

The T1 equipment associated with a T1 interface must use a compatible transmit clock. The T1 interface supports three sources for the transmit clock:

- Internal -- Indicates that the router sets the clock
- Slave -- Indicates that the incoming data stream sets the clock
- Manual -- Indicates that jumpers on the T1 link or net module set the clock

By default, the T1 interface uses manual clock mode, which is determined by hardware configuration jumpers. See *Installing and Maintaining BN Routers* or *Installing and Maintaining ASN Routers and BNX Platforms* for information about configuring the T1 module's hardware jumpers.

See the Clock Mode parameter on page A-89 for information.

Assigning Channel Functions

Each T1 channel on an interface is idle by default. You can assign the following functions:

- Data -- Assigns the channel to data pass-through (T1 connector to T1 connector)
- Voice -- Assigns the channel to voice pass-through (T1 connector to T1 connector)
- Circuit 1 -- Assigns the channel to the first T1 connector
- Circuit 2 -- Assigns the channel to the second T1 connector
- Idle -- Makes the channel idle

Circuit Assignment

You can allocate a T1 channel to only one T1 circuit. For example, if you allocate channels 17 to 24 to circuit 1 on the first T1 connector, you must make these channels idle or allocate them to circuit 2 on the second T1 connector.

Data and Voice Pass-Through

To enable data and voice pass-through, assign identical channels to data or voice on both T1 connectors.

For example, if the first T1 connector allocates channels 1 to 8 to voice pass-through and channels 9 to 16 to data pass-through, the second T1 connector must also allocate channels 1 to 8 to voice pass-through and channels 9 to 16 to data pass-through.

You can assign specific functions to T1 channels.

See the Mini Dacs parameter on page A-90 for information.

Editing E1 Services

The following sections describe how to edit the line parameters for E1 link modules:

See Chapter 1 for information about accessing the E1 Line Entry window (Figure 6-4).

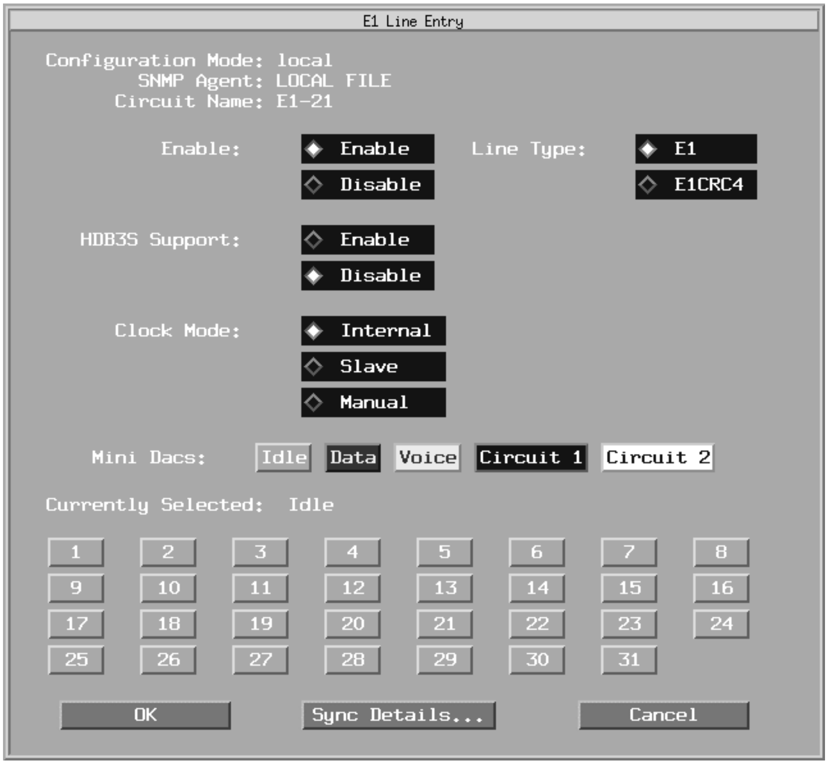

Figure 6-4. E1 Line Entry Window

See Chapter 2 for information about editing synchronous line parameters by clicking on Sync Details in the E1 Line Entry window.

Enabling or Disabling E1 Services

By default, the router enables E1 line services when you add the interface. You can disable or reenable this interface without moving the cables.

See the Enable parameter on page A-10 for information.

Enabling or Disabling CRC

Some E1 equipment expects a 4-byte CRC trailer at the end of each frame.

By default, the CRC trailer is not added to received E1 frames. Set the Line Type parameter to E1CRC4 if the E1 equipment expects a 4-byte CRC trailer at the end of each frame.

See the Line Type parameter on page A-12 for information.

Enabling or Disabling High-Density Bipolar Coding (HDB3S)

E1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (see Figure 6-2 on page 6-5).

A long string of zeros on an E1 line would cause the line to lose synchronization due to lack of pulses. For synchronization, Nortel Networks provides HDB3S, which is a mechanism to maintain sufficient 1s density in the E1 data stream.

HDB3S support is disabled by default. You can enable or disable HDB3S on this interface, depending on the ability of the associated E1 equipment to support HDB3S.

See the HDB3S Support parameter on page A-11 for information.

Setting the Clock Source

The E1 equipment associated with an E1 interface must use a compatible transmit clock. The E1 interface supports three sources for the transmit clock:

- Internal -- Indicates that the router sets the clock
- Slave -- Indicates that the incoming data stream sets the clock
- Manual -- Indicates that jumpers on the E1 link module set the clock

By default, the E1 interface uses manual clock mode, which is determined by hardware configuration jumpers. See *Installing and Maintaining BN Routers* or *Installing and Maintaining ASN Routers and BNX Platforms* for information about configuring the E1 module's hardware jumpers.

See the Clock Mode parameter on page A-11 for information.

Assigning Channel Functions

Unless you change the default channel function, each E1 channel on an interface is idle by default.

You can assign these functions:

- Data -- Assigns the channel to data pass-through (E1 connector to E1 connector)
- Voice -- Assigns the channel to voice pass-through (E1 connector to E1 connector)
- Circuit 1 -- Assigns the channel to the first E1 connector
- Circuit 2 -- Assigns the channel to the second E1 connector
- Idle -- Makes the channel idle

Circuit Assignment

You can allocate an E1 channel to only one E1 circuit. For example, if you allocate channels 17 to 25 to circuit 1 on the first E1 connector, you must make these channels idle or allocate them to circuit 2 on the second E1 connector.

Data and Voice Pass-Through

To enable data and voice pass-through, assign identical channels to data or voice on both E1 connectors.

For example, if the first E1 connector allocates channels 2 to 8 to voice pass-through and channels 9 to 16 to data pass-through, the second E1 connector must also allocate channels 2 to 8 to voice pass-through and channels 9 to 16 to data pass-through.

See the Mini Dacs parameter on page A-12 for information.

Chapter 7
Configuring MCE1 and MCT1 Services

You configure and customize services for Multichannel E1 (MCE1) or Multichannel T1 (MCT1) circuits on a Nortel Networks router by setting the parameters as described in the following sections:

Overview of MCE1 and MCT1 Services

Nortel Networks supports MCE1 and MCT1 circuits on a router that contains one of the following MCE1 or MCT1 modules:

Link Modules (BLN and BCN routers)	**Net Modules (ASN and System 5000 routers)**
MCE1 II Single-Port, 75 ohm	MCE1 Single-Port
MCE1 II Dual-Port, 75 ohm	MCT1 Dual-Port (DMCT1)
MCE1 II Single-Port, 120 ohm	
MCE1 II Dual-Port, 120 ohm	
MCT1 Single-Port	
MCT1 Dual-Port (DMCT1)	
MCT1 Quad-Port (QMCT1)	
MCT1 Quad-Port (QMCT1) with DS0A	

MCE1 and MCT1 interfaces provide high-density access to a digital access and crossconnect system (DACS). MCE1 also provides a variety of international Post Telephone and Telegraph (PTT) and telecommunications administration services.

Multichannel interfaces enable data to be segmented into multiple DS0 connections, called *channels* or *timeslots*. You can form fractional T1 (FT1) channels by grouping MCT1 DS0s. This allows you to maximize remote link capacity by using DS0 channels individually or in groups.

An MCT1 interface can transmit or receive up to 24 DS0 channels per DS1 frame over leased point-to-point links, with a line rate of 56 or 64 Kb/s. An MCE1 interface can transmit or receive up to 30 DS0 timeslots at 64 Kb/s.

In addition to the supported speeds provided by other MCT1 modules, the Quad-Port Multichannel T1 with DS0A (QMCT1 w/ DS0A) link module supports the DS0A subrate frame format standard, which enables the interface to support SDLC traffic at line speeds of 19.2 Kb/s and 9.6 Kb/s.

All MCE1 and MCT1 modules include an integrated DSU/CSU for direct connection to an E1 or T1 network. The interfaces provide integrated support for loopback testing and bit error rate test (BERT) line testing.

Configuring MCE1 and MCT1 Ports

Note: This guide assumes that you are working with a router configuration file that already contains the appropriate WAN circuits for the hardware configuration. See *Configuring and Managing Routers with Site Manager* for information about adding circuits to a configuration file.

Complete the steps in this section to enable MCE1 or MCT1 services.

1. Select the port application.
2. Set the clock parameters.
3. Accept or customize the default MCE1 or MCT1 port configuration.

See “Configuring Non-PRI Logical Lines” on page 7-34 or “Configuring ISDN PRI B Channels” on page 7-54 to complete the configuration.

Selecting the Port Application

You configure an MCE1 or MCT1 interface (*port*) based on whether you will use the lines for ISDN Primary Rate Interface (PRI) switched circuits or permanent circuit (non-PRI) applications. See “Configuring ISDN PRI B Channels,” later in this chapter, for information about ISDN PRI services.

Using the BCC

To configure an MCE1 or MCT1 interface for use with non-PRI applications, navigate to the stack or box prompt and type:

`stack#` **mce1 slot 1 module 2 connector 1**

OR

`stack#` **mce1 1/2/1**

To configure an MCE1or MCT1 interface for use with PRI switched circuits applications, navigate to the mce1/1/2/1 or mct1/1/1 prompt and type:

`mct1/1/1#` **pri**

Continue with the next section, “Setting the Clock Parameters,” on page 7-5.

Using Site Manager

To select the port application, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an unconfigured MCE1 or MCT1 connector.	The Port Application window opens.
2. Set the Port Application Mode parameter to **NONPRI** or **PRI**. Click on **Help** or see the parameter description on page A-24 for MCE1 networks, or page A-28 for MCT1 networks.	
3. Click on **OK**.	The Edit Clock Parameters window opens.

Select NONPRI to indicate that all of the lines have a permanent circuit number and are for leased lines, frame relay, or permanent connections for other non-ISDN PRI applications.

Select PRI to indicate that the lines are for switched circuits using ISDN.

Note: The 120-ohm MCE1 II link module supports ISDN PRI. MCE1 net modules support only non-PRI applications. If you try to configure an ASN MCE1 port for PRI, Site Manager displays a warning to indicate that this version of MCE1 does not support ISDN.

Continue with the next section, "Setting the Clock Parameters."

Setting the Clock Parameters

Clock parameters define the timing sources that apply to ports and DS0 timeslots that an MCE1 or MCT1 link or net module supports.

Note: DMCE1 and DMCT1 link modules contain a single clock chip that provides the timing signals for both ports. Therefore, clock parameters that you set for the first port apply to the second port on the module. Timing is independent for the two ports on a DMCT1 net module, and for the four ports on a QMCT1 and QMCT1 w/ DS0A link module. For these modules, you select the timing source for each port.

Table 7-1 lists the options supported by specific link and net modules.

Table 7-1. MCE1 and MCT1 Clock Source Options

BCC Clock Source Options	Site Manager Clock Source Option	Applicable Link Modules	Applicable ASN Net Modules	Result
internal	Internal	All	All	Use the clock chip on the link or net module.
loop1	Port1 Ext Loop	DMCT1, QMCT1, QMCT1 w/ DS0A	DMCT1	Use the signal coming in from port 1.
loop2	Port2 Ext Loop	DMCT1, QMCT1, QMCT1 w/ DS0A	DMCT1	Use the signal coming in from port 2.
loop3	Port3 Ext Loop	QMCT1, QMCT1 w/ DS0A	N/A	Use the signal coming in from port 3.
loop4	Port4 Ext Loop	QMCT1	N/A	Use the signal coming in from port 4.
external	Auxiliary Ext	MCE1, DMCE1	MCE1	Use an external clock source via BNC connectors.
		MCT1, DMCT1	N/A	Use an external clock source via DB-9 connectors.
		QMCT1, QMCT1 w/ DS0A	N/A	Use an external clock source via port1. This option requires a special Y cable, Nortel Networks Order No. AA0018006.

Using the BCC

To set the clock parameters, navigate to the mct1/1/1 prompt (for example, **box**; **mct1/1/1**) and type:

primary-clock *variable*
secondary-clock *variable*

For example:

`mct1/1/1#` **primary-clock internal**
`mct1/1/1#` **secondary-clock internal**

Using Site Manager

To set the clock parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Edit Clock Parameters window, select a primary clock source option.	
2. Select the secondary (backup) clock source option.	
3. Click on **OK**.	The MCE1 Port Parameters window or MCT1 Port Parameters window opens.

You access the Edit Clock Parameters window based on which link or net module you are configuring, and whether you have already configured the port:

- Newly installed Single- or Dual-Port MCE1 or MCT1 link module

  The Edit DS1E1 Clock Parameters window opens automatically the first time you configure an interface.

- Configured Single- or Dual-Port MCE1 or MCT1 link or net module

  Click on the CLOCK connector for the MCE1 or MCT1 module on the Configuration Manager window.

- Newly installed DMCT1 net module, QMCT1 link module, or QMCT1 w/DS0A link module.

The Edit QMCT1 Clock Parameters window opens automatically the first time you configure a port. These clock parameters define the timing sources for the selected port only.

- Configured DMCT1 net module, QMCT1 link module, or QMCT1 w/DS0A link module.

  Display the MCT1 Port Parameters window (**MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters). See "Customizing MCT1 Port Parameters" on page 7-16. You customize the clock parameters as you would any other QMCT1 or DMCT1 port parameter.

For MCE1 networks, see the Primary Clock parameter on page A-24 for information. For MCT1 networks, see page A-28. For QMCT1 and QMCT1 w/ DS0A link modules and the DMCT1 net module, see page A-35.

The router uses the secondary clock only when the primary clock is unavailable.

For MCE1 networks, see the Secondary Clock parameter on page A-25 for information. For MCT1 networks, see page A-29. For QMCT1 and QMCT1 w/ DS0A link modules and the DMCT1 net module, see page A-35.

Customizing MCE1 Port Parameters

The MCE1 port parameters apply to each of the DS0 channels (timeslots) provided by an MCE1 port (connector).

Table 7-2 lists the MCE1 configuration tasks described in this section and indicates whether you can use the BCC or Site Manager to perform each task.

Table 7-2. MCE1 Port Configuration Tasks

Task	BCC	Site Manager	Page
Enabling or Disabling the MCE1 Port	✓	✓	7-8
Setting the MCE1 Line Type	✓	✓	7-9
Setting the MCE1 Line Coding	✓	✓	7-9
Setting the MCE1 Alarm Threshold Time	✓	✓	7-10
Setting the Alarm Threshold Clear Time	✓	✓	7-11
Enabling or Disabling the International Bit	✓	✓	7-11

(continued)

Table 7-2. MCE1 Port Configuration Tasks *(continued)*

Task	BCC	Site Manager	Page
Setting the Loop Clock	✓		7-12
Setting the External Clock	✓		7-12
Setting the Line Impedance (MCE1 Net Modules Only)	✓	✓	7-13
Setting the FDL Loop Interframe Fill	✓		7-13
Setting the Transmit Buffer Use Credits for MCE1	✓		7-15
Setting the Receive Buffer Use Credits for MCE1	✓		7-15

Enabling or Disabling the MCE1 Port

An MCE1 port is enabled by default when you add the circuit. You can disable or reenable this MCE1 port without moving any cables.

Using the BCC

To enable or disable the MCE1 port, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

state *variable*

For example:

`mce1/1/2/1#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-25 for information.

Setting the MCE1 Line Type

Select one of the following line types (frame formats) to match your E1 equipment:

Table 7-3. MCE1 Line Type Options

BCC Option	Site Manager Option
e1	E1 (the default)
e1-crc	E1 CRC
e1-mf	E1 MF1
e1-crmf	E1 CRC MF

Using the BCC

To change the line type, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

port-line-framing *variable*

For example:

`mce1/1/2/1#` **port-line-framing e1-crc**

Using Site Manager

See the Line Type parameter on page A-25 for information.

Setting the MCE1 Line Coding

E1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (see Figure 6-2 in Chapter 6). A long string of zeros on an E1 line would cause the line to lose synchronization due to lack of pulses. Nortel Networks provides a line-coding mechanism to maintain synchronization.

By default, the MCE1 interface uses high-density bipolar (HDB3) line coding. You can select alternate mark inversion (AMI) line coding instead.

HDB3 line coding replaces a block of eight consecutive binary zeros with an 8-bit HDB3 code containing bipolar violations in the fourth and seventh bit positions of the substituted code. In the receive direction, the HDB3 code is detected and replaced with eight consecutive binary zeros.

AMI line coding is also bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. When configured for AMI line coding, the MCE1 port remains synchronized upon receiving up to 45 consecutive zeros.

Using the BCC

To change the line coding, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

port-line-coding *variable*

For example:

`mce1/1/2/1#` **port-line-coding ami**
`mce1/1/2/1#` **port-line-coding hdb3**

Using Site Manager

See the Line Coding parameter on page A-26 for information.

Setting the MCE1 Alarm Threshold Time

By default, the MCE1 interface waits 2 seconds before logging a performance defect or anomaly as an event message. Change the alarm threshold to any value from 2 to 10 seconds for this MCE1 interface.

Using the BCC

To change the alarm threshold, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

setup-alarm-threshold *integer*

For example:

`mce1/1/2/1#` **setup-alarm-threshold 3**

Using Site Manager

See the Setup Alarm Threshold parameter on page A-26 for information.

Setting the Alarm Threshold Clear Time

By default, the clear time for performance-failure conditions is 2 seconds. If the defect or anomaly clears in this time interval, MCE1 records a performance-cleared condition and logs an event message. Change the alarm threshold clear time to any value from 2 to 10 seconds for this MCE1 interface.

Using the BCC

To change the alarm threshold clear time, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

clear-alarm-threshold *integer*

For example:

`mce1/1/2/1#` **clear-alarm-threshold 3**

Using Site Manager

See the Clear Alarm Threshold parameter on page A-27 for information.

Enabling or Disabling the International Bit

By default, the MCE1 interface does not use the international bit in E1 frames.

Using the BCC

To enable or disable the international bit, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

international-bit *variable*

For example:

`mce1/1/2/1#` **international-bit enabled**

Using Site Manager

See the International Bit parameter on page A-27 for information.

Setting the Loop Clock

In the BCC, the Loop Clock State parameter specifies the MCE1 port's loop clock status. You can set this parameter to present (up), which is the default, or absent (down).

Using the BCC

To set the loop clock state, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

loop-clock-state *variable*

For example:

`mce1/1/2/1#` **loop-clock-state absent**

Setting the External Clock

In the BCC, the External Clock State parameter indicates whether the external clock is operational. You can set this parameter to present (up), which is the default, or absent (down).

Using the BCC

To set the external clock state, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

external-clock-state *variable*

For example:

`mce1/1/2/1#` **external-clock-state absent**

Setting the Line Impedance (MCE1 Net Modules Only)

The line impedance for the ASN MCE1 net module is 120 ohm by default. For the ASN MCE1 net module only, you can change the line impedance to 75 ohm for this MCE1 interface.

Using the BCC

To change line impedance, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

line-impedance *variable*

For example:

`mce1/1/2/1#` **line-impedance bnc-75-ohms**
`mce1/1/2/1#` **line-impedance rj45-120-ohms**

Using Site Manager

See the Line Impedance parameter on page A-27 for information.

Setting the FDL Loop Interframe Fill

In the BCC, the FDL Loop Interframe Fill parameter is set to mark by default. This enables the detection of loop retention code when the remote end is in line or payload loopback. When you set this parameter to loop-retention, the loop retention interframe time fill for the facility data link (FDL) is enabled after sending loop-up code.

Using the BCC

To set this parameter, navigate to the mce1 prompt (for example, | **stack**; **mce1/1/2/1**) and type:

fdl-loop-interframe-fill *variable*

For example:

`mce1/1/2/1#` **fdl-loop-interframe-fill loop-retention**

Setting Buffer Credits for MCE1

The BCC uses the Transmit Buffer Use Credits, Receive Buffer Use Credits, Transmit Queue Length, and Receive Queue Length parameters to regulate performance of the multichannel T1 and E1 device drivers.

Note: These parameters are not supported on the ASN.

The device driver software allocates frame buffers to all logical lines evenly; however, the software will allocate more buffers to some logical lines temporarily to absorb a short burst of traffic without dropping frames. The device driver software accounts for most network scenarios by default and offers the highest level of service possible given the amount of global packet buffer memory available to it. However, not all networks are the same. You can use the buffer use credit and queue length parameters to customize the relative priority between logical lines.

Nortel Networks recommends that you do not change the default settings of these parameters, however, without careful consideration of the traffic flow in and out of the T1/E1 logical lines.

Caution: You can affect router performance severely by over-allocating buffer credits.

One reason you might want to change the default settings of these parameters is to change the relative priority of some logical lines over others. If, for example, you notice a high incidence of transmit drop frames due to transmit clipping, there are several approaches you can take.

The first approach is to use priority queuing on each logical line to prioritize traffic. Or, you can upgrade the routing engine to the maximum memory allotment and increase the global buffer memory to 16 megabytes.

If transmit clip frames persist and you want to prioritize logical lines, you can set the Transmit Queue Length parameter to a value approximately 25% higher than the value of your most critical logical lines. See "Setting the Transmit Queue Length" on page 7-50 for more information.

In many cases, lost frames are due more to pervasive problems than to queue lengths allocated within the device drivers. Often, configuration or network design changes will have a more positive impact. Contact the Nortel Networks Technical Solutions center for more information. (Refer to "How to Get Help" on page xxxix.)

Setting the Transmit Buffer Use Credits for MCE1

In the BCC, the Transmit Buffer Use Credits parameter specifies the configured transmit buffer credits available for all transmit queues on a slot. These buffer credits are distributed among the slot's transmit queues for all active logical lines.

You can set this parameter from 0 to 512. A value of zero causes the router to use its default values.

Using the BCC

To set this parameter, navigate to the mce1 prompt (for example, **box**; **mce1/1/1**) and type:

transmit-buffer-use-credits *integer*

For example:

`mce1/1/1#` **transmit-buffer-use-credits 420**

Setting the Receive Buffer Use Credits for MCE1

In the BCC, the Receive Buffer Use Credits parameter specifies the configured receive buffer credits available for all receive queues on a slot. These buffer credits are distributed among the slot's receive queues for all active logical lines.

You can set this parameter from 0 to 512. A value of zero causes the router to use its default values.

Note: This parameter is not supported on the ASN.

Using the BCC

To set this parameter, navigate to the mce1 prompt (for example, **box**; **mce1/1/1**) and type:

receive-buffer-use-credits *integer*

For example:

`mce1/1/1#` **receive-buffer-use-credits 420**

Customizing MCT1 Port Parameters

The MCT1 port parameters apply to each of the DS0 channels (timeslots) provided by an MCT1 port (connector).

Table 7-4 lists the MCE1 configuration tasks described in this section and indicates whether you can use the BCC or Site Manager to perform each task.

Table 7-4. MCE1 Port Configuration Tasks

Task	BCC	Site Manager	Page
Enabling or Disabling the MCT1 Port	✓	✓	7-17
Setting the MCT1 Line Type	✓	✓	7-18
Setting the MCT1 Line Coding	✓	✓	7-19
Setting the Signal Level	✓	✓	7-20
Setting the Alarm Threshold Time	✓	✓	7-21
Setting the Alarm Threshold Clear Time	✓	✓	7-21
Setting the FDL Mode for ESF Line Types	✓	✓	7-22
Setting the Remote FDL HDLC Address Mode	✓	✓	7-23
Accepting or Rejecting Port Loopback Requests	✓	✓	7-23
Setting a Loopback Configuration	✓	✓	7-24
Setting Relay Control	✓		7-25
Setting the Source of Send Performance Messages	✓	✓	7-25
Setting the Source of Accept Performance Messages	✓	✓	7-26
Setting the Primary Clock Source	✓	✓	7-27
Setting the Secondary Clock Source	✓	✓	7-28

(continued)

Table 7-4. MCE1 Port Configuration Tasks *(continued)*

Task	BCC	Site Manager	Page
Setting the Loop Clock	✓		7-29
Setting the External Clock	✓		7-29
Setting Buffer Credits for MCT1	✓		7-14

Enabling or Disabling the MCT1 Port

The MCT1 interface is enabled by default when you add the circuit. Disable or reenable this MCT1 interface without moving any cables.

Using the BCC

To enable or disable the MCT1 port, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

state *variable*

For example:

`mct1/1/1#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-29 for information.

Setting the MCT1 Line Type

Select one of the following line types (frame formats) for your T1 equipment:

Table 7-5. MCT1 Line Type Options

BCC Option	Site Manager Option	Description
esf	ESF	The default; transmits extended superframes (ESFs), each consisting of 24 SF/D4 frames; provides enhanced signaling and synchronization
sf	SF/DF	Transmits superframes, each consisting of 12 individual frames
unframed-t1	Unframed T1	Use only with BERT mode to match line type

For ESF lines, you can also set the FDL mode. See “Setting the FDL Mode for ESF Line Types” later in this chapter.

For more information on these frame formats, see “Setting the T1 Frame Type” in Chapter 6.

Using the BCC

To change the line type, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

port-line-framing *variable*

For example:

`mct1/1/1#` **port-line-framing sf**

Using Site Manager

See the Line Type parameter on page A-30 for information.

Setting the MCT1 Line Coding

T1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (see Figure 6-2 in Chapter 6). A long string of zeros would cause the line to lose synchronization due to lack of pulses. Nortel Networks provides a line-coding mechanism to maintain synchronization.

By default, the MCT1 interface uses bipolar with 8 zero substitution (B8ZS) line coding. You can select AMI line coding instead.

B8ZS line coding replaces a block of eight consecutive binary 0s with an 8-bit B8ZS code. For more information on B8ZS line coding, see “Enabling or Disabling Bipolar with 8 Zero Substitution (B8ZS)” in Chapter 6.

AMI line coding is also bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the MCT1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

Note: If the T1 receive path detects a B8ZS code word when the line is configured for AMI coding, the router generates a log message and an SNMP trap.

Using the BCC

To change the line coding, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

port-line-coding *variable*

For example:

```
mct1/1/1# port-line-coding ami
mct1/1/1# port-line-coding b8zs
```

Using Site Manager

See the Line Coding parameter on page A-30 for information.

Setting the Signal Level

The Signal Level parameter specifies the T1 transmit power level in decibels (dB). Line buildout conditions the signals to mitigate attenuation. Line buildout also depends on the physical length of the T1 line.

The carrier determines signal levels on a *long-haul* (0 to 6000 ft. of cable) T1 network interface. If 0.0 dB is not sufficient for long-haul, the carrier determines values of -15 (ds1-minus15) and -7.5 dB (ds1-minus-7point5).

Signal power for DSX-1 *short-haul* (0 to 655 ft.) is based on cable length. For DSX-1, decibel levels correspond to cable length, as follows:

Table 7-6. Signal Level Options

Cable Length	BCC Option	Site Manager Option
0 to 133 ft.	zero-point0	0.0 dB
133 to 255 ft.	dsx1-plus-point5	0.5 dB
255 to 399 ft.	dsx1-plus-point8	0.8 dB
399 to 533 ft.	dsx1-plus1-point1	1.1 dB
533 to 655 ft.	dsx1-plus1-point5	1.5 dB

By default, the signal level is set to 0.0 dB. Set the long-haul or short-haul signal level for this MCT1 interface according to the length of the cable or as the carrier specifies.

Using the BCC

To change the signal level, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

signal-level *variable*

For example:

`mct1/1/1#` **signal-level ds1-minus-15**

Using Site Manager

See the Signal Level (dB) parameter on page A-31 for information.

Setting the Alarm Threshold Time

By default, the MCT1 interface waits 2 seconds before logging a performance defect or anomaly as an event message. Change the alarm threshold time to any value from 2 to 10 seconds.

Using the BCC

To change the alarm threshold time, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

setup-alarm-threshold *integer*

For example:

`mct1/1/1#` **setup-alarm-threshold 3**

Using Site Manager

See the Setup Alarm Threshold (seconds) parameter on page A-31 for information.

Setting the Alarm Threshold Clear Time

By default, the clear time for performance-failure conditions is 2 seconds. If the defect or anomaly clears in this time interval, MCT1 records a performance-cleared condition and logs an event message. You can change the alarm threshold clear time to any value from 2 to 10 seconds.

Using the BCC

To set the alarm threshold clear time, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

clear-alarm-threshold *integer*

For example:

`mct1/1/1#` **clear-alarm-threshold 3**

Using Site Manager

See the Clear Alarm Threshold (seconds) parameter on page A-32 for information.

Setting the FDL Mode for ESF Line Types

The MCT1 interface selects a facility data link (FDL) mode only when the Line Type parameter is configured as ESF (see “Setting the MCT1 Line Type” earlier in this chapter). Select one of the following ESF line types:

Table 7-7. ESF Line Types

BCC Option	Site Manager Option	Description
ansi-403	ANSI 403	The default; conforms to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DSI Metallic Interface)*
att-54016	AT&T 54016	Conforms to the 1989 AT&T specification (*Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Superframe Format*)
none	None	Disables the FDL mode

Using the BCC

To set the FDL mode, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

facilities-data-link *integer*

For example:

`mct1/1/1#` **facilities-data-link att-54016**

Using Site Manager

See the FDL Configuration parameter on page A-32 for information.

Setting the Remote FDL HDLC Address Mode

You can select the FDL HDLC address mode to determine how the local FDL responds to HDLC addresses in messages from the remote FDL.

Set the FDL address mode to by or az for this MCT1 interface.

Using the BCC

To set the FDL HDLC address mode, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

fdl-target-hdlc-address *variable*

For example:

`mct1/1/1#` **fdl-target-hdlc-address az**

Using Site Manager

See the Remote FDL HDLC Address Mode parameter on page A-32 for information.

Accepting or Rejecting Port Loopback Requests

By default, the MCT1 port accepts requests from a remote device to go into loopback mode. During loopback, the port loops receive data back onto the T1 transmit path. The remote or intermediate test equipment then performs diagnostics on the network between the equipment and the port.

You can disable detection of remote loop-up and loop-down code to prevent the port from accepting loopback requests. With Accept Loopback Request enabled, see "Setting a Loopback Configuration" to set the type of loopback.

Using the BCC

To enable or disable the detection of remote loop-up and loop-down code, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

accept-loopback request *variable*

For example:

`mct1/1/1#` **accept-loopback-request disabled**

Using Site Manager

See the Accept Loopback Request parameter on page A-33 for information.

Setting a Loopback Configuration

When set, this parameter immediately places the port in loopback mode, without a request from the remote test equipment. Set the loopback configuration by specifying one of the following options:

Table 7-8. Loopback Configuration Options

BCC Option	Site Manager Option	Description
payload-loop	Payload Loopback	Received signals are looped through the T1 framer, then looped back for retransmission. This method maintains bit-sequence integrity for information bits, but does not maintain the integrity of frames or superframes.
line-loop	Line Loopback	Received signals do not go through the framing device before being looped back out. This method ensures minimum penetration.
no-loop	No Loopback	The default; this option deactivates any current loopback.

Using the BCC

To change the loopback mode, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

loopback-mode *variable*

For example:

`mct1/1/1#` **loopback-mode payload-loop**

Using Site Manager

See the Loopback Configuration parameter on page A-33 for information.

Setting Relay Control

The relay on the QMCT1 module automatically goes into loopback mode when a system power up, reboot, or crash, or a hardware reset occurs. You can control the state of the relay by setting the Relay Control parameter using the BCC.

The options for Relay Control are:

- Loop -- The default; the relay will go into loopback as the port/module is reinitialized
- Noloop -- The relay will remain in its present state as the port/module is reinitialized

Using the BCC

To set relay control, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

relay-control *variable*

For example:

`mct1/1/1#` **relay-control noloop**

Setting the Source of Send Performance Messages

On DMCT1 net modules and QMCT1 or QMCT1 w/ DS0A link modules only, you can specify the source of send performance messages by setting one of the following options:

Table 7-9. Send Performance Messages Options

BCC Option	Site Manager Option	Description
prm-ci	Customer Inst	The default; indicates that the customer installation supplies the messages
prm-carrier	Carrier	Indicates that the carrier supplies the messages

Using the BCC

To specify the source of send performance messages, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

send-prm-cr-address-bit *variable*

For example:

`mct1/1/1#` **send-prm-cr-address-bit prm-carrier**

Using Site Manager

See the Send Performance Measurement CR Addr parameter on page A-34 for information.

Setting the Source of Accept Performance Messages

On DMCT1 net modules and QMCT1 or QMCT1 w/ DS0A link modules only, you can specify the source from which the router accepts send performance messages by setting one of the following options:

Table 7-10. Accept Performance Messages Options

BCC Option	Site Manager Option	Description
prm-ci	Customer Inst	The default; indicates that the customer installation supplies the messages
prm-carrier	Carrier	Indicates that the carrier supplies the messages

Using the BCC

To specify the source from which the router accepts send performance messages, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

accept-prm-cr-address-bit *variable*

For example:

`mct1/1/1#` **accept-prm-cr-address-bit prm-carrier**

Using Site Manager

See the Accept Perf Measurement CR Addr parameter on page A-34 for information.

Setting the Primary Clock Source

Timing is independent for the two ports on a DMCT1 net module, and for the four ports on a QMCT1 or QMCT1 w/ DS0A link module. For these modules, you select the timing source for each port.

Note: DMCE1 and DMCT1 link modules contain a single clock chip that provides the timing signals for both ports. Therefore, clock parameters that you set for the first port apply to the second port on the module.

Table 7-11 shows the primary source options for timing signals:

Table 7-11. Primary Clock Source Options

BCC Options	Site Manager Options	Description
internal	Internal	Uses the clock chip on the MCT1 module
loop1	Port 1 Ext Loop	The default; uses the signal coming in from port 1
loop2	Port 2 Ext Loop	Uses the signal coming in from port 2
loop3	Port 3 Ext Loop	Uses the signal coming in from port 3 on a QMCT1
loop4	Port 4 Ext Loop	Uses the signal coming in from port 4 on a QMCT1
external	Auxiliary Ext	Uses an external source via port 1 on a QMCT1

Note: External clocking via port 1 requires a special Y-cable, Nortel Networks Order No. AA0018006.

Using the BCC

To set the primary clock source, navigate to the mct1 prompt (for example , **box**; **mct1/1/1**) and type:

primary-clock *variable*

For example:

`mct1/1/1#` **primary-clock loop1**

Using Site Manager

See the Primary Clock parameter on page A-35 for information.

Setting the Secondary Clock Source

On DMCT1 net modules and QMCT1 or QMCT1 w/ DS0A link modules only, you can specify a backup source for timing signals:

BCC Options	Site Manager Options	Description
internal	Internal	The default; uses the clock chip on the link or net module
loop1	Port 1 Ext Loop	Uses the signal coming in from port 1
loop2	Port 2 Ext Loop	Uses the signal coming in from port 2
loop3	Port 3 Ext Loop	Uses the signal coming in from port 3 on a QMCT1
loop4	Port 4 Ext Loop	Uses the signal coming in from port 4 on a QMCT1
external	Auxiliary Ext	Uses an external source via port 1 on a QMCT1

Using the BCC

To set the secondary clock source, navigate to the mct1 prompt (for example, **box**; **mct1/1/1**) and type:

secondary-clock *variable*

For example:

`mct1/1/1#` **secondary-clock loop2**

Using Site Manager

See the Secondary Clock parameter on page A-35 for information.

Setting the Loop Clock

In the BCC, the Loop Clock State parameter specifies the MCE1 port's loop clock status. You can set this parameter to present (up), which is the default, or absent (down).

Using the BCC

To set the loop clock state, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

loop-clock-state *variable*

For example:

`mce1/1/2/1#` **loop-clock-state absent**

Setting the External Clock

In the BCC, the External Clock State parameter indicates whether the external clock is operational. You can set this parameter to present (up), which is the default, or absent (down).

Using the BCC

To set the external clock state, navigate to the mce1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

external-clock-state *variable*

For example:

`mce1/1/2/1#` **external-clock-state absent**

Setting Buffer Credits for MCT1

See "Setting Buffer Credits for MCE1" on page 7-14 for details about how to set the Transmit Buffer Use Credits and Receive Buffer Use Credits parameters using the BCC.

Configuring a DS0A Connection

This section describes how to configure a T1 connection to a QMCT1 w/ DS0A link module to carry SDLC traffic.

Gathering Required Information

You need the following information from the subscriber:

- The data rate of the SDLC connection between the IBM host and the customer premise equipment (CPE) (see Figure 7-1).

  Use this rate to set the Rate Adaption logical line parameter for both the router connecting the host side and the router connecting the remote access side. Valid options are 9.6 Kb/s or 19.2 Kb/s.

  To establish a connection, the subscriber must match this rate to that of the SDLC connection between the controller and CPE on the remote access side.

- The line-encoding settings of both the host and CPE, and the controller and CPE on the remote access side.

  Use these settings to set the NRZI Enabled logical line parameter. Valid options are Enable to configure NRZI (nonreturn to zero inverted) or Disable to configure NRZ (nonreturn to zero).

  The setting of the NRZI Enable parameter on a router connecting the host side is unrelated to and can differ from that of a router connecting the remote access side.

- The NRZI type setting for:

  -- The host side if the line-encoding settings of the host and CPE do not match

  -- The remote access side if the line-encoding settings of the controller and CPE do not match

  You need these settings to set the NRZI Type logical line parameter. Valid options are Mark or Space.

  Like the NRZ Enabled parameter, the NRZI Type on a router connecting a host side is unrelated to and can differ from that connecting a remote access side. The subscriber’s host and remote access settings can also be different.

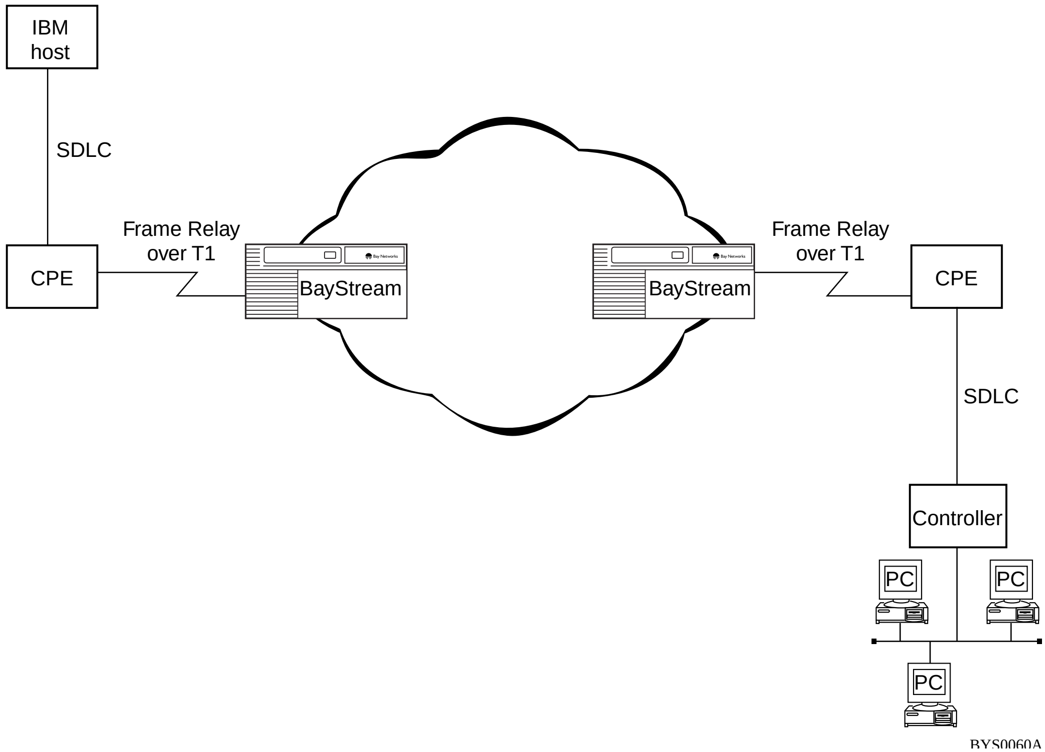

Figure 7-1. SDLC Connection Using Frame Relay over T1 Lines

Setting Parameters

Using the BCC

You can configure a T1 connection to an unconfigured port on a QMCT1 DS0A link module to carry SDLC traffic.

1. **To configure the T1 connection, navigate to the mct1 prompt (for example, box; mct1/1/1) and type:**

   logical-line *circuit name*

   For example:

   `mct1/1/1#` **logical-line mct1-11-1**

The circuit name identifies the following:

- Type of circuit (MCT1)
- Physical connector (slot and port number)
- Number of the logical line on the MCT1 port

2. **To configure SDLC as the WAN protocol, type:**

   `logical-line/mct1-11-1#` **wan-protocol sdlc**

3. **To set the Rate Adaption parameter to 9.6 (adaption-9dot6k) or 19.2 Kb/s (adaption-19dot2k), type:**

   `logical-line/mct1-11-1#` **rate-adaption adaption-9dot6k**

4. **To enable (for NRZI line coding) or disable (for NRZ line coding) the NRZI Encoding parameter, type:**

   `logical-line/mct1-11-1#` **nrzi-encoding enabled**

5. **If you enabled NRZI encoding, set the NRZI Type parameter to mark or space frame format, as specified by the subscriber. Type:**

   `logical-line/mct1-11-1#` **nrzi-type mark**

Table 7-12 provides a matrix of supported line-encoding configurations.

Table 7-12. Line Encoding for SDLC Connections

IBM Host	IBM CPE	NRZI Type
NRZI, Mark	NRZ	NRZI, Mark
NRZ	NRZ	NRZ
NRZI, Space	NRZ	NRZI, Space
NRZ	NRZI, Mark	NRZ
NRZI, Mark	NRZI, Space	NRZ

Using Site Manager

You can configure a T1 connection to an unconfigured port on a QMCT1 DS0A link module to carry SDLC traffic.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the QMCT1 link module connector.	The Port Application window opens.
2. Click on **OK** to accept the default value, Non-PRI.	The Edit Slot MCT1 window opens.
3. Click on **OK**.	The Slot MCT1 Port Parameters window opens.
4. Click on **OK** to accept the default port parameters, or edit them as described in “Configuring MCE1 and MCT1 Ports,” earlier in this chapter.	The Slot MCT1 Logical Lines window opens.
5. Click on **Add**.	The Add Circuit window opens.
6. Click on **OK**.	The WAN Protocols window opens.
7. Select **SDLC** and click on **OK**.	The Select Protocols window opens.
8. Select **DLSw** and click on **OK**.	The Local Device Configuration window opens.
9. Specify values for the parameters you want to modify for this SDLC-to-frame relay connection. Click on **Help** or see *Configuring DLSw Services* for descriptions of the DLSw Local Device parameters.	
10. Click on **OK**.	The DLS Local Device Configuration window opens.
11. Click on **Done**.	The DLSw Slot Configuration window opens.
12. Click on **Done**.	The Slot MCT1 Logical Lines window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
13. Scroll to the Rate Adaption parameter and set the value to **9.6** or **19.2** Kb/s. After you set the data rate for an SDLC connection, you can assign only one timeslot to the associated logical line. Click on **Help** or see the parameter description on page A-39.	Site Manager sets rate adaption to the value you specified.
14. Scroll to the NRZI Enable parameter and set the value to **Enable** (for NRZI line coding) or **Disable** (for NRZ line coding), as specified by the subscriber. Click on **Help** or see the parameter description on page A-42.	Site Manager sets the NRZI Enable parameter to the value you specified.
15. If you enabled NRZI, scroll to the NRZI Type parameter and set the value to **Mark** or **Space** frame format, as specified by the subscriber. Click on **Help** or see the parameter description on page A-43.	Site Manager sets the NRZI type to the value you specified.
16. Click on **Done**.	

See Table 7-12 for a matrix of supported line-encoding configurations.

Configuring Non-PRI Logical Lines

Logical lines are the logical paths for data communication on a physical connection. Add logical lines for an MCE1 or MCT1 port as follows:

1. Define logical lines.
2. Customize logical line parameters.
3. Assign timeslots.

Defining Logical Lines

You can define logical lines for an MCE1 or MCT1 port using the BCC or Site Manager. A single MCE1 port supports up to 31 logical lines. A single MCT1 port supports up to 24 logical lines.

Note: If you want to group the logical lines into a multiline circuit, see Chapter 10.

Using the BCC

1. **To add logical lines, navigate to the mce1 or mct1 prompt (for example, stack; mce1/1/2/1 or box; mct1/1/1) and type:**

   logical-line *circuit-name*

   For example:

   `mct1/1/1#` **logical-line mct1-11-1**

   OR

   `mce1/1/2/1#` **logical-line mce1-121-1**

   The circuit name identifies the following:

   - Type of circuit (MCE1 or MCT1)
   - Physical connector (slot and port number)
   - Number of the logical line on the MCE1 or MCT1 port
   - Module number (ASN net modules only)

2. **To select a WAN protocol, type:**

   wan-protocol *variable*

   For example:

   `logical-line/mct1-11-1#` **wan-protocol framerelay**

   See *Configuring and Managing Routers with Site Manager* and the appropriate protocol configuration guide for information about selecting WAN protocols.

3. **To select the protocols to run on this logical line, type the name of the protocol (`ppp`, `standard`, or `frame-relay`).**

   For example:

   `logical-line/mct1-11-1#` **frame-relay**

   `frame-relay/mct1-11-1#`

   From the frame-relay prompt, you can change the settings for the Frame Relay parameters.

   See the appropriate protocol configuration guide for information about configuring WAN protocols over a logical line.

4. **Repeat steps 1 to 3 for each logical line that you want to create.**

See "Customizing Logical Line Parameters" on page 7-38 for information on editing logical line parameters.

Using Site Manager

To add the logical lines for an MCE1 or MCT1 port, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the MCE1 or MCT1 Logical Lines window.	After you customize the port parameters for a non-PRI circuit, the MCE1 or MCT1 Logical Lines window opens.
2. Click on **Add**.	The Add Circuit window opens.
3. Specify the logical line in the Circuit Name box.	
4. Click on **OK**.	The WAN Protocols window opens.
5. Select the WAN protocol and click on **OK**. See *Configuring and Managing Routers with Site Manager* and the appropriate protocol configuration guide for information about selecting WAN protocols.	The Select Protocols window opens.
	(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
6. Select the protocols to run on this logical line. See the appropriate protocol configuration guide for instructions.	The Logical Lines window opens, showing the first MCE1 or MCT1 circuit.
7. Repeat steps 2 to 6 for each logical line that you want to create.	

You can use the default name that appears in the Add Circuit window or change the name by clicking on the Circuit Name box and typing a new name.

Figures 7-2 and 7-3 illustrate how Site Manager generates the default logical line name. The default name identifies the following:

- Circuit type (MCE1 or MCT1)
- Physical connector (slot and port number)
- Number of the logical line on the MCE1 or MCT1 port
- Module number (ASN net modules only)

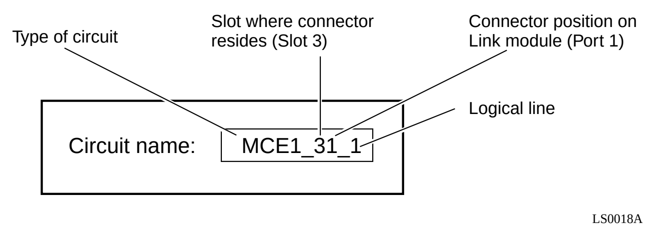

Figure 7-2. Default Circuit Name for Link Modules

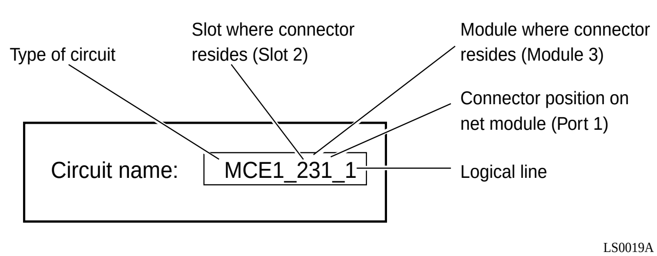

Figure 7-3. Default Circuit Name for ASN Net Modules

Customizing Logical Line Parameters

Table 7-13 lists the logical line configuration tasks described in this section and indicates whether you can use the BCC or Site Manager to perform each task.

Table 7-13. MCE1 and MCT1 Logical Line Configuration Tasks

Task	BCC	Site Manager	Page
Enabling or Disabling the Logical Line	✓	✓	7-39
Enabling or Disabling BofL Messages	✓	✓	7-40
Setting the BofL Timeout	✓	✓	7-40
Enabling or Disabling Logical Line Loopback	✓	✓	7-41
Viewing the Configured WAN Protocol	✓	✓	7-41
Setting the HDLC Service Type	✓	✓	7-42
Setting the Local HDLC Address	✓	✓	7-42
Setting the Remote HDLC Address	✓	✓	7-43
Setting Rate Adaption	✓	✓	7-44
Setting the Interframe Time Fill Pattern	✓	✓	7-45
Setting the CRC Size	✓	✓	7-46
Setting the MTU Size	✓	✓	7-46
Enabling or Disabling Remote Loopback Detection	✓	✓	7-47
Configuring BERT Diagnostic Pattern Tests	✓	✓	7-47
Enabling or Disabling Fractional T1 Loopback Detection	✓	✓	7-48
Configuring NRZI Line Encoding	✓	✓	7-49
Setting the Transmit Queue Length	✓		7-50
Setting the Receive Queue Length	✓		7-51

Using the BCC

To edit parameters for a logical line, navigate to the mce1 or mct1 prompt (for example, **stack**; **mce1/1/2/1**) and type:

```
mce1/1/2/1# logical-line mce1-121-1
logical-line-mce1-121-1#
```

You can edit the logical line parameters from the logical-line/mce1-121-1 prompt. See the following sections for information about editing logical line parameters.

Using Site Manager

To edit parameters for a logical line, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the MCE1 or MCT1 Logical Lines window, select the line and circuit name from the logical lines list.	Site Manager displays the circuit's parameters.
2. Edit the parameters.	
3. Click on **Apply**.	

Enabling or Disabling the Logical Line

The logical line is enabled by default. You can disable or reenable each logical line.

Using the BCC

To enable or disable the logical line, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

state *variable*

For example

`logical-line/mce1-121-1#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-36 for information.

Enabling or Disabling BofL Messages

Transmission of BofL packets is enabled by default on a logical line. A BofL packet is sent as often as the value you specify for the BofL Timeout parameter.

Using the BCC

To enable or disable BofL messages on the logical line, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

bofl *variable*

For example:

`logical-line/mce1-121-1#` **bofl disabled**

Using Site Manager

See the Breath of Life (BofL) Enable/Disable parameter on page A-36 for information.

Setting the BofL Timeout

The time period between transmissions of BofL packets is 5 seconds by default. You can change the BofL timeout to any value from 1 to 60 seconds.

Using the BCC

To set the BofL timeout, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

bofl-timeout *integer*

For example:

`logical-line/mce1-121-1#` **bofl-timeout 10**

Using Site Manager

See the BofL Timeout parameter on page A-36 for information.

Enabling or Disabling Logical Line Loopback

In logical line (*channelized*) loopback mode, the router retransmits received data for specified timeslots only. This proprietary, SNMP-based form of loopback passes data through the HDLC controller, and therefore only supports HDLC data. Logical line loopback mode is disabled by default.

Using the BCC

To enable or disable logical line loopback, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

fractional-loopback *variable*

For example:

`logical-line/mce1-121-1#` **fractional-loopback enabled**

Using Site Manager

See the Fractional Loopback parameter on page A-37 for information.

Viewing the Configured WAN Protocol

The WAN Protocol parameter indicates which WAN protocol is configured on this logical line. Do not change the current value.

Caution: Changing the WAN protocol does not reconfigure the interface, and could disable it.

To change the configured WAN protocol for an interface, delete and then reconfigure the circuit.

See the WAN Protocol parameter on page A-37 for information.

Setting the HDLC Service Type

The logical line HDLC service is LLC1 by default. LLC1 adds the HDLC address and control fields as a prefix to the frame. You can change the service to basic HDLC (transparent), based on the requirements of the E1 equipment.

Using the BCC

To set HDLC service, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

hdlc-service *variable*

For example:

`logical-line/mce1-121-1#` **hdlc-service transparent**

Using Site Manager

See the Service parameter on page A-37 for information.

Setting the Local HDLC Address

Use the options listed in Table 7-14 to specify the 1-byte HDLC address of this logical line.

Table 7-14. Local HDLC Address Options

BCC Option	Site Manager Option
dce	DCE
dte	DTE
seven	An explicit address value: 2, 4, 5, 6, or 7

Use unique HDLC addresses for the local and remote interfaces at either end of the point-to-point circuit. For example, if the remote address is DTE, configure the local address as DCE.

If you configure X.25 on this line, set this parameter to either DCE or DTE.

Using the BCC

To specify the local HDLC address, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

local-hdlc-address *variable*

For example:

`logical-line/mce1-121-1#` **local-hdlc-address dce**

Using Site Manager

See the Local HDLC Address parameter on page A-38 for information.

Setting the Remote HDLC Address

Use the options listed in Table 7-15 to specify the 1-byte HDLC address of the remote MCE1 interface.

Table 7-15. Remote HDLC Address Options

BCC Option	Site Manager Option
dce	DCE
dte	DTE
seven	An explicit address value: 2, 4, 5, 6, or 7

Use unique HDLC addresses for the local and remote interfaces at either end of the point-to-point circuit. For example, if the local address is DTE, configure the remote address as DCE.

If you configure X.25 on this line, set this parameter to either DCE or DTE.

Using the BCC

To specify the local HDLC address, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

remote-hdlc-address *variable*

For example:

`logical-line/mce1-121-1#` **remote-hdlc-address dte**

Using Site Manager

See the Remote HDLC Address parameter on page A-38 for information.

Setting Rate Adaption

Rate adaption determines the number of data bits transmitted and their bit positions within the timeslot to achieve the data rate. The term *rate adaption* means that by setting this parameter, you are adapting to the rate of your subscriber; the software does not change the rate dynamically.

The logical line rate adaption is 64 Kb/s by default. You can select one of the options listed in Table 7-16.

Table 7-16. Rate Adaption Options

BCC Option	Site Manager Option	Description
adaption-64k	64K	Sets the data rate to 64 Kb/s, using all 8 bits in the timeslot.
adaption-56kmsb	56K MSB	Sets the data rate to 56 Kb/s, using 7 of the 8 bits in the timeslot, excluding the most significant bit (MSB). The MSB carries framing overhead.
adaption-56klsb	56K LSB	Sets the data rate to 56 Kb/s, using 7 of the 8 bits in the timeslot, excluding the least significant bit (LSB). The LSB carries framing overhead.
adaption-9dot6k	9.6K	Sets the data rate to 9.6 Kb/s, using DS0A frame format.
adaption-19dot2k	19.2K	Sets the data rate to 19.2 Kb/s, using DS0A frame format.

The 64K, 56K MSB, and 56K LSB options specify full DS0 rates.

The 9.6K and 19.2K options specify DS0A subrates for an SDLC connection, and are available only for an installed QMCT1 with DS0A link module. If you choose one of these options, you can assign only one logical line to a timeslot. See “Configuring a DS0A Connection” earlier in this chapter.

Using the BCC

To set the rate adaption, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

rate-adaption *variable*

For example:

`logical-line/mce1-121-1#` **rate-adaption adaption-64k**

Using Site Manager

See the Rate Adaption parameter on page A-39 for information.

Setting the Interframe Time Fill Pattern

The router transmits an interframe time fill (IFTF) pattern when there is no data to transmit on a channel. You can select the IFTF pattern for data transmission across this logical line:

- Flags selects a 0x7E pattern (0 1 1 1 1 1 1 0).
- Idles selects a 0xFF pattern (1 1 1 1 1 1 1 1).

The router uses flags by default.

Using the BCC

To specify the interframe time fill pattern, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

interframe-character *integer*

For example:

`logical-line/mce1-121-1#` **interframe-character idles**

Using Site Manager

See the Interframe Time Fill Character parameter on page A-39 for information.

Setting the CRC Size

By default, the router uses the 16-bit CRC type. The router appends a 16-bit CRC to the transmitted frames and performs a 16-bit CRC on received frames. You can change to 32-bit CRC, where the router appends a 32-bit CRC to transmitted frames and performs a 32-bit CRC on received frames.

Using the BCC

To set the crc size, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

crc-size *variable*

For example:

```
logical-line/mce1-121-1# crc-size crc-32
logical-line/mce1-121-1# crc-size crc-16
```

Using Site Manager

See the CRC Size parameter on page A-40 for information.

Setting the MTU Size

The router uses the transmit/receive buffer size (MTU) to configure the largest frame that the router can transmit or receive across this MCE1 port. The router discards frames larger than this value. The MTU is 1600 bytes by default. You can change it to any size from 3 to 4608 bytes for the logical line.

Using the BCC

To set the MTU size, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

mtu-size *integer*

For example:

```
logical-line/mce1-121-1# mtu-size 3
```

Using Site Manager

See the MTU Size parameter on page A-40 for information.

Enabling or Disabling Remote Loopback Detection

Setting the Remote Loopback Detection parameter enables or disables detection of the driver's BofL packets on this logical line, as long as the BofL parameter is enabled for this interface. If you select enabled to put the line in loopback detection mode, the driver will bring down the interface when it detects its BofL packets.

Using the BCC

To enable or disable remote loopback detection, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

remote-loopback-detection *variable*

For example:

`logical-line/mce1-121-1#` **remote-loopback-detection enabled**

Using Site Manager

See the Remote Loopback Detection parameter on page A-40 for information.

Configuring BERT Diagnostic Pattern Tests

DMCT1 net modules and QMCT1 or QMCT1 w/ DS0A link modules support the bit error rate test (BERT) on individual logical lines.

In BERT mode, the router introduces deliberate error patterns into the transmitted bit stream on a single logical line. It can generate patterns such as all ones, all zeros, or a quasi-random signal sequence (QRSS) pattern.

Using Site Manager

To configure BERT diagnostics, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Enable BERT mode on the QMCT1 or DMCT1 logical line. Click on **Help** or see the parameter description on page A-41.	Site Manager enables BERT mode.
2. With BERT mode enabled, specify the bit pattern transmitted during BERT diagnostics. Click on **Help** or see the BERT Test Pattern parameter on page A-41.	

See "Testing MCE1 and MCT1 Lines," later in this chapter, for more information about running BERT diagnostics.

Enabling or Disabling Fractional T1 Loopback Detection

QMCT1 and QMCT1 w/ DS0A link modules only can detect and generate fractional T1 (FT1) loopback codes as specified in ANSI T1.403 Annex B.

FT1 loopback (*channel loopback*) is an ANSI-standard 127-octet loop. FT1 loopback detection allows remote test equipment to put one channel (logical line or DS0 group) on any port into loopback testing mode without affecting the other logical lines.

See "Running Logical Line Tests" later in this chapter for information about generating fractional loopback codes.

Note: Although the DMCT1 net module does not support FT1 loopback, it does provide BERT testing on selected DS0s, as described in "Running Logical Line Tests" later in this chapter.

Using the BCC

To enable or disable FT1 loopback, navigate to the logical-line prompt (for example, **box**; **mct1/1/1**; **logical-line/mct1-11-1**) and type:

accept-fractional-loop-code *variable*

For example:

`logical-line/mct1-11-1#` **accept-fractional-loop-code disabled**

Using Site Manager

See the Accept Fractional Loopback Code parameter on page A-42 for information.

Configuring NRZI Line Encoding

On DMCT1 net modules and QMCT1 or QMCT1 w/ DS0A link modules only, you can configure the NRZI Encoding (NRZI Enable parameter in Site Manager) and NRZI type parameters. If applicable, see "Configuring a DS0A Connection" earlier in this chapter. Table 7-12 on page 7-32 provides a matrix of supported configurations for the QMCT1 w/ DS0A logical line-encoding parameters.

When enabled, the NRZI Encoding parameter specifies nonreturn to zero inverted (NRZI) line encoding to communicate state changes between the subscriber's devices across the frame relay network. You can disable communication of such state changes by setting this parameter to disabled.

The NRZI Type parameter specifies the NRZI encoding format in the frame on the logical line. Ignore NRZI Type if you set NRZI Encoding to disabled.

Valid options are as follows:

- Mark -- This format uses a 0-bit to indicate a state change and a 1-bit to indicate no state change.
- Space -- This format uses a 1-bit to indicate a state change and a 0-bit to indicate no state change.

Using the BCC

To enable or disable NRZI encoding, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

nrzi-encoding *variable*

For example:

`logical-line/mce1-121-1#` **nrzi-encoding enabled**

To set the NRZI type, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

nrzi-type *variable*

For example:

`logical-line/mce1-121-1#` **nrzi-type space**

Using Site Manager

See the NRZI Enable parameter on page A-42 for information. For information about the NRZI Type parameter, see page A-43.

Setting the Transmit Queue Length

In the BCC, the Transmit Queue Length parameter specifies the transmit queue length for each logical line. This is the maximum number of buffers present on the transmit descriptor ring on a logical line at any given time.

You can set this parameter from 0 to 512. A value of zero causes the router to use its default values.

Nortel Networks recommends that you do not change the default setting of this parameter without careful consideration of the traffic flow in and out of the T1/E1 logical lines.

Caution: You can affect router performance severely by over-allocating buffer credits.

See "Setting Buffer Credits for MCE1" on page 7-14 for more information.

Using the BCC

To set this parameter, navigate to the logical-line prompt (for example, **box**; **mce1/1/1**; **logical-line/mce1-11-1**) and type:

transmit-queue-length *variable*

For example:

`logical-line/mce1-11-1#` **transmit-queue-length 100**

Note: This parameter is not supported on the ASN.

Setting the Receive Queue Length

In the BCC, the Receive Queue Length parameter specifies the receive queue length for each logical line. This is the maximum number of buffers present on the receive descriptor ring on a logical line at any given time.

You can set this parameter from 0 to 512. A value of zero causes the router to use its default values.

Nortel Networks recommends that you do not change the default setting of this parameter without careful consideration of the traffic flow in and out of the T1/E1 logical lines.

Caution: You can affect router performance severely by over-allocating buffer credits.

See "Setting Buffer Credits for MCE1" on page 7-14 for more information.

Using the BCC

To set this parameter, navigate to the logical-line prompt (for example, **box**; **mce1/1/1**; **logical-line/mce1-11-1**) and type:

receive-queue-length *variable*

For example:

`logical-line/mce1-11-1#` **receive-queue-length 100**

Note: This parameter is not supported on the ASN.

Assigning Timeslots

After configuring logical lines, you configure channels (DS0s) of bandwidth by grouping 1 to 24 (MCT1) or 1 to 31 (MCE1) contiguous or noncontiguous DS0 timeslots per DS1 frame.

Using the BCC

To assign a timeslot to a logical line, navigate to the logical-line prompt (for example, **stack**; **mce1/1/2/1**; **logical-line/mce1-121-1**) and type:

time-slots *integer*

For example:

`logical-line/mce1-121-1#` **time-slots 24**

To assign multiple timeslots to a logical line, type:

`logical-line/mce1-121-1#` **time-slots {1 2 3 4 10}**

Using Site Manager

To assign timeslots, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the MCE1 or MCT1 Logical Lines window.	
2. Click on **Timeslots**.	The MCE1 Timeslots window or the MCT1 Timeslots window opens. This window represents the timeslots (31 for MCE1, 24 for MCT1).
3. Click on an **Unused** timeslot.	A list of logical lines to which you can assign the timeslot opens.
4. Select the logical line to which you want to assign the timeslot.	
5. Repeat steps 3 and 4 for each timeslot you want to assign, or click on **Select All** to assign all timeslots to a logical line.	
6. Click on **OK**.	The MCE1 or MCT1 Logical Lines window opens.
7. Click on **Apply**.	
8. Click on **Done**.	The Configuration Manager window opens.

Note: For MCE1 circuits, timeslot 16 is unavailable when the Line Type parameter in the MCE1 Port Parameters window is set to E1 MF or E1 CRC MF.

Configuring ISDN PRI B Channels

ISDN Primary Rate Interface (PRI) software eliminates the need for an external ISDN terminal adapter (TA) when attaching a Nortel Networks BLN or BCN router to an ISDN network. The ISDN PRI software interface connects directly to an ISDN switched service network through an MCT1 or MCE1 link module.

The Nortel Networks ISDN PRI software interface complies with the North American and European ISDN PRI standards. The North American standard provides 23 B channels of 64 Kb/s each and one 64 Kb/s D channel. The European standard provides 30 B channels and one D channel.

Using the BCC

To configure ISDN PRI B channels, complete the following tasks.

1. **To configure PRI, navigate to the mce1 or mct1 prompt (for example, stack; mce1/1/2/1) and type:**

   `mce1/1/2/1#` **pri**

2. **To assign a timeslot to the B channel, type:**

   `pri/1/2/1#` **channels 1**

   You can assign a timeslot to all channels or from 1 to 23 channels.

   To assign multiple timeslots to a B channel, type:

   `pri/1/2/1#` **channels {1 2 3 4}**

3. **To set the MTU size, type:**

   `pri/1/2/1#` **mtu 100**

   You can set the MTU size from 3 to 4608 bytes. The default is 1600 bytes.

Using Site Manager

To configure ISDN PRI B channels, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the PRI Logical Lines window.	
2. Click on **B Channels**.	The MCE1 Timeslots window or the MCT1 Timeslots window opens. This window represents the timeslots (31 for MCE1, 24 for MCT1).
3. Select a timeslot to assign to the B channel.	
4. Select **B Channel**.	
5. Repeat steps 3 and 4 for each timeslot you want to assign, or click on **Select All** to assign all timeslots to the B channel.	
6. Click on **OK**.	
7. Select the B channel in the scroll box.	
8. Edit the MTU Size (bytes) parameter for the B channel. The router uses the MTU to configure the largest frame that the logical line can transmit or receive. The PRI MTU is 1600 bytes by default. You can change it to any size from 3 to 4608 bytes. See the MTU Size (bytes) parameter on page A-40.	
9. Click on **Apply**.	
10. Click on **Done**.	The Configuration Manager window opens.

Testing MCE1 and MCT1 Lines

The following sections describe how to use the Configuration Manager to test single-line and multiline MCE1 and MCT1 link module and net module interfaces:

- About the Tests
- Setting Port Test Parameters
- Running Port Tests
- Setting Logical Line Test Parameters
- Running Logical Line Tests

About the Tests

While in dynamic mode, you can use the Configuration Manager to trigger port actions to test the quality of MCE1 and MCT1 connections. Table 7-17 describes the tests you can run.

Table 7-17. MCE1 and MCT1 Line Tests

Test Description	Link Modules	ASN Net Modules
Transmitting specific codes to the remote end of the MCE1 or MCT1 connection	All	All
Introducing deliberate error patterns into the port BERT bit stream	All	All
Introducing deliberate error patterns into a logical line's BERT bit stream	QMCT1, QMCT1 w/DS0A	DMCT1
Initiating fractional loopback code on individual logical lines	QMCT1, QMCT1 w/DS0A	DMCT1

Note: Except for the logical line tests on QMCT1 link modules and DMCT1 net modules, all test actions are port specific. For example, a BERT reset action resets all port-specific series of BERT counters.

BERT statistics show the results of your test actions. You can view BERT statistics using the Statistics Manager utility. For information about the Statistics Manager, see *Configuring and Managing Routers with Site Manager.*

Before testing a port or logical line, you must set the test parameters:

- Setting Port Test Parameters
- Setting Logical Line Test Parameters

Then, start the tests:

- Running Port Tests
- Running Logical Line Tests

Setting Port Test Parameters

Table 7-18 lists the MCE1 and MCT1 port test configuration tasks described in this section. You can only use Site Manager to perform each task.

Table 7-18. MCE1 and MCT1 Port Test Configuration Tasks

To set the port test parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In dynamic mode, click on a configured MCT1 or MCE1 connector in the Configuration Manager window.	The Logical Lines window opens.
2. Click on **Port Details.**	The Port Parameters window opens.
3. Click on **Line Tests.** Note that the Line Tests option appears only in dynamic mode**.**	The Port Actions window opens.
4. Edit the port action parameters, located in the upper portion of the window.	
5. After setting a parameter, click on **Apply**.	
6. Click on **Done** when you are finished setting port action parameters.	

Note: All changes you apply to the port in the Port Actions window are in effect only while the window is active. When you exit the Port Actions window, all port settings revert to the original settings.

Enabling or Disabling BERT Mode

Enable BERT mode for BERT testing using Site Manager.

By setting this parameter, you enable or disable BERT mode on all logical lines except QMCT1 and DMCT1 net module interfaces. On these interfaces, you can enable or disable BERT mode on individual logical lines.

See the BERT Mode parameter on page A-41 for information.

Setting the BERT Alarm Type

Using Site Manager, you can specify the type of alarm signal to be generated while in BERT mode, or disable the generation of alarm signals altogether.

See the BERT Alarm Type parameter on page A-41 for information.

Setting the BERT Test Pattern

When a port is in BERT mode, it can generate patterns such as all ones, all zeros, or a QRSS pattern. Use Site Manager to set the BERT test pattern.

See the BERT Test Pattern parameter on page A-54 for information.

Setting the Line-Coding Method

How you set line coding depends on whether you are testing an MCE1 or MCT1 line:

- The MCE1 port uses HDB3 transmit and receive line coding by default. You can select AMI line coding instead.
- The MCT1 port uses B8ZS transmit and receive line coding by default. You can select AMI line coding instead.

For a description of these line-coding methods, see “Setting the MCE1 Line Coding” or “Setting the MCT1 Line Coding” on pages 7-9 and 7-19 respectively.

Setting the Line Type

The line-type setting depends on whether you are testing an MCE1 or MCT1 line:

- MCE1 line -- Select the appropriate frame format for the associated E1 equipment you are testing:
  - E1 -- The default
  - E1 CRC -- Adds a 4-byte CRC trailer at the end of each frame
- MCT1 line -- Select the appropriate frame format for testing:
  - ESF -- The default; FDL port actions apply
  - SF/D4

For a detailed description of SF and ESF formats, see “Setting the T1 Frame Type” in Chapter 6.

Setting FDL Options (MCT1 Only)

Facility data link (FDL) options apply only when the MCT1 line type is configured as ESF for testing. Select one of the following ESF line types using Site Manager:

Table 7-19. ESF Line Types

Site Manager Option	Description
ANSI 403	The default; conforms to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DSI Metallic Interface)*
AT&T 54016	Conforms to the 1989 AT&T specification (*Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Superframe Format*)
None	Disables the FDL mode

See the FDL Configuration parameter on page A-32 for information.

Setting the Signal Level (MCT1 Only)

By default, the T1 transmit power level is 0.0 dB. You specify a decibel level from -15 dB to 1.5 dB, according to the length of the cable or as determined by the carrier.

The carrier determines signal levels on a *long-haul* (0 to 6000 ft. of cable) T1 network interface. If 0.0 dB is not sufficient for long-haul, the carrier determines values of -15 (ds1-minus15) and -7.5 dB (ds1-minus-7point5).

Signal power for DSX-1 *short-haul* (0 to 655 ft.) is based on cable length. For DSX-1, decibel levels correspond to cable length, as follows:

Table 7-20. Signal Level Options

Cable Length	Site Manager Option
0 to 133 ft.	0.0 dB
133 to 255 ft.	0.5 dB
255 to 399 ft.	0.8 dB
399 to 533 ft.	1.1 dB
533 to 655 ft.	1.5 dB

By default, the signal level is set to 0.0 dB. Set the long-haul or short-haul signal level for this MCT1 interface according to the length of the cable or as the carrier specifies, using Site Manager.

See the Signal Level (dB) parameter on page A-31 for information.

Enabling or Disabling the International Bit (MCE1 Only)

By default, MCE1 does not use the international bit in E1 frames. Enable or disable use of the international bit for testing an MCE1 interface using Site Manager.

See the International Bit parameter on page A-27 for information.

Running Port Tests

Port tests affect all logical lines associated with a port. Table 7-21 describes the BERT test commands you can send on any MCT1 or MCE1 port. Table 7-22 describes the loopback commands you can send on an MCT1 port only.

Table 7-21. Send Commands for MCE1 and MCT1 Port Tests

Site Manager Send Command	Function
Reset BERT Counters	Resets all counters to 0
Insert 1 Error	Inserts a single (nonrepeating) error into the bit stream
Insert 1 Error/1K	Inserts a deliberate error into every thousandth position in the bit stream
Insert 1 Error/1M	Inserts a deliberate error into every millionth position in the bit stream
Disable Insert Error	Stops the insertion of deliberate errors into the bit stream

Note: FDL loopback command options apply only when the MCT1 line type is configured as ESF for testing. For more information about FDL loopback codes, see ANSI T1.408 ISDN *Primary Rate - Customer Installation Metallic Interfaces Layer 1 Specification*.

Table 7-22. Send Commands for MCT1 Port Loopback

Site Manager Send Command	Function
Loop Up	Sends a loop-up code to the remote end to initiate line loopback. After a minimum of 4.5 seconds, the port loops receive data back onto the T1 transmit path at the T1 interface. The line type setting determines the coding scheme.
Loop Down	Sends a loop-down code to the remote end to stop the line loopback condition
FDL Payload Loop	Sends a loop-up code to the remote end to initiate payload loopback
FDL Disable Payload	Sends a loop-down code to the remote end to stop the payload loopback
FDL Line Loop CI	Sends a Customer Installation (CI) loopback message
FDL Line Loop IA	Sends a CI loopback message, indicating that it originates from the CSU
FDL Line Loop IB	Sends a CI loopback message, indicating that it originates from the DSU
FDL Disable Line Loop	Disables generation of FDL line loopback codes
FDL Disable All	Sends a universal loopback deactivate code to stop all loopback activity

In *payload* loopback, the signal loops through the T1 framing device before the received signal is looped back for retransmission. In *line* loopback, the signal does not go through the framing device.

Caution: Wait for the window to update before selecting another command.

To run MCE1 or MCT1 port tests, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Set the test parameters in the Port Actions window. See "Setting Port Test Parameters" earlier in this chapter.	
2. Click on **Apply**.	Site Manager sets the parameters to the values you specified.
3. To start a test, click on the appropriate **Send** command.	Site Manager performs the test you selected.
4. Repeat step 3 for each test you want to run.	
5. Click on **Done**.	The MCE1 or MCT1 Port Parameters window opens.

See Table 7-21 for the list of BERT test commands you can send on any MCT1 or MCE1 port. See Table 7-22 for the list of loopback commands you can send on an MCT1 port only.

Setting Logical Line Test Parameters

On DMCT1 net modules, QMCT1 link modules, and QMCT1 w/ DS0A link modules only, you can test an individual logical line (DS0 group) associated with a port.

To test a logical line on a DMCT1 or QMCT1 port, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In dynamic mode, click on a configured MCT1 connector in the Configuration Manager window.	The MCT1 Logical Lines window opens.
2. Click on **Port Details**.	The MCT1 Port Parameters window opens.
3. Click on **Line Tests**. Note that the Line Tests option appears only in dynamic mode.	For a DMCT1 net module, the Edit MCT1 Port Actions window opens. For a QMCT1 link module, the Edit QMCT1 Logical Line Actions window opens.
4. Click on **Logical Lines**.	The MCT1 Logical Line Actions window opens.
5. Edit the logical line action parameters, located in the upper portion of the window.	
6. After setting a parameter, click on **Apply**.	
7. Click on **Done** when you are finished setting logical line action parameters.	

The following sections describe each logical line action parameter:

- Configuring BERT Patterns
- Configuring Fractional Loopback Requests

Note: All changes you apply to the port in the Logical Line Actions window are in effect only while the window is active. When you exit the Logical Line Actions window, all logical line settings revert to their original values.

Configuring BERT Patterns

To enable BERT diagnostics on a DMCT1 or QMCT1 logical line, you must:

- Enable BERT mode
- Set the bit test pattern

When a line is in BERT mode, it generates patterns such as all ones, all zeros, or a QRSS pattern.

To enable BERT diagnostics on a DMCT1 or QMCT1 logical line, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Set **BERT Mode** to Enable. Click on **Help** or see the parameter description on page A-41.	Site Manager enables BERT mode.
2. Set the **BERT Test Pattern**, or keep the default value of all ones. Click on **Help** or see the parameter description on page A-41.	

Configuring Fractional Loopback Requests

To configure channel-based loopback testing on a QMCT1 or QMCT1 w/ DS0A logical line only, enable one of the following fractional loopback modes:

Table 7-23. Fractional Loopback Options

Site Manager Option	Description
Accept Fractional Loopback Code	Enables the logical line to send ANSI-standard FT1 loopback codes
Fractional Loopback	Enables the logical line to send SNMP-based logical line loopback codes

See the Accept Fractional Loopback Code parameter on page A-42 and the Fractional Loopback parameter on page A-37 for information.

Running Logical Line Tests

After setting test parameters, you can run the logical line tests.

Note: Although you can run tests on only one logical line per port, you can run simultaneous logical line tests on other ports on the DMCT1 or QMCT1 module.

To test a logical line on a DMCT1, QMCT1, or QMCT1 w/ DS0A port, complete the following tasks

Site Manager Procedure	
You do this	**System responds**
1. Start at the QMCT1 or DMCT1 Logical Line Actions window.	
2. Select the logical line you want to test.	
3. Click on the appropriate **Send** command. Table 7-24 describes the BERT send commands for logical lines. Table 7-25 describes the fractional loopback send commands (for QMCT1 or QMCT1 w/ DS0A lines only). Wait for the Logical Line Actions window to update before selecting another **Send** command.	
4. Repeat step 3 for each test you want to run.	
5. Click on **Done**.	

Table 7-24. Send Commands for Logical Line BERT Tests

Site Manager Send Command	Function
Insert 1 Error	Inserts a single (nonrepeating) error into the bit stream
Insert 1 Error/1K	Inserts a deliberate error into every thousandth position in the bit stream
Insert 1 Error/1M	Inserts a deliberate error into every millionth position
Disable Insert Error	Stops the insertion of deliberate errors into the bit stream

Table 7-25. Send Commands for Logical Line Fractional Loopback Tests

Site Manager Send Command	Function
Frac Loop Up	Sends a loop-up code to the remote end
Clear Frac Loop	Transmits a loopback deactivate code to the remote end
Frac Loop Down	Sends a loop-down code to the remote end

Chapter 8
Configuring FT1 Services

This chapter describes the line services for fractional T1 (FT1) circuits on a Nortel Networks router. It contains the following sections:

Note: This guide assumes that you are working with a router configuration file that already contains the appropriate WAN circuits for the hardware configuration. See *Configuring and Managing Routers with Site Manager* for information about adding circuits to a configuration file.

Overview of FT1 Services

Nortel Networks supports FT1 circuits on ARN, AN and ANH routers using the BCC and Site Manager.

FT1 interfaces provide high-density access to a digital access and crossconnect system (DACS).

An FT1 interface can transmit or receive up to 24 DS0 channels per DS1 frame over leased point-to-point links, with a line rate between 64Kb/s and 1.536Mb/s in 64Kb increments.

All FT1 modules include an integrated DSU/CSU for direct connection to a T1 network. The interfaces provide integrated support for loopback testing and bit error rate test (BERT) line testing.

FT1/T1 and ISDN Phone Line Configuration

If you configure FT1/T1 after configuring an ISDN ST or U interface, you may experience line manager faults if you have a 2B+D channel (one physical RJ-45 cable with two phone circuits) with only one phone line configured. To avoid any line manager faults, configure both phone lines.

Configuring FT1 Services

You can configure an FT1 port using the BCC or Site Manager.

Note: The default serial line configuration is appropriate in most cases. See Chapter 2 for information about changing the default serial line parameters.

Configuring an FT1 Port Using the BCC

To configure FT1 services, navigate to the box prompt and type:

`box#` **ft1 slot 1 connector 1**

OR

`box#` **ft1 1/1**

This command configures FT1 services on slot 1 connector 1.

Setting the External Clock State

In the BCC, the External Clock State parameter enables or disables external clock use. External clock use is enabled (present) by default. You can change this parameter to absent (disabled).

Using the BCC

To change the setting on the external clock, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

external-clock-state *variable*

For example:

`ft1/1/1#` **external-clock-state absent**

Configuring FT1 Services Using Site Manager

You configure an FT1 interface (*port*) using the lines for ISDN Primary Rate Interface (PRI) permanent circuit (non-PRI) applications.

For FT1 ports, the default port application mode must be NONPRI. This indicates that all of the lines have a permanent circuit number and are for leased lines, frame relay, or permanent connections for other non-ISDN PRI applications.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an unconfigured FT1 connector.	The Port Application window opens.
2. Set the Port Application Mode parameter to **NONPRI**. For information on this parameter, click on **Help** or see page A-43.	
3. Click on **OK**.	A window containing the clock parameters opens.

Setting the Clock Parameters

Clock parameters define the timing sources that apply to ports and DS0 timeslots that an FT1 link module supports. The primary clock identifies the primary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

The options for the clock parameters are as follows:

Table 8-1. Clock Parameter Options

BCC Option	Site Manager Option	Description
internal	Internal	Uses the clock chip on the link module.
loop1	Port 1 Ext Loop	Uses the signal coming in from port 1.
loop2	Port 2 Ext Loop	Uses the signal coming in from port 2.
external	Auxiliary Ext	Uses an external clock source.

Using the BCC

To set the clock parameters, navigate to the ft1/1/1 prompt (for example, **box**; **ft1/1/1**) and type:

primary-clock *variable*
secondary-clock *variable*

For example:

`ft1/1/1#` **primary-clock internal**
`ft1/1/1#` **secondary-clock loop2**

Using Site Manager

You access the clock parameters via the window that opens after you set the port application mode. How you access this window is based on whether or not you have already configured the port.

- For an unconfigured FT1 link module

  The first time you configure a port, the Edit FT1 Clock Parameters window opens automatically. When you set these clock parameters, you define the timing sources for the selected port only.

- For a configured FT1 link module

  Display the FT1 Port Parameters window (**FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters).

To set the clock parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the window containing the clock parameters, select a primary clock source option.	
2. Set the **Primary Clock** parameter. Click on **Help** or see the parameter description on page A-49.	Site Manager sets the primary clock to the value you specified.
3. Select the secondary (backup) clock source option.	
4. Set the **Secondary Clock** parameter. Click on **Help** or see the parameter description on page A-50.	Site Manager sets the secondary clock to the value you specified.
5. Click on **OK**.	The FT1 Port Parameters window opens.

To complete the configuration, you must also configure a non-PRI logical line. See "Configuring a Non-PRI Logical Line" on page 8-20 for instructions.

Customizing FT1 Services Using the BCC or Site Manager

Table 8-2 lists the FT1 configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 8-2. FT1 Configuration Tasks

Task	BCC	Site Manager	Page
Enabling or Disabling the FT1 Port	✓	✓	8-6
Setting the FT1 Line Type	✓	✓	8-7
Setting the FT1 Line Coding	✓	✓	8-8
Setting the Signal Level	✓	✓	8-9
Setting the Alarm Threshold Time	✓	✓	8-10
Setting the Alarm Threshold Clear Time	✓	✓	8-10

(continued)

Table 8-2. FT1 Configuration Tasks *(continued)*

Task	BCC	Site Manager	Page
Setting the FDL Mode for ESF Line Types	✓	✓	8-11
Setting the Remote FDL HDLC Address Mode	✓	✓	8-12
Accepting or Rejecting Port Loopback Requests	✓	✓	8-12
Setting the Loop Retention Interframe Time Fill	✓		8-13
Setting a Loopback Configuration	✓	✓	8-14
Setting the Source of Send Performance Messages	✓	✓	8-15
Setting the Source of Accept Performance Messages	✓	✓	8-15
Setting the MTU	✓		8-16
Setting the Primary Clock Source	✓	✓	8-17
Setting the Secondary Clock Source	✓	✓	8-18
Setting the External Clock State	✓		8-19
Setting the Loop Clock	✓		8-19
Setting Relay Control	✓		8-20

Enabling or Disabling the FT1 Port

The FT1 interface is enabled by default when you add the circuit. You can disable or reenable this FT1 interface without moving any cables.

Using the BCC

To enable or disable the FT1 port, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

state *variable*

For example:

`ft1/1/1#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-44 for information.

Setting the FT1 Line Type

Select one of the line types (frame formats) in Table 8-3 for an FT1 line.

Table 8-3. FT1 Line Type Options

BCC Option	Site Manager Option	Description
esf	ESF	The default; transmits extended superframes (ESFs), each consisting of 24 SF/D4 frames; provides enhanced signaling and synchronization For ESF lines, you can also set the facility data link (FDL) mode. See “Setting the FDL Mode for ESF Line Types” on page 8-11.
sf	SF/D4	Transmits superframes, each consisting of 12 individual frames
unframed-t1	Unframed T1	Use only with BERT mode to match the line type

For more information on these frame formats, refer to “Setting the T1 Frame Type” on page 6-4.

Using the BCC

To set the line type, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

port-line-framing *variable*

For example:

`ft1/1/1#` **port-line-framing sf**

Using Site Manager

See the Line Type parameter on page A-45 for information.

Setting the FT1 Line Coding

T1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (see Figure 6-2). A long string of zeros would cause the line to lose synchronization due to lack of pulses. Nortel Networks provides a line-coding mechanism to maintain synchronization.

Table 8-4 lists the line coding options.

Table 8-4. FT1 Line Coding Options

BCC Option	Site Manager Option	Description
b8zs	B8ZS	The default; bipolar with 8 zero substitution (B8ZS) line coding replaces a block of eight consecutive binary zeros with an 8-bit B8ZS code. For more information on B8ZS line coding, see "Enabling or Disabling Bipolar with 8 Zero Substitution (B8ZS)" on page 6-5.
ami	AMI	AMI line coding is also bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the FT1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

Note: If the T1 receive path detects a B8ZS code word when the line is configured for AMI coding, the router generates a log message and an SNMP trap.

Using the BCC

To set the line coding, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

port-line-coding *variable*

For example:

`ft1/1/1#` **port-line-coding ami**

Using Site Manager

See the Line Coding parameter on page A-45 for information.

Setting the Signal Level

The Signal Level parameter specifies the T1 transmit power level in decibels (dB). Line buildout conditions the signals to mitigate attenuation. Line buildout also depends on the physical length of the T1 line.

The carrier determines signal levels on a *long-haul* (0 to 6000 ft. of cable) T1 network interface. If 0.0 dB is not sufficient for long-haul, the carrier determines values of -15 (ds1-minus15) and -7.5 dB (ds1-minus-7point5).

Signal power for DSX-1 *short-haul* (0 to 655 ft.) is based on cable length. For DSX-1, decibel levels correspond to cable length, as follows:

Table 8-5. Signal Level Options

Cable Length	BCC Option	Site Manager Option
0 to 133 ft.	zero-point0	0.0 dB
133 to 255 ft.	dsx1-plus-point5	0.5 dB
255 to 399 ft.	dsx1-plus-point8	0.8 dB
399 to 533 ft.	dsx1-plus1-point1	1.1 dB
533 to 655 ft.	dsx1-plus1-point5	1.5 dB

By default, the signal level is 0.0 dB (zero-point0). Set the long-haul or short-haul signal level for this FT1 interface according to the length of the cable or as the carrier specifies.

Using the BCC

To set the signal level, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

signal-level *variable*

For example:

`ft1/1/1#` **signal-level ds1-minus15**

Using Site Manager

See the Signal Level (dB) parameter on page A-46 for information.

Setting the Alarm Threshold Time

By default, the FT1 interface waits 2 seconds before logging a performance defect or anomaly as an event message. Change the alarm threshold time to any value from 2 to 10 seconds.

Using the BCC

To set the alarm threshold time, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

setup-alarm-threshold *integer*

For example:

`ft1/1/1#` **setup-alarm-threshold 4**

Using Site Manager

See the Setup Alarm Threshold (seconds) parameter on page A-46 for information.

Setting the Alarm Threshold Clear Time

By default, the clear time for performance-failure conditions is 2 seconds. If the defect or anomaly clears in this time interval, FT1 records a performance-cleared condition and logs an event message. You can change the alarm threshold clear time to any value from 2 to 10 seconds.

Using the BCC

To set the alarm threshold clear time, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

clear-alarm-threshold *integer*

For example:

`ft1/1/1#` **clear-alarm-threshold 3**

Using Site Manager

See the Clear Alarm Threshold (seconds) parameter on page A-47 for information.

Setting the FDL Mode for ESF Line Types

The FT1 interface selects a facility data link (FDL) mode only when the Line Type parameter is configured as ESF (see "Setting the FT1 Line Type" on page 8-7). Select one of the following ESF line types:

Table 8-6. ESF Line Types

BCC Option	Site Manager Option	Description
ansi-403	ANSI 403	The default; conforms to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DSI Metallic Interface)*
att-54016	AT&T 54016	Conforms to the 1989 AT&T specification (*Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Superframe Format*)
none	None	Disables the FDL mode

Using the BCC

To set the FDL mode, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

facilities-data-link *integer*

For example:

`ft1/1/1#` **facilities-data-link att-54016**

Using Site Manager

See the FDL Configuration parameter on page A-47 for information.

Setting the Remote FDL HDLC Address Mode

You can select the FDL HDLC address mode to determine how the local FDL responds to HDLC addresses in messages from the remote FDL.

Set the FDL address mode to by (the default) or az for this FT1 interface.

Using the BCC

To set the FDL HDLC address mode, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

fdl-target-hdlc-address *variable*

For example:

`ft1/1/1#` **fdl-target-hdlc-address az**

Using Site Manager

See the Remote FDL HDLC Address Mode parameter on page A-47 for information.

Accepting or Rejecting Port Loopback Requests

By default, the FT1 port accepts requests from a remote device to go into loopback mode. During loopback, the port loops receive data back onto the T1 transmit path. The remote or intermediate test equipment then performs diagnostics on the network between the equipment and the port.

To prevent the port from accepting loopback requests, you can disable detection of remote loop-up and loop-down code.

Using the BCC

To enable or disable port loopback requests, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

accept-loopback-request *variable*

For example:

`ft1/1/1#` **accept-loopback-request enabled**

Using Site Manager

See the Accept Loopback Request parameter on page A-48 for information.

When you enable Accept Loopback Request, you can set the type of loopback you want. See "Setting a Loopback Configuration" on page 8-14.

Setting the Loop Retention Interframe Time Fill

In the BCC, the FDL Loop Interframe Fill parameter is set to mark by default, which enables the detection of loop retention code when the remote end is in line or payload loopback. When you set this parameter to loop-retention, the loop retention interframe time fill (IFTF) for the facility data link (FDL) is enabled after it sends loop-up code.

Using the BCC

To set this parameter, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

fdl-loop-interframe-timefill *variable*

For example:

`ft1/1/1#` **fdl-loop-interframe-fill loop-retention**

Setting a Loopback Configuration

When set, the Loopback Configuration parameter immediately places the port in loopback mode. Table 8-7 lists the loopback configuration options.

Table 8-7. Loopback Configuration Options

BCC Option	Site Manager Option	Description
payload-loop	Payload Loopback	Received signals are looped through the T1 framer, then looped back for retransmission. This method maintains bit-sequence integrity for information bits, but does not maintain the integrity of frames or superframes.
line-loop	Line Loopback	Received signals do not go through the framing device before being looped back out.
no-loop	No Loopback	The default; this option deactivates any current loopback.

Using the BCC

To set a loopback configuration, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

loopback-mode *variable*

For example:

`ft1/1/1#` **loopback-mode payload-loop**

Using Site Manager

See the Loopback Configuration parameter on page A-48 for information.

Setting the Source of Send Performance Messages

On FT1 link modules, specify the source of send performance messages by setting one of the following options:

Table 8-8. Send Performance Messages Options

BCC Option	Site Manager Option	Description
prm-ci	Customer Inst	The default; indicates that the customer installation supplies the messages
prm-carrier	Carrier	Indicates that the carrier supplies the messages

Using the BCC

To specify the source of send performance messages, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

send-prm-cr-address-bit *variable*

For example:

`ft1/1/1#` **send-prm-cr-address-bit prm-carrier**

Using Site Manager

See the Send Performance Measurement CR Addr parameter on page A-49 for information.

Setting the Source of Accept Performance Messages

On FT1 link modules, specify the source from which the router accepts send performance messages by setting one of the following options:

Table 8-9. Accept Performance Messages Options

BCC Option	Site Manager Option	Description
prm-ci	Customer Inst	The default; indicates that the customer installation supplies the messages
prm-carrier	Carrier	Indicates that the carrier supplies the messages

Using the BCC

To specify the source of accept performance messages, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

accept-prm-cr-address-bit *variable*

For example:

`ft1/1/1#` **accept-prm-cr-address-bit prm-carrier**

Using Site Manager

See the Accept Perf Measurement CR Addr parameter on page A-49 for information.

Setting the MTU

The default buffer size, or maximum transmission unit (MTU), determines the largest frame that can travel across this interface. The default value is 1600 bytes. Specify an MTU from 3 to 4608 bytes on this interface using the BCC.

Using the BCC

To set the MTU size, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

mtu *integer*

For example:

`ft1/1/1#` **mtu 2000**

Setting the Primary Clock Source

Timing is independent for the ports on an FT1 link module. For these modules, you select the timing source for each port.

The primary clock identifies the primary source of the timing signals. Table 8-10 lists the options for this parameter.

Table 8-10. Primary Clock Options

BCC Options	Site Manager Options	Description
internal	Internal	Uses the clock chip on the link or net module
loop1	Port 1 Ext Loop	The default; uses the signal coming from port 1

Using the BCC

To set the primary clock, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

primary-clock *variable*

For example:

`ft1/1/1#` **primary-clock internal**

Using Site Manager

See the Primary Clock parameter on page A-49 for information.

Setting the Secondary Clock Source

The Secondary Clock parameter identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

Table 8-11 lists the options for this parameter.

Table 8-11. Secondary Clock Options

BCC Options	Site Manager Options	Description
internal	Internal	The default; uses the clock chip on the link or net module
loop1	Port 1 Ext Loop	Uses the signal coming from port 1

Using the BCC

To set the secondary clock, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

secondary-clock *variable*

For example:

`ft1/1/1#` **secondary-clock loop1**

Using Site Manager

See the Secondary Clock parameter on page A-48 for information.

Setting the External Clock State

In the BCC, the External Clock State parameter indicates whether the external clock is operational. You can set this parameter to present (up), which is the default, or absent (down).

Using the BCC

To set the external clock state, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

external-clock-state *variable*

For example:

`mce1/1/2/1#` **external-clock-state absent**

Setting the Loop Clock

In the BCC, the Loop Clock State parameter specifies this port's loop clock status. You can set this parameter to present (up), which is the default, or absent (down).

Using the BCC

To set the loop clock state, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

loop-clock-state *variable*

For example:

`ft1/1/1#` **loop-clock-state absent**

Setting Relay Control

The relay on the link module automatically goes into loopback mode when a system power up, reboot, or crash, or a hardware reset occurs. You can control the state of the relay by setting the Relay Control parameter.

In the BCC, the options for Relay Control are:

- loop -- The default; the relay will go into loopback as the port/module is reinitialized
- noloop -- The relay will remain in its present state as the port/module is reinitialized

To set relay control using the BCC, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

relay-control *variable*

For example:

`ft1/1/1#` **relay-control noloop**

Configuring a Non-PRI Logical Line

Logical lines are the logical paths for data communication on a physical connection. You can define only one logical line for FT1 ports. For instructions on how to define logical lines, see the sections that follow.

Defining Logical Lines Using the BCC

A single FT1 port supports up to 24 logical lines.

Note: If you want to group the logical lines into a multiline circuit, see Chapter 9, “Configuring Multiline Services.”

Adding a Logical Line to an FT1 Port

To add a logical line to an FT1 port, navigate to the ft1 prompt (for example, **box**; **ft1/1/1**) and type:

`ft1/1/1#` **logical-line**

Specifying a Circuit Name

You can use the current circuit name or specify a new name. The current circuit name identifies the following:

- Circuit type
- Physical connector (slot and port number)
- Number of the logical line on the FT1 port

To specify a new circuit name, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

circuit-name *string*

For example:

`logical-line/1/1#` **circuit-name ft1-newyork**

Selecting a WAN Protocol

To configure a WAN protocol over this logical line, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

wan-protocol *variable*

For example:

`logical-line/1/1#` **wan-protocol ppp**

Setting the WAN Interface Type

The interface is set for synchronous operation by default. Set this parameter to asynchronous to select asynchronous communication, or to pasynchronous for polled asynchronous communication.

To set the WAN interface type, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

wan-type *variable*

For example:

`logical-line/1/1#` **wan-type asynchronous**

Defining Logical Lines Using Site Manager

To add the logical line for an FT1 port, complete the following steps.

Site Manager Procedure	
You do this	**System responds**
1. Start at the FT1 Logical Line window.	After you customize the port parameters for a non-PRI circuit, the FT1 Logical Line window opens.
2. Click on **Add**.	The Add Circuit window opens.
3. Specify the logical line in the Circuit Name box.	
4. Click on **OK**.	The WAN Protocols window opens.
5. Select the WAN protocol and click on **OK**. For information about selecting WAN protocols, see *Configuring and Managing Routers with Site Manager* and the appropriate protocol configuration guide.	The Select Protocols window opens.
6. Select the protocols to run on this logical line. For instructions, see the appropriate protocol configuration guide.	The Logical Line window opens, showing the first FT1 circuit.

You can use the default name that appears in the Add Circuit window, or change the name by clicking on the Circuit Name box and typing a new name.

Figure 8-1 illustrates how Site Manager generates the default logical line name. The default name identifies the following:

- Circuit type
- Physical connector (slot and port number)
- Number of the logical line on the FT1 port

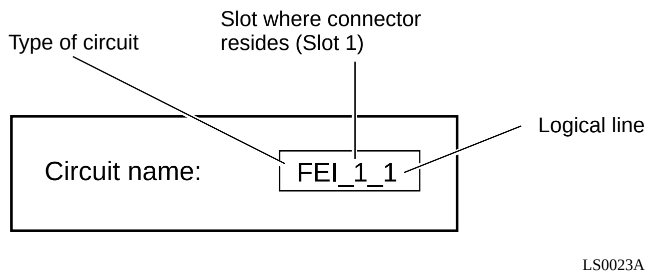

Figure 8-1. Default Circuit Name for ARN Link Modules

Customizing Logical Line Parameters

Table 8-12 lists the configuration tasks described in this section and indicates whether you can use the BCC or Site Manager to perform each task.

Table 8-12. Logical Line Configuration Tasks

Configuration Task	BCC	Site Manager	Page
Enabling or Disabling the Logical Line	✓	✓	8-24
Setting the Clock Source	✓		8-25
Enabling or Disabling BofL Messages	✓	✓	8-25
Setting the BofL Timeout	✓	✓	8-26
Enabling or Disabling Logical Line Loopback	✓	✓	8-26
Viewing the Configured WAN Protocol	✓	✓	8-27
Setting the HDLC Service Type	✓	✓	8-27
Setting the Local HDLC Address	✓	✓	8-28
Setting the Remote HDLC Address	✓	✓	8-28
Setting the CRC Size	✓	✓	8-29
Setting the MTU Size	✓	✓	8-30
Enabling or Disabling Remote Loopback Detection	✓	✓	8-30
Configuring BERT Diagnostic Pattern Tests	✓	✓	8-31
Configuring NRZI Line Encoding	✓	✓	8-32
Assigning Timeslots	✓	✓	8-33
Editing Line Resources		✓	8-35

After you finish adding the logical lines for a non-PRI interface using Site Manager, the FT1 Logical Line window displays each logical line. This window also displays the parameter values for the highlighted logical line. Use the scroll bar to view additional logical line parameters.

To edit parameters for a logical line, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the FT1 Logical Line window, select the line and circuit name from the logical lines list.	Site Manager displays the circuit's parameters.
2. Edit the parameters.	Site Manager sets the values that you specify for each parameter.
3. Click on **Apply**.	

Enabling or Disabling the Logical Line

The logical line is enabled by default. You can disable or reenable each logical line.

Using the BCC

To enable or disable the logical line, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

state *variable*

For example:

`logical-line/1/1#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-50 for information.

Setting the Clock Source

In the BCC, the Clock Source parameter indicates the default timing, or clock, source for transmitting data to the network. Timing is set to internal by default, which indicates that the logical line is on the network. When the logical line is on either end of a private-wire configuration, set timing to network (master) on one end of the configuration and internal (slave) on the other end.

Using the BCC

To change the clock source, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

clock-source *variable*

For example:

`logical-line/1/1#` **clock-source internal**

Enabling or Disabling BofL Messages

Transmission of BofL packets is enabled by default on a logical line. A BofL packet is sent as often as the value you specify for the BofL Timeout parameter.

You can disable or reenable BofL messages on the logical line.

Using the BCC

To enable or disable BofL messages, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

bofl *variable*

For example:

`logical-line/1/1#` **bofl disabled**

Using Site Manager

See the Breath of Life (BofL) Enable/Disable parameter on page A-50 for information.

Setting the BofL Timeout

The time period between transmissions of BofL packets is 5 seconds by default. You can change the BofL timeout value on the logical line to any value from 1 to 60 seconds.

Using the BCC

To change the BofL timeout value, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

bofl-timeout *integer*

For example:

`logical-line/1/1#` **bofl-timeout 10**

Using Site Manager

See the BofL Timeout parameter on page A-51 for information.

Enabling or Disabling Logical Line Loopback

In logical line (*channelized*) loopback mode, the router retransmits received data for specified timeslots only. This proprietary, SNMP-based form of loopback passes data through the HDLC controller, and therefore only supports HDLC data. Logical line loopback mode is disabled by default.

You can specify whether or not to initiate logical line loopback mode on the logical line using Site Manager.

Using Site Manager

See the Fractional Loopback parameter on page A-51 for information.

Viewing the Configured WAN Protocol

The WAN Protocol parameter indicates which WAN protocol is configured on this logical line. Do not change the current value.

Caution: Changing the WAN protocol does not reconfigure the interface, and could disable it.

To change the configured WAN protocol for an interface, delete and then reconfigure the circuit.

For more information, refer to "Selecting a WAN Protocol" on page 8-21.

Setting the HDLC Service Type

The logical line HDLC service is LLC1 by default. LLC1 adds the HDLC address and control fields as a prefix to the frame. You can change the service to basic HDLC (Transparent), based on the requirements of the T1 equipment.

Using the BCC

To set HDLC service, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

service *variable*

For example:

```
logical-line/1/1# service transparent
logical-line/1/1# service llc1
```

Using Site Manager

See the Service parameter on page A-52 for information.

Setting the Local HDLC Address

Specify the 1-byte HDLC address of this logical line as follows:

- dce
- dte
- An explicit address value: 2, 4, 5, 6, or 7

Use unique HDLC addresses for the local and remote interfaces at either end of the point-to-point circuit. For example, if the remote address is dte, configure the local address as dce.

If you configure X.25 on this line, set this parameter to either dce or dte.

Using the BCC

To specify the local HDLC address, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

local-address *variable*

For example:

`logical-line/1/1#` **local-address dce**

Using Site Manager

See the Local HDLC Address parameter on page A-52 for information.

Setting the Remote HDLC Address

Specify the 1-byte HDLC address of the remote FT1 interface as follows:

- dce
- dte
- An explicit address value: 2, 4, 5, 6, or 7

Use unique HDLC addresses for the local and remote interfaces at either end of the point-to-point circuit. For example, if the local address is dte, configure the remote address as DCE.

If you configure X.25 on this line, set this parameter to either dce or dte.

Using the BCC

To specify the remote HDLC address, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

remote-address *variable*

For example:

`logical-line/1/1#` **remote-address dte**

Using Site Manager

See the Remote HDLC Address parameter on page A-52 for information.

Setting the CRC Size

By default, the router uses the 16-bit CRC type. The router appends a 16-bit CRC to the transmitted frames and performs a 16-bit CRC on received frames. You can change to 32-bit CRC, where the router appends a 32-bit CRC to transmitted frames and performs a 32-bit CRC on received frames.

Using the BCC

To specify CRC size, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

crc-size *variable*

For example:

```
logical-line/1/1# crc-size crc32bit
logical-line/1/1# crc-size crc16bit
```

Using Site Manager

See the CRC Size parameter on page A-53 for information.

Setting the MTU Size

The router uses the transmit/receive buffer size (MTU) to configure the largest frame that the router can transmit or receive across this FT1 port. The router discards frames larger than this value. The MTU is 1600 bytes by default. You can change it to any size from 3 to 4608 bytes for the logical line.

Using the BCC

To specify the MTU size, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

mtu *integer*

For example:

`logical-line/1/1#` **mtu 10**

Using Site Manager

See the MTU Size (bytes) parameter on page A-53 for information.

Enabling or Disabling Remote Loopback Detection

Setting the Remote Loopback Detection parameter enables or disables detection of the driver's BofL packets on this logical line, as long as the BofL Enable/Disable parameter is enabled for this interface. If you select Enable to put the line in loopback detection mode, the driver will bring down the interface when it detects its BofL packets. This parameter is disabled by default.

Using the BCC

To enable or disable remote loopback detection, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

remote-loopback-detection *variable*

For example:

`logical-line/1/1#` **remote-loopback-detection enabled**
`logical-line/1/1#` **remote-loopback-detection disabled**

Using Site Manager

See the Remote Loopback Detection parameter on page A-53 for information.

Configuring BERT Diagnostic Pattern Tests

FT1 link modules support the bit error rate test (BERT) on individual logical lines. You can enable or disable BERT mode using Site Manager only.

In BERT mode, the router introduces deliberate error patterns into the transmitted bit stream on a single logical line. It can generate patterns such as all ones, all zeros, or a quasi-random signal sequence (QRSS) pattern.

Using Site Manager

To enable BERT mode and specify the BERT diagnostic test pattern, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Enable **BERT Mode** on the FT1 logical line. Click on **Help** or see the parameter description on page A-54 for information.	Site Manager enables BERT mode.
2. Specify the bit pattern transmitted during BERT diagnostics. Click on **Help** or see the **BERT Test Pattern** parameter on page A-54 for information.	Site Manager specifies the bit pattern.

For more information about running BERT diagnostics, see “Testing FT1 Lines” on page 8-35.

Configuring NRZI Line Encoding

You can specify nonreturn to zero inverted (NRZI) line encoding to communicate state changes between the subscriber's devices across the frame relay network. You can also specify the NRZI encoding format in the frame on the logical line.

Using the BCC

The sync-line-coding command specifies the encoding format in the frame on the logical line. Valid options are:

- nrz -- The default; this format uses nonreturn to zero coding.
- nrzi -- This format uses nonreturn to zero inverted coding.
- nrzimark -- This format uses a 0-bit to indicate a state change and a 1-bit to indicate no state change.

To change the NRZI encoding format, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

sync-line-coding *variable*

For example:

`logical-line/1/1#` **sync-line-coding nrzimark**

Using Site Manager

You can configure the NRZI Enable and NRZI type parameters. If applicable, see "Configuring a Non-PRI Logical Line" on page 8-20.

When enabled, the NRZI Enable parameter specifies NRZI line encoding to communicate state changes between the subscriber's devices across the frame relay network. You can disable communication of such state changes by setting this parameter to Disable.

See the NRZI Enable parameter on page A-55 for information.

The NRZI Type parameter specifies the NRZI encoding format in the frame on the logical line. Ignore NRZI Type if you set NRZI Enable to Disable.

Valid options are:

- Mark -- This format uses a 0-bit to indicate a state change and a 1-bit to indicate no state change.
- Space -- This format uses a 1-bit to indicate a state change and a 0-bit to indicate no state change.

See the NRZI Type parameter on page A-55 for information.

Assigning Timeslots

After configuring logical lines, you configure channels (DS0s) of bandwidth by grouping 1 to 24 contiguous or noncontiguous DS0 timeslots per DS1 frame.

Allocating DS0s

If you have an FT1/T1 DSU/CSU or E1 module and an ISDN S/T or U module installed on the same ARN router, you can alternate assigned DS0 channels with unassigned channels, up to a maximum rate of 512 Kb/s (8 channels).

Caution: You cannot alternate assigned and unassigned channels across the 24 channels in a T1 line (768 Kb/s).

If you have rates above 512 Kb/s, Nortel Networks recommends that you configure the DS0 contiguously, even though some noncontiguous channel configurations may work. If you have an unsupported channel configuration, the following message appears in the event log:

```
Connector COM <COM#>, Current timeslot assignment is not supported.
```

This message indicates an invalid assignment of DS0s for the specified connector; you should have your service provider change the T1 channel assignments. Using contiguous channel assignments addresses this problem.

Selecting 56K Rate Adaption on FT1/T1 DSU/CSU Lines

Rate adaption determines the number of bits and their bit positions within a time slot. The FT1/T1 logical line rate adaption is 64 Kb/s per DS0. You cannot change this rate.

Using the BCC

To assign a timeslot to a logical line, navigate to the logical-line prompt (for example, **box**; **ft1/1/1**; **logical-line/1/1**) and type:

time-slots *integer*

For example:

`logical-line/1/1#` **time-slots 1**

To assign multiple timeslots to a logical line, type:

`logical-line/1/1#` **time-slots {1 2 3 4 10}**

Using Site Manager

To assign a timeslot to a logical line, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the FT1 Logical Line window.	
2. Click on **Timeslots**.	The FT1 Timeslots window opens. This window represents the 24 FT1 timeslots.
3. Click on an **Unused** timeslot.	A list of logical lines to which you can assign the timeslot opens.
4. Select the logical line to which you want to assign the timeslot.	
5. Repeat steps 3 and 4 for each timeslot you want to assign, or click on **Select All** to assign all timeslots to a logical line.	
6. Click on **OK**.	The FT1 Logical Line window opens.
7. Click on **Apply**.	
8. Click on **Done**.	The Configuration Manager window opens.

Editing Line Resources

If you run ST2 traffic on this logical line, you can reserve bandwidth for this type of traffic. To do so, specify Edit for the Line Resources parameter in Site Manager, which provides access to the Resource Manager.

Using Site Manager

See the Line Resources parameter on page A-56 for information.

Testing FT1 Lines

The following sections describe how to test FT1 link module interfaces using Site Manager:

- About the Tests
- Setting Port Test Parameters
- Running Port Tests

About the Tests

You can use Site Manager to trigger port actions to test the quality of FT1 connections. The tests you can run perform the following actions:

- Transmit specific codes to the remote end of the FT1 connection
- Introduce deliberate error patterns into the port BERT bit stream
- Introduce deliberate error patterns into a logical line's BERT bit stream

Note: All test actions are port specific. For example, a BERT reset action resets all port-specific series of BERT counters.

BERT statistics show the results of your test actions. You can view BERT statistics using the Site Manger Statistics Manager utility. For information about the Statistics Manager, see *Configuring and Managing Routers with Site Manager*.

Setting Port Test Parameters

Table 8-13 lists the configuration tasks described in this section.

Table 8-13. Port Test Configuration Tasks

Using Site Manager

To set the port test parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In dynamic mode, click on a configured FT1 connector in the Configuration Manager window.	The Logical Line window opens.
2. Click on **Port Details.**	The Port Parameters window opens.
3. Click on **Line Tests.** Note that the Line Tests option appears only in dynamic mode.	The Port Actions window opens.
4. Edit the port action parameters, located in the upper portion of the window.	
5. After setting a parameter, click on **Apply**.	Site Manager sets the parameters to the values you specified.
6. Click on **Done** when you are finished setting port action parameters.	

Note: All changes you apply to the port in the Port Actions window are in effect only while the window is active. When you exit the Port Actions window, all port settings revert to the original settings.

Enabling or Disabling BERT Mode

To initiate BERT testing, you must enable BERT mode. By setting the BERT mode parameter, you enable or disable BERT mode on all logical lines. On these interfaces, you can enable or disable BERT mode on individual logical lines.

Using Site Manager

See the Bert mode parameter on page A-54 for information.

Setting the BERT Alarm Type

You can specify the type of alarm signal to be generated while in BERT mode, or disable the generation of alarm signals altogether. Table 8-14 lists the alarm signal options.

Table 8-14. BERT Alarm Type Options

Option	Description
AIS	Transmits Blue alarms (all ones)
Yellow	Transmits Yellow alarms (all zeros)
Disable	Disables the generation of alarm signals.

Using Site Manager

See the BERT alarm type parameter on page A-54 for information.

Setting the BERT Test Pattern

When a port is in BERT mode, it can generate patterns such as all ones (the default), all zeros, or a QRSS pattern.

Using Site Manager

See the BERT test pattern parameter on page A-54 for more information.

Setting the Line-Coding Method

T1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (see Figure 6-2). A long string of zeros causes the line to lose synchronization due to lack of pulses. Nortel Networks provides a line-coding mechanism to maintain synchronization.

Table 8-15 lists the line coding options.

Table 8-15. FT1 Line Coding Options

Option	Description
B8ZS	The default; bipolar with 8 zero substitution (B8ZS) line coding replaces a block of eight consecutive binary zeros with an 8-bit B8ZS code. For more information on B8ZS line coding, see "Enabling or Disabling Bipolar with 8 Zero Substitution (B8ZS)" on page 6-5.
AMI	AMI line coding is also bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the FT1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

Note: If the T1 receive path detects a B8ZS code word when the line is configured for AMI coding, the router generates a log message and an SNMP trap.

Using Site Manager

See the Line Coding parameter on page A-45 for information.

Setting the Line Type

Select one of the following line types (frame formats) for your FT1 line:

Table 8-16. FT1 Line Type Options

Option	Description
ESF	The default; transmits extended superframes (ESFs), each consisting of 24 SF/D4 frames; provides enhanced signaling and synchronization For ESF lines, you can also set the facility data link (FDL) mode. See “Setting the FDL Mode for ESF Line Types” on page 8-11.
SF/D4	Transmits superframes, each consisting of 12 individual frames
Unframed T1	Use only with BERT mode to match the line type.

For more information on these frame formats, refer to “Setting the T1 Frame Type” on page 6-4.

Using Site Manager

See the Line Type parameter on page A-45 for information.

Setting FDL Options

Facility data link (FDL) options apply only when the FT1 line type is configured as ESF for testing. Select one of the following ESF line types:

Table 8-17. ESF Line Types

Option	Description
ANSI 403	The default; conforms to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DSI Metallic Interface)*
AT&T 54016	Conforms to the 1989 AT&T specification (*Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Superframe Format*)
None	Disables the FDL mode

Using Site Manager

See the FDL Configuration parameter on page A-47 for information.

Setting the Signal Level

The Signal Level parameter specifies the T1 transmit power level in decibels (dB). Line buildout conditions the signals to mitigate attenuation. Line buildout also depends on the physical length of the T1 line.

The carrier determines signal levels on a *long-haul* (0 to 6000 ft. of cable) T1 network interface. If 0.0 dB is not sufficient for long-haul, the carrier determines values of -15 and -7.5 dB.

Signal power for DSX-1 *short-haul* (0 to 655 ft.) is based on cable length.

For DSX-1, decibel levels correspond to cable length, as follows:

Table 8-18. Signal Level Options

Cable Length	Option
0 to 133 ft.	0.0 dB
133 to 255 ft.	0.5 dB
255 to 399 ft.	0.8 dB
399 to 533 ft.	1.1 dB
533 to 655 ft.	1.5 dB

By default, the signal level is 0.0 dB. Set the long-haul or short-haul signal level for this FT1 interface according to the length of the cable or as the carrier specifies.

Using Site Manager

See the Signal Level (dB) parameter on page A-46 for information.

Running Port Tests

Port tests affect all logical lines associated with a port.

Using Site Manager

To run FT1 port tests, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Set the test parameters in the Port Actions window. See "Setting Port Test Parameters" earlier in this chapter.	
2. Click on **Apply**.	Site Manager sets the parameters to the values you specified.
3. To start a test, click on the appropriate **Send** command. Wait for the window to update before selecting another command.	Site Manager performs the test you selected.
4. Repeat step 3 for each test you want to run.	
5. Click on **Done**.	The FT1 Port Parameters window opens.

Entering BERT Test Commands

Table 8-19 describes the BERT test commands you can send on any FT1 port.

Table 8-19. Send Commands for FT1 Port Tests

Send Command	Function
Reset BERT Counters	Resets all counters to 0
Insert 1 Error	Inserts a single (nonrepeating) error into the bit stream
Insert 1 Error/1K	Inserts a deliberate error into every thousandth position in the bit stream
Insert 1 Error/1M	Inserts a deliberate error into every millionth position in the bit stream
Disable Insert Error	Stops the insertion of deliberate errors into the bit stream

Note: FDL loopback command options apply only when the FT1 line type is configured as ESF for testing. For more information about FDL loopback codes, see ANSI T1.408 ISDN *Primary Rate - Customer Installation Metallic Interfaces Layer 1 Specification*.

Entering FT1 Port Loopback Commands

Table 8-20 describes the loopback commands you can send on an FT1 port.

Caution: Wait for the window to update before selecting another command.

Table 8-20. Send Commands for FT1 Port Loopback

Send Command	Function
Loop Up	Sends a loop-up code to the remote end to initiate line loopback. After a minimum of 4.5 seconds, the port loops receive data back onto the T1 transmit path at the T1 interface. The line type setting determines the coding scheme.
Loop Down	Sends a loop-down code to the remote end to stop the line loopback condition
FDL Payload Loop	Sends a loop-up code to the remote end to initiate payload loopback
FDL Disable Payload	Sends a loop-down code to the remote end to stop the payload loopback
FDL Line Loop CI	Sends a Customer Installation (CI) loopback message
FDL Line Loop IA	Sends a CI loopback message, indicating that it originates from the CSU
FDL Line Loop IB	Sends a CI loopback message, indicating that it originates from the DSU
FDL Disable Line Loop	Disables generation of FDL line loopback codes
FDL Disable All	Sends a universal loopback deactivate code to stop all loopback activity

In *payload* loopback, the signal loops through the T1 framing device before the received signal is looped back for retransmission. In *line* loopback, the signal does not go through the framing device.

Chapter 9
Configuring FE1 Services

This chapter describes the line services for fractional E1 (FE1) circuits on a Nortel Networks router. It contains the following sections:

Overview of FE1 Services

Nortel Networks supports FE1 circuits on BayStack ARN, AN and ANH routers using the BCC and Site Manager.

FE1 interfaces provide high-density access to a digital access and crossconnect system (DACS).

For unframed E1, an FE1 interface can transmit or receive up to 32 DS0 channels per DS1 frame over leased point-to-point links, with a line rate from 64 Kb/s to 2.048 Mb/s in 64 Kb increments. For framed E1, an FE1 interface can transmit or receive up to 31 DS0 channels per DS1 frame over leased point-to-point links, with a line rate between 64 Kb/s and 2.048 Mb/s in 64 Kb increments.

All FE1 modules include an integrated DSU/CSU for direct connection to an E1 network. The interfaces provide integrated support for loopback testing and bit error rate test (BERT) line testing.

Configuring FE1 Services

You can configure an FE1 port using the BCC or Site Manager.

Note: The default serial line configuration is appropriate in most cases. See Chapter 2 for information about changing the default serial line parameters.

Configuring an FE1 Port Using the BCC

To configure FE1 services, navigate to the `box` prompt and type:

`box#` **fe1 slot 1 connector 1**

OR

`box#` **fe1 1/1**

This command configures FE1 services on slot 1 connector 1.

Setting the External Clock State

In the BCC, the External Clock State parameter enables or disables external clock use. External clock use is enabled (present) by default. You can change this parameter to absent (disabled).

Using the BCC

To change the setting on the external clock, navigate to the FE1 prompt (for example, **box**; **fe1/1/1**) and type:

external-clock-state *variable*

For example:

`fe1/1/1#` **external-clock-state absent**

Configuring FE1 Services Using Site Manager

You configure an FE1 interface (*port*) using the lines for ISDN Primary Rate Interface (PRI) permanent circuit (non-PRI) applications.

For FE1 ports, the default port application mode must be NONPRI. This indicates that all of the lines have a permanent circuit number and are for leased lines.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an unconfigured FE1 connector.	The Port Application window opens.
2. Set the Port Application Mode parameter to **NONPRI**. For information on this parameter, click on **Help** or see page A-43.	
3. Click on **OK**.	A window containing the clock parameters opens.

Setting the Clock Parameters

Clock parameters define the timing sources that apply to ports and DS0 timeslots that an FE1 link module supports. The primary clock identifies the primary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

The options for the clock parameters are as follows:

Table 9-1. Clock Parameter Options

BCC Option	Site Manager Option	Description
internal	Internal	Uses the internal clock chip.
loop1	Port 1 Ext Loop	Uses the signal coming in from port 1.

Using the BCC

To set the clock parameters, navigate to the fe1/1/1 prompt (for example, **box**; **fe1/1/1**) and type:

primary-clock-source *variable*
secondary-clock-source *variable*

For example:

`fe1/1/1#` **primary-clock-source internal**
`fe1/1/1#` **secondary-clock-source loop1**

Using Site Manager

You access the clock parameters via the window that opens after you set the port application mode. How you access this window is based on if you have already configured the port.

- For an unconfigured FE1 link module

  The first time you configure a port, the Edit FE1 Clock Parameters window opens automatically. When you set these clock parameters, you define the timing sources for the selected port only.

- For a configured FE1 link module

  Display the FE1 Port Parameters window (**FE1** Connector > Edit Logical Lines > **Port Details** > FE1 Port Parameters).

To set the clock parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the window containing the clock parameters, select a primary clock source option.	
2. Set the **Primary Clock** parameter. Click on **Help** or see the parameter description on page A-49.	Site Manager sets the primary clock to the value you specified.
3. Select the secondary (backup) clock source option.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Set the **Secondary Clock** parameter. Click on **Help** or see the parameter description on page A-50.	Site Manager sets the secondary clock to the value you specified.
5. Click on **OK**.	The FE1 Port Parameters window opens.

To complete the configuration, you must also configure a non-PRI logical line. See "Configuring a Non-PRI Logical Line" on page 9-12 for instructions.

Customizing FE1 Services Using the BCC or Site Manager

Table 9-2 lists the FE1 configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 9-2. FE1 Configuration Tasks

Task	BCC	Site Manager	Page
Disabling and Reenabling the FE1 Port	✓	✓	9-5
Setting the FE1 Line Type	✓	✓	9-6
Setting the FE1 Line Coding	✓	✓	9-7
Setting the Alarm Threshold Time	✓	✓	9-8
Setting the Alarm Threshold Clear Time	✓	✓	9-8
Accepting or Rejecting Loopback Requests	✓	✓	9-9
Setting a Loopback Configuration	✓	✓	9-9
Enabling and Disabling the International Bit	✓	✓	9-10
Setting the Primary Clock	✓	✓	9-11
Setting the Secondary Clock	✓	✓	9-11

Disabling and Reenabling the FE1 Port

The FE1 interface is enabled by default when you add the circuit. You can disable or reenable this FE1 interface without moving any cables.

Using the BCC

To enable or disable the FE1 port, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

state *variable*

For example:

`fe1/1/1#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-58 for information.

Setting the FE1 Line Type

Select one of the following line types (frame formats) for your E1 equipment:

Table 9-3. FE1 Line Type Options

BCC Option	Site Manager Option
e1	E1
e1-crc	E1 CRC
e1-mf	E1 MF
e1-crcmf	E1 CRC MF
unframed-e1	Unframed E1

Using the BCC

To set the line type, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

framing *variable*

For example:

`fe1/1/1#` **framing e1**

Using Site Manager

See the Line Type parameter on page A-58 for information.

Setting the FE1 Line Coding

E1 uses bipolar format for signals. In bipolar format, alternating positive and negative pulses on the digital line signify the number 1, and the absence of a pulse signifies 0 (see Figure 6-2). A long string of zeros causes the line to lose synchronization due to lack of pulses. Nortel Networks provides a line-coding mechanism to maintain synchronization.

By default, the FE1 interface uses HDB3 line coding. You can select AMI line coding instead.

AMI line coding is also bipolar: a binary 0 is transmitted as 0 volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the FE1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

Table 9-4 lists the line coding options.

Table 9-4. FE1 Line Coding Options

BCC Option	Site Manager Option	Description
hdb3	HDB3	The default; the FE1 interface uses HDB3 line coding. High-density bipolar coding (HDB3) is a mechanism used to maintain sufficient ones density in the E1 data stream.
ami	AMI	AMI line coding is also bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the FT1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

➡ **Note:** If the E1 receive path detects a HDB3 code word when the line is configured for AMI coding, the router generates a log message and an SNMP trap.

Using the BCC

To set the line coding, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

line-coding *variable*

For example:

`fe1/1/1#` **line-coding ami**

Using Site Manager

See the Line Coding parameter on page A-59 for information.

Setting the Alarm Threshold Time

By default, the FE1 interface waits 2 seconds before logging a performance defect or anomaly as an event message. You can change the alarm threshold time to any value from 2 to 10 seconds.

Using the BCC

To set the alarm threshold time, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

setup-alarm-threshold *integer*

For example:

`fe1/1/1#` **setup-alarm-threshold 2**

Using Site Manager

See the Setup Alarm Threshold (seconds) parameter on page A-60 for information.

Setting the Alarm Threshold Clear Time

By default, the clear time for performance-failure conditions is 2 seconds. If the defect or anomaly clears in this time interval, the FE1 interface records a performance-cleared condition and logs an event message. You can change the alarm threshold clear time to any value from 2 to 10 seconds.

Using the BCC

To set the alarm threshold clear time, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

clear-alarm-threshold *integer*

For example:

`fe1/1/1#` **clear-alarm-threshold 2**

Using Site Manager

See the Clear Alarm Threshold (seconds) parameter on page A-60 for information.

Accepting or Rejecting Loopback Requests

Note: Although the accept-loopback-request (BCC) and Accept Loopback Request (Site Manager) parameters appear to be available, they are not supported by the FE1 services software.

Setting a Loopback Configuration

Setting this parameter immediately places the port in loopback mode, without a request from the remote test equipment.

Table 9-5 lists the loopback configuration options.

Table 9-5. Loopback Configuration Options

BCC Option	Site Manager Option	Description
line-loop	Line Loopback	Received signals do not go through the framing device before being looped back out.
no-loop	No Loopback	The default; this option deactivates any current loopback.

Using the BCC

To set a loopback configuration, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

loopback-mode *variable*

For example:

`fe1/1/1#` **loopback-mode no-loop**

Using Site Manager

See the Loopback Configuration parameter on page A-61 for information.

Enabling or Disabling the International Bit

By default, the FE1 interface does not use the International Bit in FE1 frames. You can enable use of the International bit for this FE1 interface.

Using the BCC

To set the International Bit, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

international-bit *variable*

For example:

`fe1/1/1#` **international-bit enabled**

Using Site Manager

See the International Bit parameter on page A-61 for information.

Setting the Primary Clock Source

Timing is independent for the port on an FE1/E1 WAN adapter module. For this module, you select the timing source for the FE1 port.

Table 9-6 lists the options for this parameter.

Table 9-6. Primary Clock Option

BCC Options	Site Manager Options	Description
internal	Internal	Uses the internal clock chip.
loop1	Port 1 Ext Loop	The default; uses the signal coming from port 1

Using the BCC

To set the primary clock, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

primary-clock-source *variable*

For example:

`fe1/1/1#` **primary-clock-source internal**

Using Site Manager

See the Primary Clock parameter on page A-62 for information.

Setting the Secondary Clock Source

The Secondary Clock parameter identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

Table 9-7 lists the options for this parameter:

Table 9-7. Secondary Clock Options

BCC Options	Site Manager Options	Description
internal	Internal	The default; uses the internal clock chip.
loop1	Port 1 Ext Loop	Uses the signal coming from port 1

Using the BCC

To set the secondary clock, navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

secondary-clock-source *variable*

For example:

`fe1/1/1#` **secondary-clock-source loop1**

Using Site Manager

See the Secondary Clock parameter on page A-62 for information.

Configuring a Non-PRI Logical Line

A logical line is the logical path for data communication on a physical connection. The E1/FE1 WAN adapter module supports only a single logical line per physical port. To configure a non-PRI logical line, you must complete the following steps. For instructions, see the sections that follow.

1. Define the logical line.
2. Customize logical line parameters.
3. Assign timeslots.

Defining the Logical Line Using the BCC

For FE1, a single FE1 port supports a single logical line.

Adding a Logical Line to an FE1 Port

To add a logical line to an FE1 port, you must specify a circuit name. Navigate to the fe1 prompt (for example, **box**; **fe1/1/1**) and type:

logical-line *circuit-name*

For example:

```
fe1/1/1# logical-line boston
logical-line/boston#
```

Defining the Logical Line Using Site Manager

When you define a logical line you can use the default name that appears in the Add Circuit window, or you can change the name by clicking on the Circuit Name box and typing a new name.

Figure 9-1 illustrates how Site Manager generates the default logical line name. The default name identifies the following:

- Circuit type
- Physical connector (slot and port number)
- Number of the logical line on the FE1 port

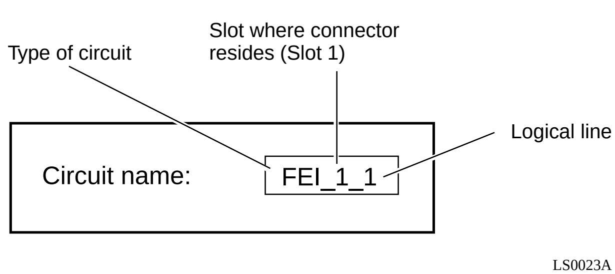

Figure 9-1. Default Circuit Name for ARN Link Modules

To add the logical line for an FE1 port, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the Edit Adapter Module FE1 Port Parameters window.	After you customize the port parameters for a non-PRI circuit, the Adapter Module FE1 Logical Line window opens.
2. Click on **Add**.	The Add Circuit window opens.
3. Specify the logical line in the Circuit Name box.	
4. Click on **OK**.	The WAN Protocols window opens.
5. Select the WAN protocol and click on **OK**. For information about selecting WAN protocols, see *Configuring and Managing Routers with Site Manager* and the appropriate protocol configuration guide.	The Select Protocols window opens.
6. Select the protocols to run on this logical line. For instructions, see the appropriate protocol configuration guide.	The Adapter Module FE1 Logical Line window opens, showing the first FE1 circuit.

Customizing Logical Line Parameters

Table 9-8 lists the configuration tasks described in this section and indicates whether you can use the BCC or Site Manager to perform each task.

Table 9-8. Logical Line Configuration Tasks

Configuration Task	BCC	Site Manager	Page
Disabling and Reenabling the Logical Line	✓	✓	9-16
Disabling and Reenabling BofL Messages	✓	✓	9-16
Setting the BofL Timeout	✓	✓	9-17
Setting the MTU Size	✓	✓	9-17
Enabling or Disabling Interface Filtering	✓	✓	9-18
Setting the Service Type	✓	✓	9-18
Setting Minimum Frame Spacing	✓	✓	9-19
Setting the Local HDLC Address	✓	✓	9-19

(continued)

Table 9-8. Logical Line Configuration Tasks *(continued)*

Configuration Task	BCC	Site Manager	Page
Setting the Remote HDLC Address	✓	✓	9-20
Viewing the Configured WAN Protocol		✓	9-21
Setting the CRC Size	✓	✓	9-21
Setting Synchronous Line Coding	✓	✓	9-21
Enabling or Disabling Extended Addressing	✓	✓	9-22
Enabling or Disabling Remote Loopback Detection	✓	✓	9-23
Editing Line Resources		✓	9-23
Assigning Timeslots	✓	✓	9-23
Setting FE1 Line Priority	✓		9-24
Setting the Hold-Down Interval	✓		9-25
Viewing the External Clock Speed	✓		9-25

After you finish adding the logical line for a non-PRI interface using Site Manager, the Adapter Module FE1 Logical Line window displays each logical line. This window also displays the parameter values for the highlighted logical line. Use the scroll bar to view additional logical line parameters.

To edit parameters for a logical line, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In the Adapter Module FE1 Logical Line window, select the line and circuit name from the logical lines list.	Site Manager displays the circuit's parameters.
2. Edit the parameters.	
3. Click on **Apply**.	

Disabling and Reenabling the Logical Line

The logical line is enabled by default. You can disable or reenable each logical line.

Using the BCC

To disable or enable the logical line, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

state *variable*

For example:

`logical-line/boston#` **state disabled**

Using Site Manager

See the Enable/Disable parameter on page A-63 for information.

Disabling and Reenabling BofL Messages

Transmission of BofL packets is enabled by default on a logical line. A BofL packet is sent as often as the value you specify for the BofL Timeout parameter.

You can disable or reenable BofL messages on the logical line.

Using the BCC

To enable or disable BofL messages, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

bofl *variable*

For example:

`logical-line/boston#` **bofl disabled**

Using Site Manager

See the Breath of Life (BofL) Enable/Disable parameter on page A-63 for information.

Setting the BofL Timeout

The time period between transmissions of BofL packets is 5 seconds by default. You can change the BofL timeout value on the logical line to any value from 1 to 60 seconds.

Using the BCC

To change the BofL timeout value, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

bofl-timeout *integer*

For example:

`logical-line/boston#` **bofl-timeout 10**

Using Site Manager

See the BofL Timeout parameter on page A-64 for information.

Setting the MTU Size

The router uses the transmit/receive buffer size, maximum transmission unit (MTU), to configure the largest frame that the router can transmit or receive across this FE1 port. The router discards frames larger than this value. The MTU is 1600 bytes by default. You can change it to any size from 3 to 4608 bytes for the logical line.

Using the BCC

To specify the MTU size, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

mtu *integer*

For example:

`logical-line/boston#` **mtu 10**

Using Site Manager

See the MTU Size (bytes) parameter on page A-64 for information.

Enabling or Disabling Interface Filtering

You can specify whether the interface filters packets for addresses other than its own local address, or whether address filtering is based on both the local and remote addresses.

With this parameter set to enabled, the interface receives all frames.

By default, this parameter is disabled, which means that the interface receives only frames destined for its local address.

Using the BCC

To enable or disable interface filtering, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

promiscuous *variable*

For example:

`logical-line/boston#` **promiscuous enabled**

Using Site Manager

See the Promiscuous parameter on page A-65 for information.

Setting the Service Type

The logical line HDLC service is LLC1 by default. LLC1 adds the HDLC address and control fields as a prefix to the frame. You can change the service to basic HDLC (transparent), based on the requirements of the E1 equipment.

Using the BCC

To set the service type, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

service *variable*

For example:

`logical-line/boston#` **service llc1**

Using Site Manager

See the Service parameter on page A-65 for information.

Setting Minimum Frame Spacing

The Minimum Frame Spacing parameter specifies the minimum number of flags transmitted between adjacent frames on this interface. The interface transmits one frame by default.

Set frame spacing to a value from 1 to 32 flags for the interface.

Using the BCC

To set the minimum frame spacing, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

minimum-frame-space *integer*

For example:

`logical-line/boston#` **minimum-frame-space 1**

Using Site Manager

See the Minimum Frame Spacing parameter on page A-66 for information.

Setting the Local HDLC Address

You can specify the 1-byte HDLC address of this logical line as follows:

- dce
- dte
- An explicit address value: 2, 4, 5, 6, or 7

You must use unique HDLC addresses for the local and remote interfaces at either end of the point-to-point circuit. For example, if the remote address is DTE, configure the local address as DCE.

If you configure X.25 on this line, set this parameter to either DCE or DTE.

Using the BCC

To specify the local HDLC address, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

local-address *variable*

For example:

`logical-line/boston#` **local-address addressdce**

Using Site Manager

See the Local HDLC Address parameter on page A-66 for information.

Setting the Remote HDLC Address

You can specify the 1-byte HDLC address of the remote FE1 interface as follows:

- dce
- dte
- An explicit address value: 2, 4, 5, 6, or 7

You must use unique HDLC addresses for the local and remote interfaces at either end of the point-to-point circuit. For example, if the local address is DTE, configure the remote address as DCE.

If you configure X.25 on this line, set this parameter to either DCE or DTE.

Using the BCC

To specify the remote HDLC address, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

remote-address *variable*

For example:

`logical-line/boston#` **remote-address addressdte**

Using Site Manager

See the Remote HDLC Address parameter on page A-67 for information.

Viewing the Configured WAN Protocol

The WAN Protocol parameter indicates which WAN protocol is configured on this logical line. Do not change the current value.

Caution: Changing the WAN protocol does not reconfigure the interface and could disable it.

To change the configured WAN protocol for an interface, you must delete and then reconfigure the circuit.

See the WAN Protocol parameter on page A-67 for information.

Setting the CRC Size

By default, the router uses the 16-bit CRC type. The router appends a 16-bit CRC to the transmitted frames and performs a 16-bit CRC on received frames. You can change the CRC type to 32-bit CRC, where the router appends a 32-bit CRC to transmitted frames and performs a 32-bit CRC on received frames.

Using the BCC

To specify CRC size, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

crc-size *variable*

For example:

```
logical-line/boston# crc-size crc16bit
logical-line/boston# crc-size crc32bit
```

Using Site Manager

See the CRC Size parameter on page A-68 for information.

Setting Synchronous Line Coding

You can specify the line coding of the physical synchronous line to match the line coding of a device at the other end of the line. Specify the line coding as follows:

- Select NRZ (the default) for nonreturn to zero coding.

- Select NRZI for nonreturn to zero inverted coding.
- Select NRZI Mark for nonreturn to zero inverted mark coding.

Set the line coding for the interface.

Using the BCC

To set the synchronous line coding, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

sync-line-coding *variable*

For example:

`logical-line/boston#` **sync-line-coding nrz**

Using Site Manager

See the Sync Line Coding parameter on page A-68 for information.

Enabling or Disabling Extended Addressing

By default, the router does not test the address length of frames on a synchronous interface. With the Extended Address parameter enabled, the router tests the first bit of the address to determine the length of the address, in octets.

Enable or disable extended addressing for the interface.

Using the BCC

To enable or disable extended addressing, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

extended-address *variable*

For example:

`logical-line/boston#` **extended-address disabled**

Using Site Manager

See the Extended Address parameter on page A-68 for information.

Enabling or Disabling Remote Loopback Detection

If the transmission of BofL messages is enabled on this logical line, you can place the line in loopback detection mode. If you place the line in loopback detection mode, the driver brings down the line when it detects its BofL packets.

Using the BCC

To enable or disable remote loopback detection, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

remote-loopback-detection *variable*

For example:

```
logical-line/boston# remote-loopback-detection enabled
logical-line/boston# remote-loopback-detection disabled
```

Using Site Manager

See the Remote Loopback Detection parameter on page A-69 for information.

Editing Line Resources

If you run ST2 traffic on this logical line, you can reserve bandwidth for this type of traffic. To do so, specify Edit for the Line Resources parameter in Site Manager, which provides access to the Resource Manager.

Using Site Manager

See the Line Resources parameter on page A-69 for information.

Assigning Timeslots

After configuring logical lines, you configure channels (DS0s) of bandwidth by grouping 1 to 31 contiguous or noncontiguous DS0 timeslots per DS1 frame.

Using the BCC

To assign a timeslot to a logical line, navigate to the logical-line prompt (for example, **box**; **fe1/1/1**; **logical-line/boston**) and type:

time-slots *integer*

For example:

`logical-line/boston#` **time-slots 1**

To assign multiple timeslots to a logical line, type:

`logical-line/boston#` **time-slots {1 2 3 4 10}**

Using Site Manager

To assign a timeslot to a logical line, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Display the Adapter Module FE1 Logical Line window.	
2. Click on **Timeslots**.	The FE1 Timeslots window opens. This window represents the 31 FE1 timeslots.
3. Click on an **Unused** timeslot.	A list of logical lines to which you can assign the timeslot opens.
4. Select the logical line to which you want to assign the timeslot.	
5. Repeat steps 3 and 4 for each timeslot you want to assign, or click on **Select All** to assign all timeslots to a logical line.	
6. Click on **OK**.	The Adapter Module FE1 Logical Line window opens.
7. Click on **Apply**.	
8. Click on **Done**.	The Configuration Manager window opens.

Setting FE1 Line Priority

Specify the priority of this FE1 line within the same demand or backup pool with the priority parameter.

To set this parameter, navigate to the logical-line prompt and type:

priority *variable*

For example:

`logical-line/boston#` **priority 1**

Setting the Hold-Down Interval

Specify the time that the router waits before bringing up this line when using dial services with the hold-down-time parameter.

To set this parameter, navigate to the logical-line prompt and type:

hold-down-time *integer*

For example:

`logical-line/boston#` **hold-down-time 0**

Viewing the External Clock Speed

View the clock speed of the externally-supplied clock with the external-clock-speed parameter.

To view the value of this parameter, navigate to the logical-line prompt and type:

external-clock-speed *?*

For example:

`logical-line/boston#` **external-clock-speed ?**

`current value: 64102`

Testing FE1 Lines

The following sections describe how to use the Configuration Manager to test FE1 link module interfaces:

About the Tests

You can use the Configuration Manager in dynamic mode to trigger port actions to test the quality of FE1 connections. The tests perform the following actions:

- Transmit specific codes to the remote end of the FE1 connection.
- Introduce deliberate error patterns into the port BERT bit stream.

Note: All test actions are port specific. For example, a BERT reset action resets all port-specific series of BERT counters.

BERT statistics show the results of your test actions. You can view BERT statistics using the Statistics Manager utility. For information about the Statistics Manager, see *Configuring and Managing Routers with Site Manager.*

Setting Port Test Parameters

To set the port test parameters, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. In dynamic mode, click on a configured FE1 connector in the Configuration Manager window.	The Adapter Module FE1 Logical Line window opens.
2. Click on **Port Details.**	The Port Parameters window opens.
3. Click on **Line Tests.** (The Line Tests option appears only in dynamic mode**.)**	The Port Actions window opens.
4. Edit the port action parameters, located in the upper portion of the window.	
5. After setting a parameter, click on **Apply**.	Site Manager sets the parameter to the value you specified.
6. Click on **Done** when you are finished setting port action parameters.	

Note: All changes that you apply to the port in the Port Actions window are in effect only while the window is active. When you exit the Port Actions window, all port settings revert to their original settings.

The following sections describe each port action parameter:

Section	Page
Enabling or Disabling BERT Mode	9-28
Setting the BERT Alarm Type	9-28
Setting the BERT Test Pattern	9-28
Setting the Line-Coding Method	9-28
Setting the Line Type	9-28

Enabling or Disabling BERT Mode

To initiate BERT testing, you must enable BERT mode. By setting the BERT mode parameter, you enable or disable BERT mode on a single logical line for FE1. You can enable or disable BERT mode on individual logical lines.

Setting the BERT Alarm Type

You can specify the type of alarm signal to be generated while in BERT mode, or you can disable the generation of alarm signals altogether.

Select AIS (alarm indication signal) to transmit blue alarms (all ones). Select Yellow to transmit yellow alarms (all zeros).

Setting the BERT Test Pattern

When a port is in BERT mode, it can generate patterns such as: all ones, all zeros, qrss, two15, two15inv, two20, two23, two23inv.

Specify the bit pattern to be transmitted during BERT diagnostics.

Setting the Line-Coding Method

The FE1 port uses HDB3 transmit and receive line coding by default. You can select AMI line coding instead.

For a description of these line-coding methods, see “Setting the FE1 Line Coding” on page 9-7.

Setting the Line Type

When configuring the line-type setting for an FE1 line, select the appropriate frame format for testing:

- E1
- E1 CRC
- E1 MF
- E1 CRC MF
- Unframed E1

Running Port Tests

Port tests affect a logical line associated with a port.

Table 9-9 describes the BERT test commands you can send on an FE1 port.

Table 9-9. Send Commands for FE1 Port Tests

Send Command	Function
Reset BERT Counters	Resets all counters to 0
Insert 1 Error	Inserts a single (nonrepeating) error into the bit stream
Insert 1 Error/1K	Inserts a deliberate error into every thousandth position in the bit stream
Insert 1 Error/1M	Inserts a deliberate error into every millionth position in the bit stream
Disable Insert Error	Stops the insertion of deliberate errors into the bit stream

Caution: Wait for the window to update before selecting another command.

In *line* loopback, the signal does not go through the framing device.

To run FE1 port tests, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Set the test parameters in the Port Actions window. See “Setting Port Test Parameters” on page 9-27.	
2. Click on **Apply**.	
3. To start a test, click on the appropriate **Send** command.	
4. Repeat step 3 for each test you want to run.	
5. Click on **Done**.	The FE1 Port Parameters window opens.

Defining FE1 Port-Line Testing Using the BCC

To set the port-line test parameters using the BCC, complete the following tasks.

Setting the Error Insert Value

To set the error insert value, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

bert-error-insert *variable*

For example:

`port-line-test/1/1#` **bert-error-insert oneerror**

Enabling Bert Mode

To enable BERT mode, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

bert-mode *variable*

For example:

`port-line-test/1/1#` **bert-mode enabled**

Resetting BERT Testing

To reset BERT testing (set BERT messages back to zero), navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

bert-reset *variable*

For example:

`port-line-test/1/1#` **bert-reset reset**

Setting the BERT Alarm Type

To set the BERT alarm type, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

bert-send-alarm *variable*

For example:

`port-line-test/1/1#` **bert-send-alarm ais-alarm**

Setting the BERT Test Pattern

To set the BERT test pattern, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

bert-test-pattern *variable*

For example:

`port-line-test/1/1#` **bert-test-pattern qrss**

Setting the Framing Method

To set the framing method, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

framing *variable*

For example:

`port-line-test/1/1#` **framing e1**

Enabling the International Bit

To enable the International Bit, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

international-bit *variable*

For example:

`port-line-test/1/1#` **international-bit enabled**

Setting the Line Coding Method

To set the line coding method, navigate to the port-line-test prompt (for example, **box**; **fe1/1/1**; **port-line-test/1/1**) and type:

line-coding *variable*

For example:

`port-line-test/1/1#` **line-coding hdb3**

Chapter 10
Configuring Multiline Services

This chapter describes how to configure multiline services. It contains the following sections:

Overview of Multiline Configurations

A *multiline configuration* is a circuit that consists of more than one WAN *data path*. A data path is a connection between two points, and can be a permanent physical line, a dial-up physical line, or a virtual circuit connection.

Read these sections for information about multiline configurations:

Types of Multiline Circuits

You can configure multiline services over the following types of WAN media:

- Synchronous (Nortel Networks Standard, PPP, and frame relay protocols)
- T1/E1
- MCE1/MCT1
- HSSI

The data paths that form a multiline circuit must share the same bandwidth, MTU, and encapsulation method. T1, E1, MCT1, MCE1, HSSI, and Nortel Networks Standard synchronous lines share the same encapsulation method, so you can group any of these lines to form a multiline circuit as long as they share the same bandwidth and MTU.

Frame relay and PPP each have unique encapsulation methods. You cannot mix these line types with any other line type when you create a multiline circuit.

Physical and Logical Circuits

There are two types of multiline circuits:

- Circuits that include several physical lines
- Circuits on one physical line with several data paths that have separate addresses (*logical lines*)

In Figure 10-1, Multiline Circuit A groups three synchronous lines into one circuit. Multiline Circuit B consists of one physical synchronous line, but has three data paths with separate addresses.

A multiline circuit reacts to individual data paths coming up and going down by adding to and subtracting from its pool of active data paths, and can operate with some of its data paths down.

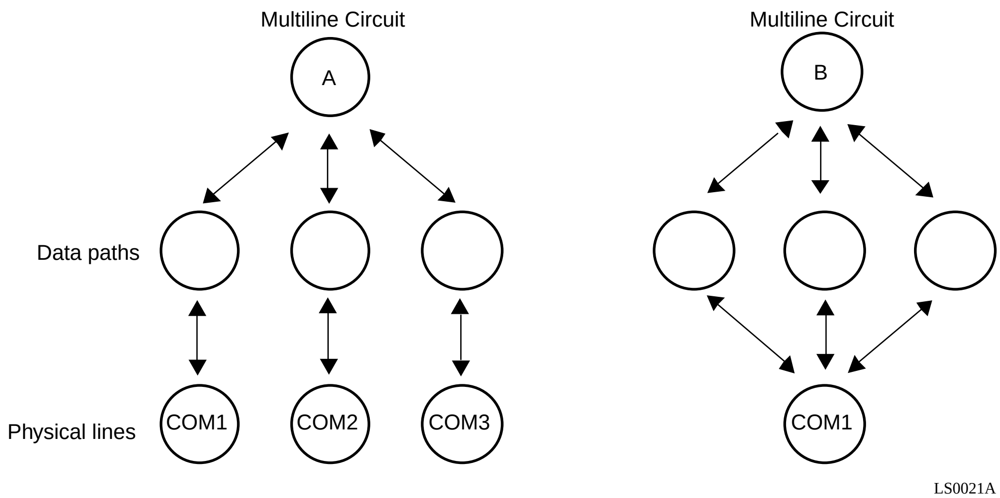

Figure 10-1. Multiline Circuit Types

Benefits of a Multiline Configuration

Using a multiline configuration has the following advantages:

- Greater bandwidth between two sites

  Bandwidth is the rate at which traffic travels on the circuit. A multiline circuit has greater bandwidth because traffic can travel over more than one data path.

- Greater degree of fault tolerance

  In a multiline configuration, a single circuit has multiple data paths. If one data path becomes disabled, traffic can travel over another data path.

Multiline Example

Suppose that your network uses Nortel Networks routers to connect two sites, one in New York City and one in Los Angeles (Figure 10-2). A high volume of important data travels between the two sites via three synchronous lines. Grouping the three synchronous lines into one multiline circuit:

- Reduces congestion by distributing the volume of traffic more evenly among the three lines
- Decreases the chance of data loss if a connection fails

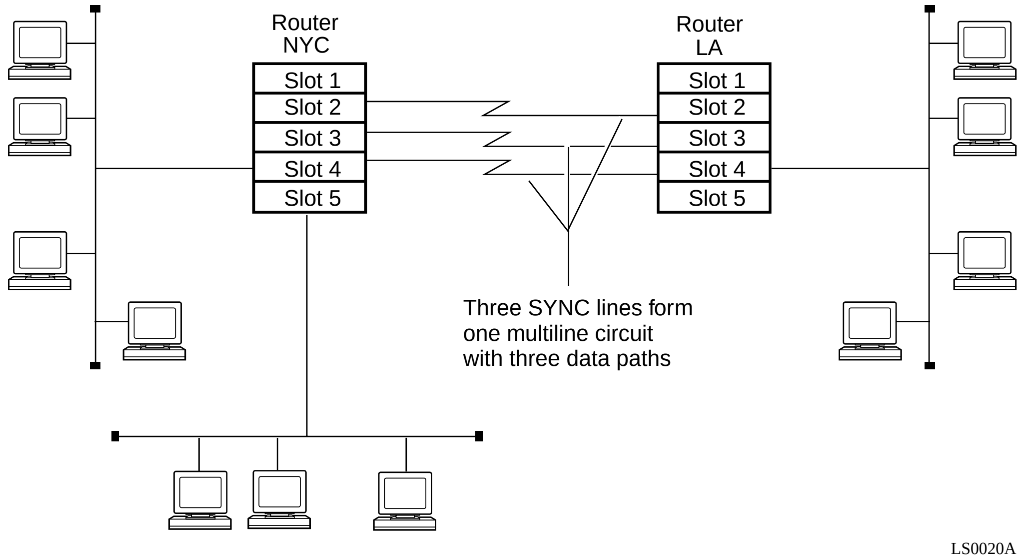

Figure 10-2. Multiline Circuit Consisting of Three Synchronous Lines

Software Considerations

This section provides notes for using multiline services with the following software configurations:

- Frame Relay
- Multilink PPP
- Bandwidth-on-Demand (BOD)

Frame Relay

You can configure multiline services for both group access mode and direct access mode frame relay PVCs. For more information about using multiline services with frame relay, see *Configuring Frame Relay Services*.

Multilink PPP

The Nortel Networks implementation of PPP includes a *multilink* feature. Multilink is similar to multiline; multilink, however, enables you to:

- Group lines of different speeds
- Preserve packet sequencing
- Distribute traffic more evenly among the data paths
- Monitor traffic volume

Multilink is particularly beneficial when you configure circuits to access BOD. For more information about the Multilink PPP feature, see *Configuring PPP Services*.

Bandwidth-on-Demand (BOD)

You can configure Nortel Networks routers to access BOD to reduce line congestion. This feature enables the router to access secondary dial-up lines when the primary leased or dial-up line becomes congested. The router can then transmit excess traffic over the secondary switched lines.

For more information about BOD, see *Configuring Dial Services*.

Configuring Multiline Services

The method you use to configure a multiline circuit depends on the types of lines you need to group.

- For information on how to group logical lines into a multiline circuit, go to "Grouping Logical Lines into a Multiline Circuit" on page 10-11.
- For information on how to group physical lines into a multiline circuit, see "Grouping Physical Lines into a Multiline Circuit" on page 10-6 or "Adding Physical Lines to a Circuit" on page 10-7.
- For information on how to use multiline with frame relay, see *Configuring Frame Relay Services.*

Grouping Physical Lines into a Multiline Circuit

To group up to 16 physical synchronous lines into a multiline circuit, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the Configuration Manager window.	
2. Click on the appropriate link module connector. You must select an E1, T1, MCT1, MCE1, HSSI, or synchronous link or net module connector.	The Add Circuit window opens (Figure 10-3).
3. Click on any of the other connectors you want to add to the multiline circuit.	
4. Click on **OK**.	
5. Add the necessary protocols to this circuit. See *Configuring Bridging Services* or the appropriate routing protocol guide for instructions.	

The connectors that you selected now form a group with a single circuit name. For example, in Figure 10-3, the lines connecting to COM2, COM3, and COM4 now form one circuit called S42, which distributes traffic using address pairs. To change the default traffic distribution method, go to "Changing the Traffic Distribution Method" later in this chapter.

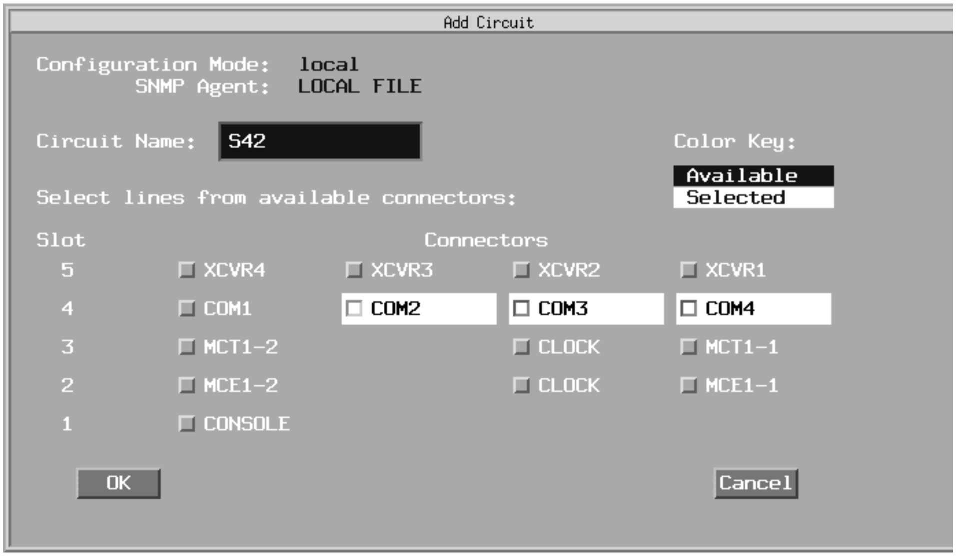

Figure 10-3. Add Circuit Window

Adding Physical Lines to a Circuit

The data paths that form a multiline circuit must share the same bandwidth, maximum transmission unit (MTU), and encapsulation method. T1, E1, MCT1, MCE1, HSSI, and Nortel Networks Standard synchronous lines share the same encapsulation method, so you can group any of these lines to form a multiline circuit as long as they share the same bandwidth and MTU.

To add a physical synchronous line to an existing circuit on which you have configured protocols, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the Configuration Manager window.	
2. Click on the connector of the circuit to which you are adding lines.	The Edit Connector window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
3. Click on **Edit Circuit**.	The Circuit Definition window opens (Figure 10-4).
4. Click on the connectors you are adding to the circuit.	Site Manager highlights the connectors you choose. For example, Figure 10-4 illustrates the addition of COM2 to the circuit S42, which already uses connectors COM3 and COM4.
5. Choose **Lines > Change Lines** (Figure 10-5). If you want to change the traffic distribution method, go to "Changing the Traffic Distribution Method" later in this chapter.	The lines now form one circuit. The default traffic distribution method is based on the address.
6. Choose **File > Exit** to exit the Circuit Definition window.	

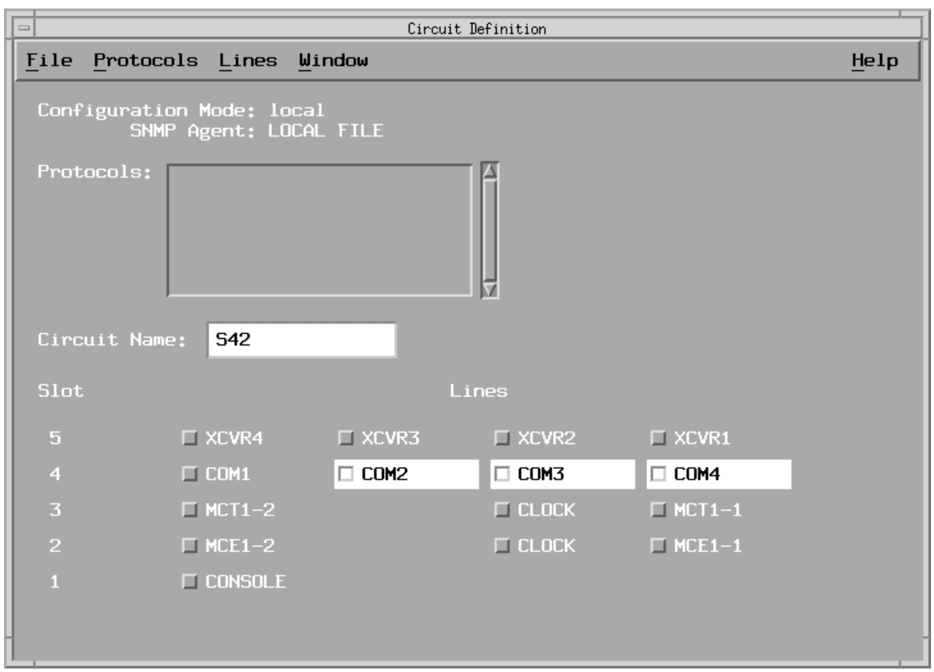

Figure 10-4. Circuit Definition Window

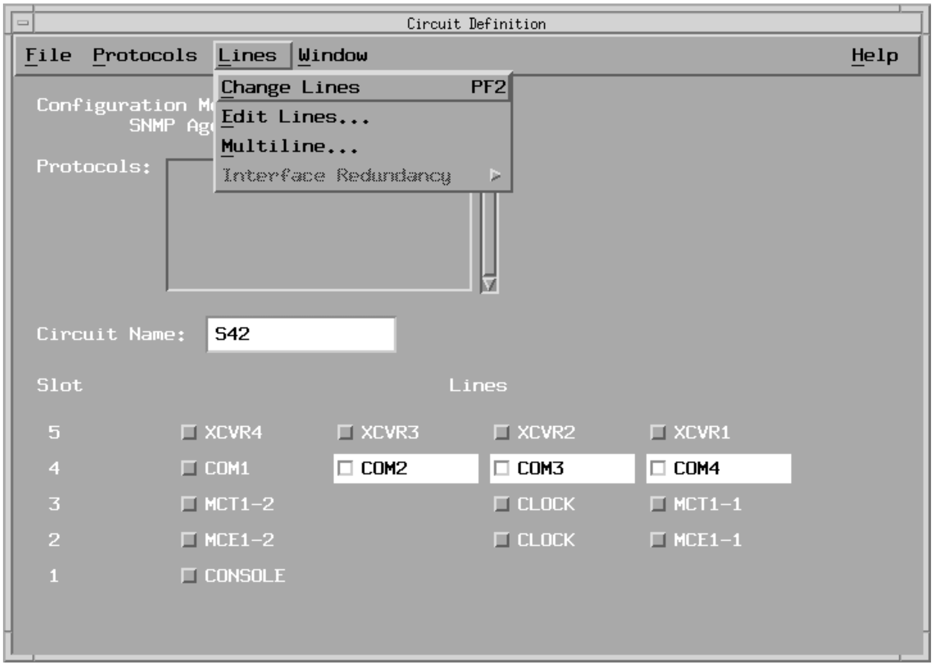

Figure 10-5. Change Lines Menu Option

Changing the Traffic Distribution Method

By default, all multiline circuits distribute traffic using address pairs. To change the traffic distribution method, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the Configuration Manager window.	
2. Click on one of the connectors of the appropriate multiline circuit.	The Edit Connector window opens.
3. Click on **Edit Circuit**.	The Circuit Definition window opens (Figure 10-5).

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Choose **Lines > Multiline**.	The Edit Multiline Options window opens (Figure 10-6), displaying the circuit number in its title.
5. Edit the Data Path Chooser parameter to select the data path. See the Data Path Chooser parameter on page A-91.	
6. Click on **OK**.	

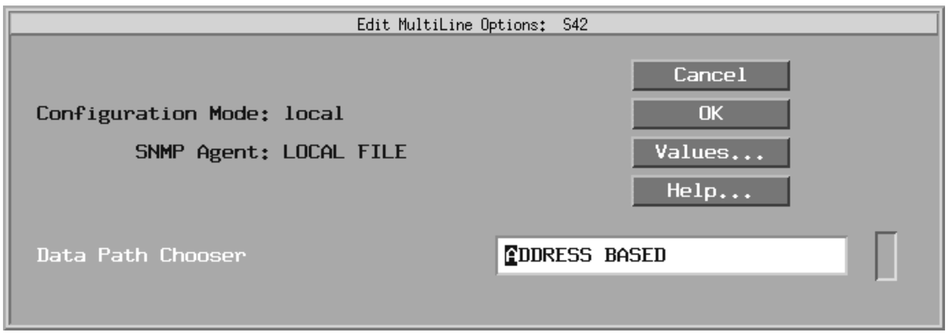

Figure 10-6. Edit Multiline Options Window

To distribute traffic among multiline data paths, you can use one of the following methods:

- Address-Based Selection
- Random Selection

Address-Based Selection

If you choose address-based selection, the router determines the appropriate data path for outbound traffic from the source and destination addresses in individual packets. The router always uses the same data path for a given address pair.

The router determines whether to route or bridge the packet, and then uses the appropriate address. It uses the routing-level addresses for routing traffic, and the MAC-level addresses for bridging traffic.

Address-based selection ensures that all outbound traffic to a particular endstation travels on the same data path, and that packets arrive in the correct sequence. Use this method for protocols that cannot receive packets out of sequence. Note, however, that this option may not result in even traffic distribution across all data paths.

Note: Address-based selection cannot be used with frame relay in group or hybrid access mode. Traffic distribution is automatically changed to random selection.

Random Selection

If you choose random selection, the router determines the data path for outbound traffic by using random number generation. With this method, the router:

1. Assigns a set of numbers to each data path
2. Generates a random number for each outbound packet
3. Sends the packet across the data path with the matching number

Note: Random selection provides even distribution across all active data paths in the topology; however, packets traveling on different paths can arrive at their destination out of sequence. Some protocols cannot tolerate packets arriving out of sequence, and as a result, you can experience poor performance or failures. Be sure that random selection is appropriate for your application.

See the Data Path Chooser parameter on page A-91 for information.

Grouping Logical Lines into a Multiline Circuit

You can group as many as 31 MCE1 logical lines and 24 MCT1 logical lines into one multiline circuit. All logical lines in a multiline group have the same circuit name.

This section describes how to group unused MCE1 or MCT1 logical lines into one multiline circuit. An unused logical line is a line without a defined circuit.

Note: If the MCE1 or MCT1 circuit is already configured, you must delete the single-line circuit before creating a multiline circuit.

Before you can group lines, you must create the unused logical lines. To create the unused logical lines, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Start at the MCE1 or MCT1 Logical Lines window. (See Chapter 7 for details.)	
2. Click on an unconfigured MCE1 or MCT1 connector in the Configuration Manager window.	The Port Application window opens.
3. Set the Port Application Mode parameter to **NONPRI**, then click on **OK**.	The Edit Clock Parameters window opens.
4. Select a primary and secondary clock source option, then click on **OK**.	The MCE1 or MCT1 Port Parameters window opens.
5. Set the port parameters, then click on **OK**.	The MCE1 or MCT1 Logical Lines window opens.
6. After customizing the port parameters, click on **Add**.	The Add Circuit window opens. Do not click on **OK** in the Add Circuit window. Selecting OK adds a single-line circuit for this logical line. You cannot create a multiline circuit from a single-line circuit.
7. Click on **Cancel** to create an unused logical line.	The MCE1 or MCT1 Logical Lines window reopens.
8. Repeat steps 6 and 7 for each unused logical line you want to create.	The MCE1 or MCT1 Logical Lines window now lists the unused logical lines. Figure 10-7 shows four unused logical lines.

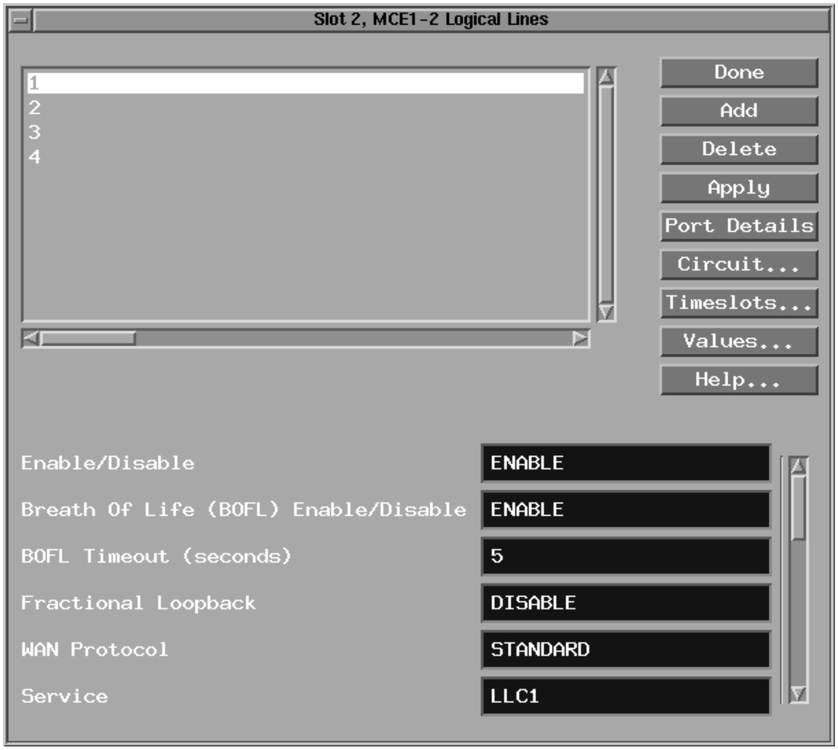

Figure 10-7. Logical Lines Window Showing Unused Logical Lines (MCE1 Example)

To group lines into a multiline group from the MCE1 or MCT1 Logical Lines window, complete the following tasks.

Site Manager Procedure	
You do this	**System responds**
1. Click on **Circuit**.	The Add Circuit window opens because the unused logical lines are not yet part of a defined circuit.
2. Click on **OK** to create the circuit.	The WAN Protocols window opens.
3. Select the protocol for this circuit and click on **OK**.	The Select Protocols window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Select additional protocols and click on **OK**.	The MCE1 or MCT1 Logical Lines window reopens, this time displaying the configured circuit with the remaining unused logical lines (Figure 10-8). The circuit is currently associated with one logical line.
5. Select the logical line that contains the new circuit and click on **Circuit**.	The Circuit Definition window opens (Figure 10-9). In Figure 10-8, the circuit is defined for logical line 5 and is called MCE1-22-5. For information about the format of logical line names, see Figure 7-2 (link modules) or Figure 7-3 (net modules) in Chapter 7.
6. Click on the connector that has the unused logical lines.	The Select Logical Line window opens (Figure 10-10), displaying the lowest-numbered unused logical line.
7. Select and hold down the logical line number (Figure 10-11).	The Select Logical Line window displays the remaining unused logical lines.
8. Select a logical line to include in the multiline circuit and click on **OK**.	The Circuit Definition window opens.
9. Choose **File > Exit**.	The MCE1 or MCT1 Logical Lines window opens, displaying two logical lines associated with the multiline circuit (Figure 10-12).
10. Click on **Circuit** to display the Circuit Definition window.	
11. Repeat steps 6 through 8.	
12. Choose **Lines > Change Lines**.	
13. Repeat steps 7 and 8 for each unused logical line you want to include in the multiline circuit.	The logical lines are now grouped as a circuit.
14. Choose **File > Exit**.	The MCE1 or MCT1 Logical Lines window opens, displaying the multiline group. Note that all logical lines now have the same circuit name (MCE1-22-5 in the example).

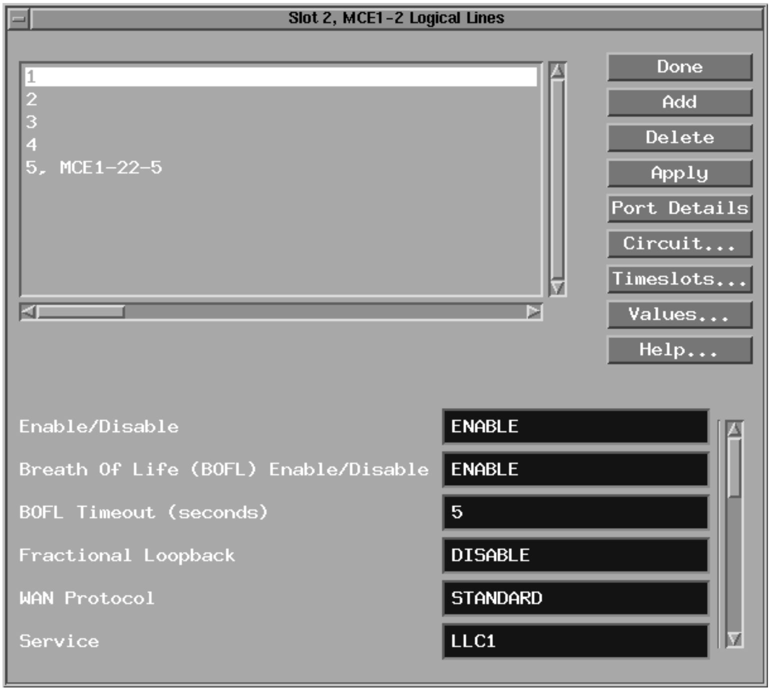

Figure 10-8. Logical Lines Window Showing the Circuit and Unused Logical Lines (MCE1 Example)

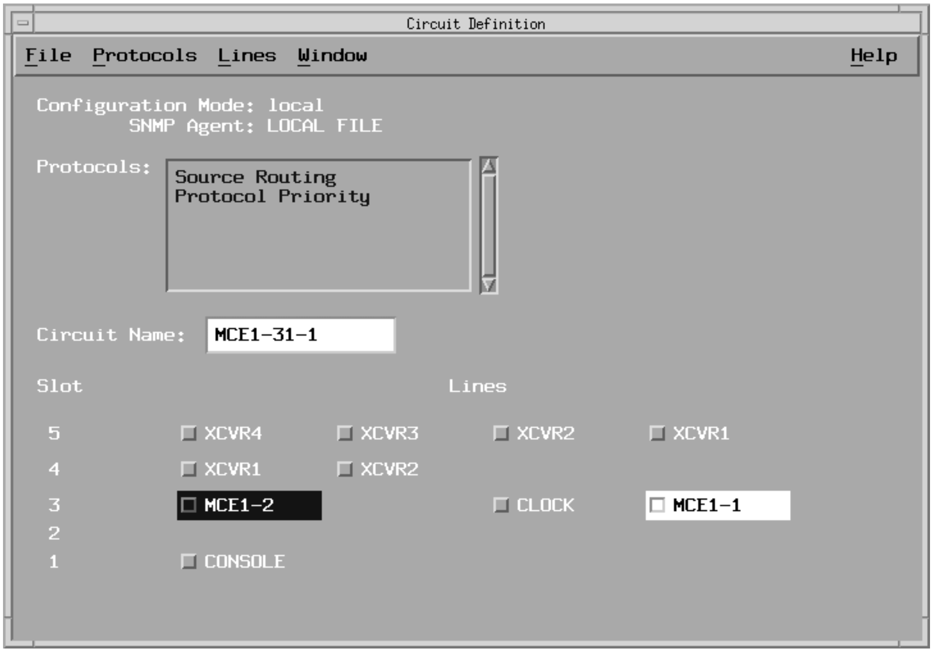

Figure 10-9. Circuit Definition Window

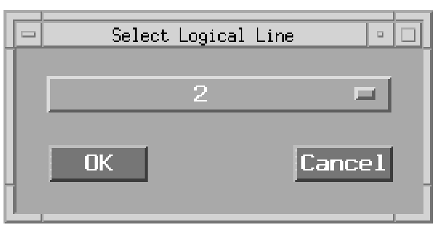

Figure 10-10. Select Logical Line Window

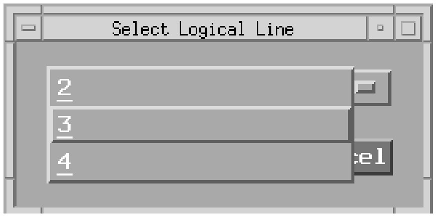

Figure 10-11. Selecting an Unused Logical Line

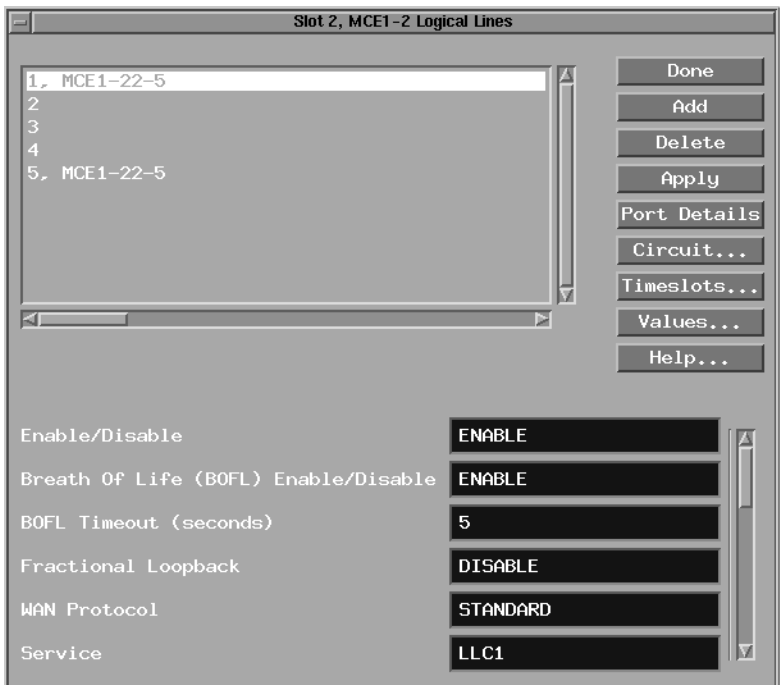

Figure 10-12. Two Logical Lines in a Multiline Circuit

Appendix A
Site Manager Parameters

The following sections in this appendix contain reference information about Site Manager line services parameters:

For each line parameter associated with a physical layer protocol, this appendix provides the Site Manager menu path to the parameter, information about default settings, valid parameter options, the parameter function, instructions for setting the parameter, and the MIB object ID.

Note: The Site Manager menu path to each parameter listed in this appendix begins at the Configuration Manager window.

Asynchronous Line Parameters

On a Nortel Networks AN or ANH router only, the Configuration Manager displays the Edit ASYNC Parameters window when you select the ASYNC protocol from the WAN Protocols window for a COM2 port line.

Parameter: Enable

Path: **COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default: Enable
Options: Enable | Disable
Function: Enables or disables ASYNC on the router.
Instructions: Set this parameter to either enable or disable ASYNC.
MIB Object ID: 1.3.6.1.4.1.18.3.4.3.1.2

Parameter: MTU

Path: **COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default: 1000 bytes
Options: 3 to 1580 bytes
Function: Specifies the largest frame (MTU) that the router can transmit via TCP.
Instructions: Specify a value in the range 3 to 1580.
MIB Object ID: 1.3.6.1.4.1.18.3.4.3.1.7

Parameter:	**Start Protocol**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	Answer
Options:	Loop | Originate | Answer
Function:	Specifies the start mode for the ASYNC TCP connection.
Instructions:	Select Answer to advise local TCP to wait for a connection request. Select Originate to advise local TCP to initialize a connection to the specified remote IP address. Select Loop to perform asynchronous cable testing.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.9

Parameter:	**Remote IP Addr**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	None
Options:	Any valid 32-bit IP address in dotted-decimal notation
Function:	Specifies a remote TCP host with which this router will communicate using ASYNC. The remote IP address is used only when the Start Protocol parameter is set to Originate.
Instructions:	Enter a valid IP address in dotted-decimal notation.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.26

Parameter:	**Remote Port**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	7
Options:	1 to 65535
Function:	Specifies a remote port on the router for the TCP connection for asynchronous communications.
Instructions:	Enter a remote port number. The remote port number is used only when the Start Protocol parameter is set to Originate.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.27

Parameter:	**Local Port**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	2100
Options:	1 to 65535
Function:	Specifies a local port on the router for the TCP connection for asynchronous communications.
Instructions:	Enter a local port number. The local port number is used only when the Start Protocol parameter is set to Answer.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.28

Parameter:	**Baud Rate**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	9600
Options:	300 | 1200 | 2400 | 4800 | 9600 | 19200
Function:	Specifies the asynchronous line speed.
Instructions:	Select the appropriate line speed for this configuration.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.29

Parameter:	**Idle Timer**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	20 seconds
Options:	1 to 300 seconds
Function:	Specifies the asynchronous idle timer, in seconds.
Instructions:	Specify an appropriate idle timer value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.30

Parameter:	**Receive Window**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	4096 bytes
Options:	512 to 65535 bytes
Function:	Specifies the size of the TCP receive window for received asynchronous packets.
Instructions:	Specify a value in the range 512 to 65535.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.31

Parameter:	**TCP KeepAlive**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	8 seconds
Options:	3 to 180 seconds
Function:	Specifies how often the local TCP host sends keepalive messages to the remote TCP host. When the local TCP host sends a TCP keepalive message, it expects an acknowledgment (ACK) from the remote TCP host. The ACK then resets the inactive limit timer. If the local TCP host does not receive the ACK from the remote TCP host within the time limit specified by the TCP Inactive Limit parameter, the TCP connection is disabled. To prevent an error or alarm condition, set the TCP Inactive Limit parameter to a value that allows enough time for multiple TCP keepalive messages.
Instructions:	Specify a value in the range 3 to 180 seconds.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.35

Parameter:	**TCP Inactive Limit**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	300 seconds
Options:	-65536 to 65535 seconds
Function:	Specifies the maximum inactivity timer, in seconds. When the inactive limit timer expires, the TCP connection between the router and the remote TCP host is lost. This parameter works with the TCP KeepAlive parameter. To prevent a TCP connection loss, set this parameter to a value that allows enough time for multiple TCP keepalive messages and ACKs from the remote TCP host. (See the TCP KeepAlive parameter description for information.) If the port is listening (TCP KeepAlive) for an incoming connection, you can specify a negative value for this parameter to mark the connection as inactive and defer resetting the connection until a connection request is received.
Instructions:	Specify a value in the range -65536 to 65535, or accept the default value (300).
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.36

Parameter:	**Cfg TxQ Length**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	None
Options:	1 to 255 bytes
Function:	Specifies the maximum transmit queue length, in bytes. This parameter reduces the size of the driver transmit queue if the transmit queue is larger than the value of this parameter.
Instructions:	Specify a value in the range 1 to 255.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.37

Parameter:	**Cfg RxQ Length**
Path:	**COM** Connector > **Edit Line** > Edit Asynchronous Parameters
Default:	None
Options:	1 to 255 bytes
Function:	Specifies the maximum receive queue length, in bytes. This parameter reduces the size of the driver receive queue if the receive queue is larger than the value of this parameter.
Instructions:	Specify a value in the range 1 to 255.
MIB Object ID:	1.3.6.1.4.1.18.3.4.3.1.38

DSU/CSU Parameters

On a BayStack AN, ANH, or ARN router only, you access the DSU/CSU line services parameters from the Configuration Manager window.

Parameter: Option Mode

Path: **COM** Connector > **Edit DSU/CSU** > Edit DSU CSU Parameters

Default: DDS1-56KBPS

Options: DDS1-56KBPS | CC-64KBPS

Function: Identifies the type of Telco service to which the DSU/CSU is connected.

Instructions: The data rate of the DSU/CSU must match the network service. Select DDS1-56KBPS when connected to a DDS1 56 Kb/s line. Select CC-64KBPS when connected to a Clear Channel 64 Kb/s line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.30.1.1.6

Parameter: Transmit Clock Source

Path: **COM** Connector > **Edit DSU/CSU** > Edit DSU CSU Parameters

Default: Slave

Options: Slave | Master

Function: Determines the default transmit timing (clock) source for transmitting data to the network. When set to Master, an internal oscillator in the DSU creates the clock for a private-wire configuration. In Slave mode, a PLL internal to the DSU will recover and synchronize the DSU clock.

Instructions: Set both ends to Slave for a Telco network. For a private-wire configuration, set one end to Master and the other end to Slave. Note that there can be only one clock source on a DDS line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.30.1.1.7

Parameter:	**64K Transmit Monitor**
Path:	**COM** Connector > **Edit DSU/CSU** > Edit DSU CSU Parameters
Default:	Disabled
Options:	Enabled | Disabled
Function:	Valid only in 64K Clear Channel mode (Option Mode set to CC-64KBPS). When enabled, the parameter suppresses data to prevent unintended duplication of a network control code. For example, user data that happens to include the text of a loopback control code could place the remote end of the connection into a loop.
Instructions:	Specify Enabled to monitor and suppress user data; keep the default, Disabled, to allow all data.
MIB Object ID:	1.3.6.1.4.1.18.3.4.30.1.1.9

Parameter:	**V.54 Loopback**
Path:	**COM** Connector > **Edit DSU/CSU** > Edit DSU CSU Parameters
Default:	NO LOOP
Options:	NO LOOP | ANALOG | DIGITAL | REM DIGITAL | REM DIG/ PATTERN | ANALOG/ PATTERN | PATTERN-2047
Function:	Configures a V.54 loopback test state within the DSU/CSU. Note that selecting a loopback test state disrupts user data transmission through the DSU/CSU for the period specified by the V.54 Timer parameter.
Instructions:	Select a test state or keep the default, NO LOOP.
MIB Object ID:	1.3.6.1.4.1.18.3.4.30.1.1.12

Parameter:	**V.54 Timer**
Path:	**COM** Connector > **Edit DSU/CSU** > Edit DSU CSU Parameters
Default:	0
Options:	0 to 255 seconds
Function:	Sets the duration, in seconds, for the loopback testing specified in the V.54 Loopback parameter. Zero (0) indicates that loopback testing runs indefinitely.
Instructions:	Specify the number of seconds for loopback testing to run. If the only connection with the remote router is through the DSU/CSU interface, be sure to specify a nonzero value, since loopback testing leaves the router unable to communicate with the remote router.
MIB Object ID:	1.3.6.1.4.1.18.3.4.30.1.1.13

E1 Line Parameters

You access the E1 line parameters from the Configuration Manager window.

Parameter:	**Enable**
Path:	**E1** Connector > **Edit Line** > Edit E1 Parameters
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables the E1 line.
Instructions:	Set to Disable if you want to disable the E1 line.
MIB Object ID:	1.3.6.1.4.1.18.3.4.11.1.2

Parameter: HDB3S Support

Path: **E1** Connector > **Edit Line** > Edit E1 Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables high-density bipolar coding (a mechanism to maintain sufficient ones density in the E1 data stream).

Instructions: Enable or disable this parameter, depending on the ability of the associated E1 equipment to support HDB3S.

MIB Object ID: 1.3.6.1.4.1.18.3.4.11.1.7

Parameter: Clock Mode

Path: **E1** Connector > **Edit Line** > Edit E1 Parameters

Default: Internal

Options: Manual | Slave | Internal

Function: Specifies the source of the E1 transmit clock.

Instructions: Select Internal to indicate that the router sets the clock.

Select Slave to indicate that the incoming data stream sets the clock.

Select Manual to indicate that the jumpers on the E1 link module set the clock. See *Installing and Maintaining BN Routers* or *Installing and Maintaining ASN Routers and BNX Platforms* for information about configuring hardware jumpers.

MIB Object ID: 1.3.6.1.4.1.18.3.4.11.1.8

Parameter:	**Mini Dacs**
Path:	**E1** Connector > **Edit Line** > Edit E1 Parameters
Default:	Idle
Options:	Idle | Data | Voice | Circuit 1 | Circuit 2
Function:	Assigns a specific function to each E1 channel.
Instructions:	Select Idle to make the channel idle. Select Data to assign the channel to voice pass-through (E1 connector to E1 connector). Select Circuit 1 to assign the channel to the first E1 connector. Select Circuit 2 to assign the channel to the second E1 connector.
MIB Object ID:	1.3.6.1.4.1.18.3.4.11.1.9

Parameter:	**Line Type**
Path:	**E1** Connector > **Edit Line** > Edit E1 Parameters
Default:	E1
Options:	E1 | E1CRC4
Function:	Enables or disables a 4-byte CRC on received frames.
Instructions:	Select E1CRC4 if the E1 equipment expects a 4-byte CRC trailer at the end of each frame.
MIB Object ID:	1.3.6.1.4.1.18.3.4.11.1.18

HSSI Line Parameters

You access the HSSI line parameters from the Configuration Manager window.

Parameter: **Enable**

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables this HSSI line.

Instructions: Set this parameter to either Enable or Disable for this line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.2

Parameter: **BofL**

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: Enable

Options: Enable | Disable

Function: Enables the transmission of proprietary Ethernet-encapsulated BofL messages over a point-to-point connection between the local router and a remote peer.

Instructions: Set to Enable or Disable, depending on whether you want to transmit BofL messages over this HSSI line. If you enable BofL locally, you must also configure the remote peer to enable BofL.

Nortel Networks recommends that you enable BofL for point-to-point connections between Nortel Networks peers. If, however, such a connection occurs through a wide area transport service such as frame relay or SMDS, you must disable BofL.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.7

Parameter: BofL Frequency

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: 1 second

Options: 0 to 60 seconds

Function: Specifies the interval, in seconds, between BofL transmissions. This parameter is valid only if BofL is set to Enable.

After sending a BofL message, the router starts a timer that has a value equal to five times the setting of this parameter. If the router does not receive a BofL message from the remote peer before the timer expires, the router disables the HSSI line, and then attempts to restart it.

Instructions: Accept the default, 1 second, or specify a new value, making sure that both ends of the point-to-point connection are configured with the same value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.8

Parameter: MTU

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: 4608 bytes

Options: 3 to 4608 bytes

Function: Specifies the buffer size for the HSSI interface and, therefore, determines the largest frame that can travel across the HSSI port.

Instructions: Set this parameter to a value appropriate for your network.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.9

Parameter: WAN Protocol

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: None

Options: Standard | PassThru | PPP | SMDS | Frame Relay | ATM DXI

Function: Indicates which WAN protocol you enabled on this HSSI circuit.

Instructions: Accept this setting. Changing the protocol here will not reconfigure the interface.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.1.12

Parameter:	**Transmission Interface**
Path:	**HSSI** Connector > **Edit Line** > Edit HSSI Parameters
Default:	DS3
Options:	DS1 | DS3
Function:	Specifies the appropriate MIB for the local management interface (LMI) to use, as long as you enable LMI and configure SMDS or frame relay across the HSSI interface. The HSSI driver does not support the DS1 or DS3 MIB. Rather, the external DCE (for example, a DL3200 SMDS CSU/DSU from Digital Link) may provide MIB support.
Instructions:	Select a DS1 MIB (specified by RFC 1232) or a DS3 MIB (specified by RFC 1233), depending on the carrier services the attached DCE provides (DS1 at 1.54 MB/s, or DS3 at 44.736 MB/s).
MIB Object ID:	1.3.6.1.4.1.18.3.4.7.1.1.13

Parameter:	**External Clock Speed**
Path:	**HSSI** Connector > **Edit Line** > Edit HSSI Parameters
Default:	46359642 (44.736 MB/s)
Options:	307200 to 52638515
Function:	Specifies the bandwidth that the HSSI channel provides. The HSSI specification requires that the DCE provide a transmit clock that times data transfer across the DTE/DCE interface. The value you specify for this parameter does not actually affect hardware initialization. Certain routing protocols use this parameter value for route selection.
Instructions:	Specify a value equal or close to the data transmission rate across the HSSI channel.
MIB Object ID:	1.3.6.1.4.1.18.3.4.7.1.14

Parameter: **CRC Size**

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: 32 bit

Options: 16 bit | 32 bit

Function: Specifies an error-detection scheme. You can choose either 16 bit (standard ITU-T) or 32 bit (extended) to detect errors in the packet.

Instructions: Set this parameter to either 16 bit or 32 bit, making sure that the remote end of the HSSI connection is configured with the same value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.15

Parameter: **Carrier Loss Debounce Time-out**

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: 0

Options: 0 to 2147483647 seconds

Function: Determines how many seconds the line driver waits after losing the carrier signal before transitioning to the Carrier Lost state. If the carrier signal returns before reaching this threshold, the driver never enters the Carrier Lost state.

Instructions: For most lines, you want the driver to immediately transition to the Carrier Lost state upon detecting carrier loss. For a problem line, however, you can specify a number of seconds for the router to sense carrier loss before entering the Carrier Lost state.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.64

Parameter: **Loopback Configuration**

Path: **HSSI** Connector > **Edit Line** > Edit HSSI Parameters

Default: No_Loopback

Options: No_Loopback | Local_Digital | Local_Line | Remote_Line

Function: Sets the DTE loopback mode over normal full-duplex operation. DTE loopback is a diagnostic test that causes the DTE to transmit a signal to the DCE. The DTE then waits for the DCE to return the signal. The DCE provides the transmit and receive clock signals.

Instructions: Click on Values and select one of the following DTE loopback settings:

- No_Loopback -- Prevents the DTE from sending loopback signals to the DCE.
- Local_Digital (Loop A) -- Allows the DTE to check the DTE/DCE interface. In a Loop A test, the DTE transmission is returned to the DTE on the received local DCE data circuit. The CA LED (DCE Ready) must be on.
- Local_Line (Loop B) -- Allows the DTE to check the DTE/DCE interface and the transmit and receive sections of the local DCE. In a Loop B test, the output of the transmit section of the DCE is returned to the receive section of the DCE. The CA LED (DCE Ready) must be on.
- Remote_Line (Loop C) -- Allows the DTE to check the functions of the transmission path to the remote DCE interface.

MIB Object ID: 1.3.6.1.4.1.18.3.4.7.1.67

LAPB Parameters

When you edit an Octal Sync link module line, or any synchronous line on Nortel Networks AN, ANH, ARN, or ASN routers, the router automatically configures the LAPB protocol if you configure a circuit for the X.25 protocol. The Edit SYNC Parameters window for these lines includes an additional button for editing LAPB parameters.

Parameter: **Enable**

Path: **COM** Connector for X.25 Interface > **Edit Line** > LAPB > Edit LAPB Parameters

Default: Enable

Options: Enable | Disable

Function: Globally enables or disables LAPB services.

Instructions: Select Disable to disable LAPB services.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.2

Parameter: **Station Type**

Path: **COM** Connector for X.25 Interface > **Edit Line** > LAPB > Edit LAPB Parameters

Default: DTE

Options: DTE | DCE | DXE

Function: Identifies the station type (that is, whether the device is a DTE or DCE) for this interface.

Instructions: If your device is data terminal equipment, select DTE. If your device is data communications equipment, select DCE. If you do not want to assign a specific station type, and instead want the network to determine the station type, select DXE. This value indicates that the router is in unassigned mode; it is neither a DTE nor a DCE. If you select DXE, the router will send an exchange identification (XID), but negotiation will not take place until the network assigns a station type.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.7

Parameter:	**Control Field**
Path:	**COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters
Default:	Modulo 8
Options:	Modulo 8 | Modulo 128
Function:	Specifies the desired window size, or modulo, of the sequence numbering that the router uses to number frames.
Instructions:	Select the appropriate window size for your configuration.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.8.1.8

Parameter:	**Max N1 Frame Size (octets)**
Path:	**COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters
Default:	256 bytes
Options:	3 to 4500 bytes
Function:	Specifies the frame size, in bytes, for a frame that the router or network transmits. This number excludes flags and 0 bits inserted for transparency.
Instructions:	Select the frame size that suits your network configuration.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.8.1.9

Parameter:	**Window Size**
Path:	**COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters
Default:	7
Options:	1 to 127
Function:	Specifies the default transmit and receive window size for the interface. This value is the maximum number of unacknowledged sequence frames that can be outstanding from the router or the network at any one time.
Instructions:	Specify the appropriate window size for your configuration.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.8.1.10

Parameter: Max N2 Retries

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: 10

Options: 1 to 64

Function: Determines the value of the N2 retry count, which is the number of retransmission attempts that the router makes, per frame, before it considers the line to be down. The retry count is the maximum number of attempts following the expiration of the T1 timer.

Instructions: Specify the number of times you want the router to try to retransmit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.11

Parameter: Max T1 Acknowledge Timer (seconds)

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: 30 seconds

Options: 1 to 9999 seconds

Function: Specifies the maximum time, in seconds, that the router waits for an acknowledgment of a frame that it has sent to the network.

Instructions: Specify the maximum time, in seconds, that you want the router to wait for a frame acknowledgment from the network.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.12

Parameter: **Max T2 Acknowledge Timer (seconds)**

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: 1 second

Options: 1 to 9999 seconds

Function: Specifies the time, in seconds, that the router waits before sending an acknowledgment for a sequenced frame. A value of 1 means that the router does not delay before generating an acknowledgment.

Instructions: Specify the amount of time that you want the router to wait before acknowledging a frame.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.13

Parameter: **Max T3 Disconnect Timer (seconds)**

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: 60 seconds

Options: 1 to 9999 seconds

Function: Specifies the time, in seconds, that the router waits before determining that the link is disconnected. A value of 1 indicates that once the router completes the frame exchange to bring down the link, it considers the link disconnected.

Instructions: Specify the amount of time that you want the router to wait before it considers the link disconnected.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.14

Parameter: Initiate Link Setup Action

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: Active

Options: Active | Passive

Function: Identifies whether the router initiates link setup or waits for the network to initiate link setup.

Instructions: Select Active if you want the router to initiate link setup; select Passive if you want the network to initiate link setup.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.16

Parameter: Enable Rx/Tx of XID Frames

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: Disable

Options: Enable | Disable

Function: Enables or disables the transmission and reception of test XID frames by the router.

Instructions: Select Enable to allow the router to send XID frames; select Disable to prevent the router from sending XID frames.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.17

Parameter: Command/Response Address

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: DTE

Options: DTE | DCE

Function: Specifies the local command or response address, which is the DTE or DCE value expressed as a single octet.

Instructions: Select DTE for the DTE address; select DCE for the DCE address.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.18

Parameter: **WAN Protocol**

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: Standard

Options: Standard | X.25

Function: Specifies the WAN protocol you want to use on this interface.

Instructions: Do not change this value. Use the Circuit List window to change the protocol.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.20

Parameter: **Network Link Type**

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: NET2

Options: GOSIP | NET2

Function: Sets the link type used with the X.25 network hardware.

Instructions: Select NET2 or GOSIP.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.39

Parameter: **Idle RR Frames**

Path: **COM** Connector for X.25 Interface > **Edit Line** > **LAPB** > Edit LAPB Parameters

Default: Off

Options: On | Off

Function: Enables or disables the transmission and reception of RR frames during periods when there are no information frame exchanges. When this parameter is set to On, an RR frame is transmitted when no traffic is present on the physical media.

Instructions: Select On or Off.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.8.1.40

MCE1 Port Application and Clock Parameters

Parameter:	**Port Application Mode**
Path:	Unconfigured **MCE1** Connector > Port Application
Default:	NONPRI
Options:	NONPRI | PRI
Function:	Specifies the port application to use on the logical lines.
Instructions:	Select NONPRI to indicate that all of the lines have a permanent circuit number and are for leased lines, frame relay, or permanent connections to other non-ISDN PRI applications. Select PRI to indicate that the lines are for switched circuits using ISDN. The 120-ohm MCE1 II link module supports ISDN PRI. MCE1 net modules support only non-PRI applications.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.1.16

Parameter:	**Primary Clock**
Path:	MCE1 **CLOCK** Connector > Edit Slot > DS1/E1 Clock Parameters
Default:	Port 1 Ext Loop
Options:	Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext
Function:	Identifies the primary source of the timing signals.
Instructions:	Select Internal to use the clock chip on the link or net module. Select Port 1 Ext Loop to use the signal coming from port 1. Select Port 2 Ext Loop to use the signal coming from port 2 (Dual-Port MCE1 only). Select Auxiliary Ext to use an external source via BNC connectors.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.1.1.4

Parameter: Secondary Clock

Path: MCE1 **CLOCK** Connector > Edit Slot > DS1/E1 Clock Parameters

Default: Internal

Options: Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext

Function: Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.

Select Port 2 Ext Loop to use the signal coming from port 2 (Dual-Port MCE1 only).

Select Auxiliary Ext to use an external source via BNC connectors.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.1.1.5

MCE1 Port Parameters

You access the MCE1 port parameters from the Configuration Manager window.

Parameter: Enable/Disable

Path: **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables the MCE1 port.

Instructions: Set to Disable only if you want to disable the MCE1 port.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.2

Parameter: Line Type

Path: **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: E1

Options: E1 | E1 CRC | E1 MF | E1 CRC MF

Function: Specifies the frame format.

Instructions: Select the appropriate frame format for your E1 equipment.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.6

Parameter: Line Coding

Path: **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: HDB3

Options: AMI | HDB3

Function: Specifies a line-coding method. AMI line coding is bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the MCE1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

HDB3 line coding maintains sufficient 1s density in the E1 data stream. It replaces a block of eight consecutive binary zeros with an 8-bit HDB3 code containing bipolar violations in the fourth and seventh bit positions of the substituted code. In the receive direction, the HDB3 code is detected and replaced with eight consecutive binary zeros.

Instructions: Select the line-coding method.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.7

Parameter: Setup Alarm Threshold (seconds)

Path: **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the time, in seconds, that MCE1 tolerates a performance defect or anomaly. If the performance defect or anomaly is still present when this time interval expires, MCE1 records a performance failure and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.7

Parameter: Clear Alarm Threshold (seconds)

Path: **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the clear time, in seconds, for performance-failure conditions. If the defect or anomaly clears in this time interval, MCE1 records a performance-cleared condition and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.8

Parameter: International Bit

Path: **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: Disable

Options: Enable | Disable

Function: Specifies whether the international bit is set in the E1 frame.

Instructions: Select Enable to set the international bit; select Disable to disable it.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.16

Parameter: Line Impedance

Path: ASN **MCE1** Connector > Edit Logical Lines > **Port Details** > MCE1 Port Parameters

Default: 120 Ohm

Options: 120 Ohm | 75 Ohm

Function: For the ASN MCE1 net module only, specifies the line impedance.

Instructions: Set the line impedance.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.20

MCT1 Port Application and Clock Parameters

Parameter:	**Port Application Mode**
Path:	Unconfigured **MCT1** Connector > Port Application
Default:	NONPRI
Options:	NONPRI | PRI
Function:	Specifies the port application to use on the logical lines.
Instructions:	Select NONPRI to indicate that all of the lines have a permanent circuit number and are for leased lines, frame relay, or permanent connections to other non-ISDN PRI applications. Select PRI to indicate that the lines are for switched circuits using ISDN.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.1.16

Parameter:	**Primary Clock**
Path:	MCT1 **CLOCK** Connector > Edit Slot > DS1/E1 Clock Parameters
Default:	Port 1 Ext Loop
Options:	Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext
Function:	Identifies the primary source of the timing signals.
Instructions:	Select Internal to use the clock chip on the link or net module. Select Port 1 Ext Loop to use the signal coming from port 1. Select Port 2 Ext Loop to use the signal coming from port 2 (Dual-Port MCT1 only). Select Auxiliary Ext to use an external source via BNC connectors.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.1.1.4

Parameter:	**Secondary Clock**
Path:	MCT1 **CLOCK** Connector > Edit Slot > DS1/E1 Clock Parameters
Default:	Internal
Options:	Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext
Function:	Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.
Instructions:	Select Internal to use the clock chip on the link or net module. Select Port 1 Ext Loop to use the signal coming from port 1. Select Port 2 Ext Loop to use the signal coming from port 2 (Dual-Port MCT1 only). Select Auxiliary Ext to use an external source via BNC connectors.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.1.1.5

MCT1 Port Parameters

You access the MCT1 port parameters from the Configuration Manager window.

Parameter:	**Enable/Disable**
Path:	**MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables the MCT1 port.
Instructions:	Set to Disable only if you want to disable the MCT1 port.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.3.1.2

Parameter: Line Type

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: ESF

Options: Unframed T1 | ESF | SF/D4

Function: Specifies the frame format.

ESF transmits superframes consisting of 24 individual SF/D4 frames, and provides enhanced signaling and synchronization.

SF/D4 transmits superframes consisting of 12 individual frames.

Instructions: Select the appropriate frame format for your T1 equipment. Use Unframed T1 only with BERT mode to match the line type.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.6

Parameter: Line Coding

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: B8ZS

Options: AMI | B8ZS

Function: Specifies a line-coding method. B8ZS line coding replaces a block of eight consecutive binary zeros with an 8-bit B8ZS code containing bipolar violations in the fourth and seventh bit positions of the substituted code. In the receive direction, the B8ZS code is detected and replaced with eight consecutive binary zeros.

AMI line coding is also bipolar: a binary zero is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the MCT1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

Instructions: Select the line-coding method.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.7

Parameter: Signal Level (dB)

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: 0.0 dB

Options: -15 dB | -7.5 dB | 0.0 dB | 0.5 dB | 0.8 dB | 1.1 dB | 1.5 dB

Function: Specifies the T1 transmit power level, in decibels (dB).

The DS1 values of -15 and -7.5 dB are long-haul; the carrier determines these values if 0.0 dB is not sufficient.

The DSX1 values of 0.0, 0.5, 0.8, 1.1, and 1.5 dB are short-haul; they correspond to the cable length as follows:

- 0.0 dB -- 0 to 133 ft.
- 0.5 dB -- 133 to 255 ft.
- 0.8 dB -- 255 to 399 ft.
- 1.1 dB -- 399 to 533 ft.
- 1.5 dB -- 533 to 655 ft.

Instructions: Specify the decibel level based on the length of the cable or as the carrier specifies.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.6

Parameter: Setup Alarm Threshold (seconds)

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the time, in seconds, that MCT1 tolerates a performance defect or anomaly. If the performance defect or anomaly is still present when this time interval expires, MCT1 records a performance failure and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.7

Parameter: Clear Alarm Threshold (seconds)

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the clear time, in seconds, for performance-failure conditions. If the defect or anomaly clears in this time interval, MCT1 records a performance-cleared condition and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.8

Parameter: FDL Configuration

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: ANSI 403

Options: ANSI 403 | AT&T 54016 | None

Function: Selects a facility data link (FDL) mode only when the line is configured with an ESF line type. The default, ANSI 403, conforms to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DS1 Metallic Interface*). AT&T 54016 conforms to the 1989 AT&T specification (*Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Superframe Format*).

Instructions: Specify the FDL mode.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.14

Parameter: Remote FDL HDLC Address Mode

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: BY

Options: AZ | BY

Function: Selects the FDL address mode to determine whether the local FDL responds to HDLC address BY or AZ in messages from the remote FDL.

Instructions: Specify the FDL address mode.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.9

Parameter: Accept Loopback Request

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables loop-up and loop-down code detection. When this parameter is enabled, this port accepts and complies with requests to go into loopback mode from a remote device.

Instructions: Enable or disable local loopback.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.10

Parameter: Loopback Configuration

Path: **MCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: No Loopback

Options: No Loopback | Payload Loopback | Line Loopback

Function: Forces the DS1 interface to go into loopback. The remote or intermediate equipment then performs diagnostics on the network between that equipment and the DS1 interface:

- No Loopback -- This option deactivates any loopback.
- Payload Loopback -- The received signal on this interface is looped through the device. Typically, the received signal is looped back for retransmission after it has passed through the framing device.
- Line Loopback -- The received signal does not go through the framing device (minimum penetration) but is looped back out.

Instructions: Select the loopback configuration option for testing. After testing, set this parameter to No Loopback to return the interface to normal operation.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.10

QMCT1 and DMCT1 Port Parameters

In addition to the parameters described in the previous section, the Port Parameters window for the QMCT1 and QMCT1 w/ DS0A link modules and the DMCT1 net module includes four configurable parameters.

Parameter: Send Performance Measurement CR Addr

Path: **QMCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: Customer Inst

Options: Customer Inst | Carrier

Function: Specifies the source of performance messages. Customer Inst indicates that the customer installation supplies the messages; Carrier indicates that the carrier supplies the messages.

You configure this parameter for QMCT1 link modules only.

Instructions: Select the source for outgoing performance messages.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.18

Parameter: Accept Perf Measurement CR Addr

Path: **QMCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters

Default: Customer Inst

Options: Customer Inst | Carrier

Function: Specifies the source from which the router accepts performance messages. Customer Inst indicates that the router accepts messages only from the customer installation; Carrier indicates that the router accepts messages only from the carrier.

You configure this parameter for QMCT1 link modules only.

Instructions: Select the source for inbound performance messages.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.19

Parameter:	**Primary Clock**
Path:	**QMCT1** or **DMCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters
Default:	Port 1 Ext Loop
Options:	Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext
Function:	Identifies the primary source of the timing signals.
Instructions:	Select Internal to use the clock chip on the link or net module.
	Select Port 1 Ext Loop to use the signal coming from port 1.
	Select Port 2 Ext Loop to use the signal coming from port 2.
	Select Port 3 Ext Loop to use the signal coming from port 3.
	Select Port 4 Ext Loop to use the signal coming from port 4.
	Select Auxiliary Ext to use an external source via BNC connectors.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.18.1.3

Parameter:	**Secondary Clock**
Path:	**QMCT1** Connector > Edit Logical Lines > **Port Details** > MCT1 Port Parameters
Default:	Internal
Options:	Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext
Function:	Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.
Instructions:	Select Internal to use the clock chip on the link or net module.
	Select Port 1 Ext Loop to use the signal coming from port 1.
	Select Port 2 Ext Loop to use the signal coming from port 2.
	Select Port 3 Ext Loop to use the signal coming from port 3.
	Select Port 4 Ext Loop to use the signal coming from port 4.
	Select Auxiliary Ext to use an external source via BNC connectors.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.18.1.4

MCE1 and MCT1 Logical Line Parameters

You access the MCE1 and MCT1 logical line parameters from the Configuration Manager window.

Parameter:	**Enable/Disable**
Path:	Configured **MCE1 or MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables the logical line.
Instructions:	Select Enable or Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.2

Parameter:	**Breath of Life (BofL) Enable/Disable**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	Enable
Options:	Enable | Disable
Function:	When you set this parameter to Enable, a BofL packet is sent as often as the value you specify for the BofL Timeout parameter.
Instructions:	Set to Disable only if you want to end transmission of BofL packets.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.8

Parameter:	**BofL Timeout**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	5 seconds
Options:	1 to 60 seconds
Function:	Indicates the time between transmissions of BofL packets.
Instructions:	Specify the time, in seconds, between transmissions of BofL packets.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.9

Parameter:	**Fractional Loopback**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	Disable
Options:	Enable | Disable
Function:	Specifies whether to use diagnostic loopback mode on this circuit. In this mode, the router retransmits received data to the sender.
Instructions:	Select Enable only if you want the port to be in loopback mode.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.10

Parameter:	**WAN Protocol**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	Standard
Options:	For MCE1: Standard | PPP | SMDS | Frame Relay | SDLC
	For MCT1: Standard | Passthru | PPP | SMDS | Frame Relay
Function:	Specifies the WAN protocol for this logical line.
Instructions:	Accept the current value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.14

Parameter:	**Service**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	LLC1
Options:	Transparent | LLC1
Function:	Sets the HDLC service type for this logical line. Transparent is basic HDLC mode. LLC1 adds the HDLC address and control fields as a prefix to the frame.
Instructions:	Select the HDLC service type for this logical line.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.15

Parameter:	**Local HDLC Address**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	7
Options:	DCE | 2 | DTE | 4 | 5 | 6 | 7
Function:	Specifies the 1-byte local HDLC address of this logical line. The DCE address is 1; the DTE address is 3.
Instructions:	Select DCE, DTE, or specify an explicit address value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.16

Parameter:	**Remote HDLC Address**
Path:	Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines
Default:	7
Options:	DCE | 2 | DTE | 4 | 5 | 6 | 7
Function:	Specifies the 1-byte remote HDLC address of this logical line. The DCE address is 1; the DTE address is 3.
Instructions:	Select DCE, DTE, or specify an explicit address value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.17

Parameter: Rate Adaption

Path: Configured **QMCT1** Connector > MCT1 Logical Lines

Default: 56K LSB

Options: 64K | 56K MSB | 56K LSB | 9.6K | 19.2K

Function: Sets the number of data bits transmitted and their bit positions in the timeslot to achieve the data rate. The term *rate adaption* means that by setting this parameter, you are adapting to the rate of your subscriber; the software does not change the rate dynamically.

The 64K, 56K MSB, and 56K LSB options specify full DS0 rates. The 64K option specifies that all 8 bits in the timeslot carry data. Both 56K options specify that 7 of the bits in the timeslot carry data. If you select MSB, the most significant bit carries framing overhead. If you select LSB, the least significant bit carries framing overhead.

The 9.6K and 19.2K options specify DS0A subrates for an SDLC connection. Select one of these options only if you installed a QMCT1 DS0A link module. The 9.6K option specifies a DS0A subrate of 9.6 Kb/s. The 19.2K option specifies a DS0A subrate of 19.2 Kb/s. If you select one of these options, you can assign only one logical line to a timeslot.

Instructions: Set the value to match the data rate between the subscriber’s host and the customer premise equipment (CPE).

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.18

Parameter: Interframe Time Fill Character

Path: Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines

Default: Flags

Options: Flags | Idles

Function: Specifies the interframe time fill (IFTF) pattern for transmission across this circuit. Flags selects an 0x7E pattern (0 1 1 1 1 1 1 0); Idles selects an 0xFF pattern (1 1 1 1 1 1 1 1).

Instructions: Set the interframe time fill character for this logical line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.19

Parameter: CRC Size

Path: Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines

Default: 16 bit CRC

Options: 32 bit CRC | 16 bit CRC

Function: Specifies the CRC type. With 16-bit CRC, the router appends a 16-bit CRC to the transmitted frames and performs a 16-bit CRC on received frames. With 32-bit CRC, the router appends a 32-bit CRC to transmitted frames and performs a 32-bit CRC on received frames.

Instructions: Set the CRC size.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.20

Parameter: MTU Size (bytes)

Path: Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines

Default: 1600 bytes

Options: 3 to 4608 bytes

Function: Specifies the transmit/receive buffer size (MTU) to configure the largest frame that the router can transmit or receive over this port. The router discards frames larger than this value.

Instructions: Specify a value in the range 3 to 4608 bytes.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.55

Parameter: Remote Loopback Detection

Path: Configured **MCE1** or **MCT1** Connector > MCE1 or MCT1 Logical Lines

Default: Disable

Options: Enable | Disable

Function: Enables or disables detection of the driver's BofL packets, provided that you set the Breath of Life (BofL) Enable/Disable parameter to Enable. If you select Enable and put the line into loopback mode, the downstream driver will bring down the interface when it detects its BofL packets.

Instructions: Select Enable or Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.56

Parameter:	**BERT Mode**
Path:	Configured **QMCT1** or **DMCT1** Connector > MCT1 Logical Lines
Default:	Disable
Options:	Enable | Disable
Function:	Selecting Enable activates BERT mode.
Instructions:	To activate BERT mode, select Enable and click on Apply. You can configure this parameter for QMCT1 link modules and DMCT1 net modules only.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.62

Parameter:	**BERT Test Pattern**
Path:	Configured **QMCT1** or **DMCT1** Connector > MCT1 Logical Lines
Default:	Ones
Options:	Zeros | Ones | QRSS | 2e15 | 2e15 Inverted | 2e20 | 2e23 | 2e23 Inverted
Function:	Specifies the bit pattern transmitted during BERT diagnostics. When a port is in BERT mode, it can generate patterns such as all ones, all zeros, or a quasi-random signal sequence (QRSS) pattern.
Instructions:	Select a test pattern and click on Apply. You can configure this parameter for QMCT1 link modules and DMCT1 net modules only.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.63

Parameter:	**BERT Alarm Type**
Path:	Configured **QMCT1** or **DMCT1** Connector > MCT1 Logical Lines
Default:	Disable
Options:	AIS | Yellow
Function:	Specifies the type of alarm signal to be generated while in BERT mode.
Instructions:	Select AIS (alarm indication signal) to transmit Blue alarms (all ones.) Select Yellow to transmit Yellow alarms (all zeros).
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.64

Parameter: Accept Fractional Loopback Code

Path: Configured **QMCT1** Connector (in Dynamic Mode) > MCT1 Logical Lines

Default: Enable

Options: Enable | Disable

Function: Determines whether the logical line can accept loopback requests from a remote T1 device.

Instructions: Select Enable or Disable.

You can configure this parameter for QMCT1 link modules only.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.65

Parameter: NRZI Enable

Path: Configured **QMCT1** Connector > MCT1 Logical Lines

Default: Disable

Options: Enable | Disable

Function: The software uses this parameter only if you installed a QMCT1 DS0A link module. Disable specifies no communication of state changes between the subscriber's devices over the frame relay network. Enable specifies NRZI line encoding to communicate such state changes.

Instructions: If you are configuring the router connection to the host side, and the NRZI settings of the host and CPE match, use the Disable setting. If they do not match, set this parameter to Enable.

If you are configuring the router connection to the remote access side, and the NRZI settings of the controller and CPE match, use the Disable setting. If they do not match, set this parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.66

Parameter: NRZI Type

Path: Configured **QMCT1** Connector > MCT1 Logical Lines

Default: Mark

Options: Mark | Space

Function: The software uses this parameter only if you installed a QMCT1 DS0A link module and you set the NRZI Enable parameter to Enable. This parameter specifies the NRZI encoding type in the frame on the logical line. The Mark format uses a 0-bit to indicate a state change and a 1-bit to indicate no state change; the Space format uses the opposite.

Instructions: Ignore this parameter if you set NRZI Enable to Disable.

Otherwise, if you are configuring the router connection to

- The host side, determine which device on that side is using NRZI, and match this parameter to the encoding type used by that device
- The remote access side, determine which device on that side is using NRZI, and match this parameter to the encoding type used by that device

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.67

FT1 Port Application and Clock Parameters

Parameter: Port Application Mode

Path: Unconfigured **FT1** Connector > Port Application

Default: NONPRI

Options: NONPRI

Function: Specifies the port application to use on the logical lines.

Instructions: Select NONPRI to indicate that all of the lines have a permanent circuit number and are for leased lines, frame relay, or permanent connections to other non-ISDN PRI applications.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.1.16

Parameter: Primary Clock

Path: FT1 **CLOCK** Connector > Edit Slot > DS1/E1 Clock Parameters
Default: Port 1 Ext Loop
Options: Internal | Port 1 Ext Loop
Function: Identifies the primary source of the timing signals.
Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.
MIB Object ID: 1.3.6.1.4.1.18.3.4.9.1.1.4

Parameter: Secondary Clock

Path: FT1 **CLOCK** Connector > Edit Slot > DS1/E1 Clock Parameters
Default: Internal
Options: Internal | Port 1 Ext Loop
Function: Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.
Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.
MIB Object ID: 1.3.6.1.4.1.18.3.4.9.1.1.5

FT1 Port Parameters

You access the MCT1 port parameters from the Configuration Manager window.

Parameter: Enable/Disable

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters
Default: Enable
Options: Enable | Disable
Function: Enables or disables the FT1 port.
Instructions: Set to Disable only if you want to disable the FT1 port.
MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.2

Parameter: **Line Type**

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: ESF

Options: Unframed T1 | ESF | SF/D4

Function: Specifies the frame format.

ESF transmits superframes consisting of 24 individual SF/D4 frames, and provides enhanced signaling and synchronization.

SF/D4 transmits superframes consisting of 12 individual frames.

Instructions: Select the appropriate frame format for your T1 equipment. Use Unframed T1 only with BERT mode to match the line type.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.6

Parameter: **Line Coding**

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: B8ZS

Options: AMI | B8ZS

Function: Specifies a line-coding method. B8ZS line coding replaces a block of eight consecutive binary zeros with an 8-bit B8ZS code containing bipolar violations in the fourth and seventh bit positions of the substituted code. In the receive direction, the B8ZS code is detected and replaced with eight consecutive binary zeros.

AMI line coding is also bipolar: a binary zero is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the FT1 link module remains synchronized upon receiving up to 45 consecutive zeros.)

Instructions: Select the line-coding method.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.7

Parameter: Signal Level (dB)

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: 0.0 dB

Options: -15 dB | -7.5 dB | 0.0 dB | 0.5 dB | 0.8 dB | 1.1 dB | 1.5 dB

Function: Specifies the T1 transmit power level, in decibels (dB).

The DS1 values of -15 and -7.5 dB are long-haul; the carrier determines these values if 0.0 dB is not sufficient.

The DSX1 values of 0.0, 0.5, 0.8, 1.1, and 1.5 dB are short-haul; they correspond to the cable length as follows:

- 0.0 dB -- 0 to 133 ft.
- 0.5 dB -- 133 to 255 ft.
- 0.8 dB -- 255 to 399 ft.
- 1.1 dB -- 399 to 533 ft.
- 1.5 dB -- 533 to 655 ft.

Instructions: Specify the decibel level based on the length of the cable or as the carrier specifies.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.6

Parameter: Setup Alarm Threshold (seconds)

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the time, in seconds, that FT1 tolerates a performance defect or anomaly. If the performance defect or anomaly is still present when this time interval expires, FT1 records a performance failure and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.7

Parameter: Clear Alarm Threshold (seconds)

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the clear time, in seconds, for performance-failure conditions. If the defect or anomaly clears in this time interval, FT1 records a performance-cleared condition and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.8

Parameter: FDL Configuration

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: ANSI 403

Options: ANSI 403 | AT&T 54016 | None

Function: Selects a facility data link (FDL) mode only when the line is configured with an ESF line type. The default, ANSI 403, conforms to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DS1 Metallic Interface*). AT&T 54016 conforms to the 1989 AT&T specification (*Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Superframe Format*).

Instructions: Specify the FDL mode.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.14

Parameter: Remote FDL HDLC Address Mode

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: BY

Options: AZ | BY

Function: Selects the FDL address mode to determine whether the local FDL responds to HDLC address BY or AZ in messages from the remote FDL.

Instructions: Specify the FDL address mode.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.9

Parameter: **Accept Loopback Request**

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables loop-up and loop-down code detection. When this parameter is enabled, this port accepts and complies with requests to go into loopback mode from a remote device.

Instructions: Enable or disable local loopback.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.10

Parameter: **Loopback Configuration**

Path: **FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters

Default: No Loopback

Options: No Loopback | Payload Loopback | Line Loopback

Function: Forces the DS1 interface to go into loopback. The remote or intermediate equipment then performs diagnostics on the network between that equipment and the DS1 interface:

- No Loopback -- This option deactivates any loopback.
- Payload Loopback -- The received signal on this interface is looped through the device. Typically, the received signal is looped back for retransmission after it has passed through the framing device.
- Line Loopback -- The received signal does not go through the framing device (minimum penetration) but is looped back out.

Instructions: Select the loopback configuration option for testing. After testing, set this parameter to No Loopback to return the interface to normal operation.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.10

Parameter:	**Send Performance Measurement CR Addr**
Path:	**FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters
Default:	Customer Inst
Options:	Customer Inst | Carrier
Function:	Specifies the source of performance messages. Customer Inst indicates that the customer installation supplies the messages; Carrier indicates that the carrier supplies the messages.
Instructions:	Select the source for outgoing performance messages.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.3.1.18

Parameter:	**Accept Perf Measurement CR Addr**
Path:	**FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters
Default:	Customer Inst
Options:	Customer Inst | Carrier
Function:	Specifies the source from which the router accepts performance messages. Customer Inst indicates that the router accepts messages only from the customer installation; Carrier indicates that the router accepts messages only from the carrier.
Instructions:	Select the source for inbound performance messages.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.3.1.19

Parameter:	**Primary Clock**
Path:	**FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters
Default:	Port 1 Ext Loop
Options:	Internal | Port 1 Ext Loop
Function:	Identifies the primary source of the timing signals.
Instructions:	Select Internal to use the clock chip on the link or net module. Select Port 1 Ext Loop to use the signal coming from port 1.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.18.1.3

Parameter:	**Secondary Clock**
Path:	**FT1** Connector > Edit Logical Lines > **Port Details** > FT1 Port Parameters
Default:	Internal
Options:	Internal | Port 1 Ext Loop | Port 2 Ext Loop | Auxiliary Ext
Function:	Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.
Instructions:	Select Internal to use the clock chip on the link or net module. Select Port 1 Ext Loop to use the signal coming from port 1.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.18.1.4

FT1 Logical Line Parameters

You access the FT1 logical line parameters from the Configuration Manager window.

Parameter:	**Enable/Disable**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables the logical line.
Instructions:	Select Enable or Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.2

Parameter:	**Breath of Life (BofL) Enable/Disable**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	Enable
Options:	Enable | Disable
Function:	When you set this parameter to Enable, a BofL packet is sent as often as the value you specify for the BofL Timeout parameter.
Instructions:	Set to Disable only if you want to end transmission of BofL packets.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.8

Parameter: BofL Timeout

Path: Configured **FT1** Connector > FT1 Logical Lines

Default: 5 seconds

Options: 1 to 60 seconds

Function: Indicates the time between transmissions of BofL packets.

Instructions: Specify the time, in seconds, between transmissions of BofL packets.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.9

Parameter: Fractional Loopback

Path: Configured **FT1** Connector > FT1 Logical Lines

Default: Disable

Options: Enable | Disable

Function: Specifies whether to use diagnostic loopback mode on this circuit. In this mode, the router retransmits received data to the sender.

Instructions: Select Enable only if you want the port to be in loopback mode.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.10

Parameter: WAN Protocol

Path: Configured **FT1** Connector > FT1 Logical Lines

Default: Standard

Options: Standard | Passthru | PPP | SMDS | Frame Relay

Function: Specifies the WAN protocol for this logical line.

Instructions: Accept the current value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.14

Parameter:	**Service**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	LLC1
Options:	Transparent | LLC1
Function:	Sets the HDLC service type for this logical line. Transparent is basic HDLC mode. LLC1 adds the HDLC address and control fields as a prefix to the frame.
Instructions:	Select the HDLC service type for this logical line.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.15

Parameter:	**Local HDLC Address**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	7
Options:	DCE | 2 | DTE | 4 | 5 | 6 | 7
Function:	Specifies the 1-byte local HDLC address of this logical line. The DCE address is 1; the DTE address is 3.
Instructions:	Select DCE, DTE, or specify an explicit address value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.16

Parameter:	**Remote HDLC Address**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	7
Options:	DCE | 2 | DTE | 4 | 5 | 6 | 7
Function:	Specifies the 1-byte remote HDLC address of this logical line. The DCE address is 1; the DTE address is 3.
Instructions:	Select DCE, DTE, or specify an explicit address value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.17

Parameter:	**CRC Size**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	16 bit CRC
Options:	32 bit CRC | 16 bit CRC
Function:	Specifies the CRC type. With 16-bit CRC, the router appends a 16-bit CRC to the transmitted frames and performs a 16-bit CRC on received frames. With 32-bit CRC, the router appends a 32-bit CRC to transmitted frames and performs a 32-bit CRC on received frames.
Instructions:	Set the CRC size.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.20

Parameter:	**MTU Size (bytes)**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	1600 bytes
Options:	3 to 4608 bytes
Function:	Specifies the transmit/receive buffer size (MTU) to configure the largest frame that the router can transmit or receive over this port. The router discards frames larger than this value.
Instructions:	Specify a value in the range 3 to 4608 bytes.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.55

Parameter:	**Remote Loopback Detection**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	Disable
Options:	Enable | Disable
Function:	Enables or disables detection of the driver’s BofL packets, provided that you set the Breath of Life (BofL) Enable/Disable parameter to Enable. If you select Enable and put the line into loopback mode, the downstream driver will bring down the interface when it detects its BofL packets.
Instructions:	Select Enable or Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.56

Parameter:	**BERT Mode**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	Disable
Options:	Enable | Disable
Function:	Selecting Enable activates BERT mode.
Instructions:	To activate BERT mode, select Enable and click on Apply.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.62

Parameter:	**BERT Test Pattern**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	Ones
Options:	Zeros | Ones | QRSS | 2e15 | 2e15 Inverted | 2e20 | 2e23 | 2e23 Inverted
Function:	Specifies the bit pattern transmitted during BERT diagnostics. When a port is in BERT mode, it can generate patterns such as all ones, all zeros, or a quasi-random signal sequence (QRSS) pattern.
Instructions:	Select a test pattern and click on Apply.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.63

Parameter:	**BERT Alarm Type**
Path:	Configured **FT1** Connector > FT1 Logical Lines
Default:	Disable
Options:	AIS | Yellow
Function:	Specifies the type of alarm signal to be generated while in BERT mode.
Instructions:	Select AIS (alarm indication signal) to transmit Blue alarms (all ones.) Select Yellow to transmit Yellow alarms (all zeros).
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.6.1.64

Parameter: NRZI Enable

Path: Configured **FT1** Connector > FT1 Logical Lines

Default: Disable

Options: Enable | Disable

Function: The software uses this parameter only if you installed an FT1 DS0A link module. Disable specifies no communication of state changes between the subscriber's devices over the frame relay network. Enable specifies NRZI line encoding to communicate such state changes.

Instructions: If you are configuring the router connection to the host side, and the NRZI settings of the host and CPE match, use the Disable setting. If they do not match, set this parameter to Enable.

If you are configuring the router connection to the remote access side, and the NRZI settings of the controller and CPE match, use the Disable setting. If they do not match, set this parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.66

Parameter: NRZI Type

Path: Configured **FT1** Connector > FT1 Logical Lines

Default: Mark

Options: Mark | Space

Function: The software uses this parameter only if you installed a FT1 DS0A link module and you set the NRZI Enable parameter to Enable. This parameter specifies the NRZI encoding type in the frame on the logical line. The Mark format uses a 0-bit to indicate a state change and a 1-bit to indicate no state change; the Space format uses the opposite.

Instructions: Ignore this parameter if you set NRZI Enable to Disable.

Otherwise, if you are configuring the router connection to

- The host side, determine which device on that side is using NRZI, and match this parameter to the encoding type used by that device
- The remote access side, determine which device on that side is using NRZI, and match this parameter to the encoding type used by that device

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.6.1.67

Parameter: Line Resources

Path: Configured **FT1** Connector > Adapter Module FT1 Logical Lines

Default: Edit

Options: Edit

Function: Provides access to the Edit Line Resources window to manage reservable bandwidth for ST2 traffic.

Instructions: Select the parameter and click on **Values**. The Edit Connector window appears. Click on **Edit Line Resources** to access the Resource Manager.

MIB Object ID: None

FE1 Line Parameters

You access the Port Application Mode parameter from the Port Application window.

Parameter: Port Application Mode

Path: **FE1** Connector > Port Application

Default: NONPRI

Options: NONPRI

Function: Specifies the port application to use on the logical lines.

Instructions: Select NONPRI to indicate that all of the lines have a permanent circuit number and are for leased lines, frame relay, or permanent connections to other non-ISDN PRI applications.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.1.16

FE1 Clock Parameters

You access the FT1 clock parameters from the Edit Adapter Module window.

Parameter: Primary Clock

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: For QMCT1: Internal

For FE1: Port 1 Ext Loop

Options: For QMCT1: Internal | Port 1 Ext Loop | Port 2 Ext Loop | Port 3 Ext Loop | Port 4 Ext Loop | Auxiliary Ext

For FE1: Internal | Port 1 Ext Loop

Function: Identifies the primary source of the timing signals.

- Internal -- Uses the clock chip on the link module
- Port n Ext Loop -- Uses the signal coming from Port n
- Auxiliary Ext -- Uses an external source via the DB9 interface

Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.18.1.3

Parameter: Secondary Clock

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: For QMCT1: Internal

For FE1: Internal

Options: Internal | Port 1 Ext Loop

Function: Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

- Internal -- Uses the clock chip on the link module
- Port n Ext Loop -- Uses the signal coming from Port n
- Auxiliary Ext -- Uses an external source via the DB9 interface

Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.18.1.4

FE1 Port Parameters

You access the FT1 port parameters from the Edit Adapter Module FE1 Port Parameters window.

Parameter:	**Enable/Disable**
Path:	**FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables the port.
Instructions:	Set to Disable only if you want to disable the port.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.3.1.2

Parameter:	**Line Type**
Path:	**FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters
Default:	For MCT1: ESF For MCE1 and FE1: E1
Options:	For MCT1: Unframed T1 | ESF | SF/D4 For MCE1: E1 | E1 CRC | E1 MF | E1 CRC MF For FE1: E1 | E1 CRC | E1 MF | E1 CRC MF | Unframed E1
Function:	Specifies the frame format.
Instructions:	Select the appropriate frame format for your equipment. • Unframed T1 -- Use only during BERT mode to match the line type. • ESF -- Transmits super frames consisting of 24 individual SF/D4 frames and provides enhanced signaling and synchronization. • SF/D4 -- Transmits super frames consisting of 12 individual frames.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.4.1.6

Parameter: Line Coding

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: For MCT1: B8ZS
For MCE1 and FE1: HDB3

Options: For MCT1: AMI | B8ZS

For MCE1 and FE1: AMI | HDB3

Function: Specifies a line-coding method. AMI line coding is bipolar: a binary 0 is transmitted as zero volts, and a binary 1 is transmitted as either a positive or negative pulse, opposite in polarity to the previous pulse. (When configured for AMI line coding, the MCT1, MCE1, or E1/FE1 module remains synchronized upon receiving up to 45 consecutive zeros.)

For MCT1, B8ZS (Bipolar with 8-Zero substitution) line coding replaces a block of 8 consecutive binary zeros with an 8-bit B8ZS code containing bipolar violations in the 4th and 7th bit positions of the substituted code. In the receive direction, the B8ZS code is detected and replaced with 8 consecutive binary zeros.

For MCE1 and FE1, HDB3 line coding maintains sufficient 1s density in the E1 data stream. It replaces a block of eight consecutive binary zeros with an 8-bit HDB3 code containing bipolar violations in the fourth and seventh bit positions of the substituted code. In the receive direction, the HDB3 code is detected and replaced with eight consecutive binary zeros.

Instructions: Select the line-coding method.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.7

Parameter: **Setup Alarm Threshold (seconds)**

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the time, in seconds, that the device driver tolerates a performance defect or anomaly. If the performance defect or anomaly is still present when this time interval expires, the device driver records a performance failure and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.7

Parameter: **Clear Alarm Threshold (seconds)**

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: 2 seconds

Options: 2 to 10 seconds

Function: Specifies the clear time, in seconds, for performance-failure conditions. If the defect or anomaly clears in this time interval, the device driver records a performance-cleared condition and logs an event message.

Instructions: Set the timer value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.8

Parameter: **Accept Loopback Request**

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables loop-up and loop-down code detection. When this parameter is enabled, this port accepts and complies with requests to go into loopback mode from a remote device.

Instructions: Enable or disable local loopback.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.10

Parameter: Loopback Configuration

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: No Loopback

Options: No Loopback | Payload Loopback | Line Loopback

Function: Forces the DS1 interface to go into loopback. The remote or intermediate equipment then performs diagnostics on the network between that equipment and the DS1 interface:

- No Loopback -- This option deactivates any loopabck.
- Payload Loopback -- The received signal on this interface is looped through the device. Typically, the received signal is looped back for retransmission after it has passed through the framing device.
- Line Loopback -- The received signal does not go through the framing device (minimum penetration) but is looped back out.

Instructions: Select the loopback configuration option for testing. After testing, set this parameter to No Loopback to return the interface to normal operation.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.4.1.10

Parameter: International Bit

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: Disable

Options: Enable | Disable

Function: Specifies whether the international bit is set in the E1 frame.

Instructions: Select Enable to set the international bit; select Disable to disable it.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.3.1.15

Parameter: Primary Clock

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: For QMCT1: Internal

For FE1: Port 1 Ext Loop

Options: For QMCT1: Internal | Port 1 Ext Loop | Port 2 Ext Loop | Port 3 Ext Loop | Port 4 Ext Loop | Auxiliary Ext

For FE1: Internal | Port 1 Ext Loop

Function: Identifies the primary source of the timing signals.

- Internal -- Uses the clock chip on the link module
- Port n Ext Loop -- Uses the signal coming from Port n
- Auxiliary Ext -- Uses an external source via the DB9 interface

Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.18.1.3

Parameter: Secondary Clock

Path: **FE1** Connector > Adapter Module FE1 Logical Lines > **Port Details** > Edit Adapter Module FE1 Port Parameters

Default: For QMCT1: Internal

For FE1: Internal

Options: Internal | Port 1 Ext Loop

Function: Identifies the secondary source of the timing signals. The router uses the secondary clock only when the primary clock is unavailable.

- Internal -- Uses the clock chip on the link module
- Port n Ext Loop -- Uses the signal coming from Port n
- Auxiliary Ext -- Uses an external source via the DB9 interface

Instructions: Select Internal to use the clock chip on the link or net module.

Select Port 1 Ext Loop to use the signal coming from port 1.

MIB Object ID: 1.3.6.1.4.1.18.3.4.9.18.1.4

FE1 Logical Line Parameters

You access the FE1 Logical Line parameters from the Adapter Module Logical Line window.

Parameter: Enable/Disable

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines
Default: Enable
Options: Enable | Disable
Function: Enables and disables this synchronous line.
Instructions: Select Enable or Disable.
MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.2

Parameter: Breath of Life (BofL) Enable/Disable

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines
Default: Enable
Options: Enable | Disable
Function: Enables the transmission of proprietary Breath of Life messages over a point-to-point connection between the local router and a remote peer.
Instructions: Set to Enable or Disable, depending on whether you want to transmit BofL messages over this synchronous interface. If you enable BofL locally, the remote peer must also be configured to enable BofL.

Note: We recommend that you enable BofL for point-to-point connections between Nortel Networks peers. However, if such a connection is accomplished through a wide-area transport service such as Frame Relay, X.25 or SMDS, you must disable BofL.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.7

Parameter: **BofL Timeout**

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: 5 seconds

Options: 1 to 60 seconds

Function: Specifies the time between transmissions of Breath of Life messages from this synchronous interface. Timeout will occur if five periods elapse without both a successful frame transmission and a successful reception. When timeout occurs, the synchronous line will be disabled and re-enabled automatically.

For example, if you set this parameter to 5 seconds, then the interface must successfully transmit and receive a frame within 25 seconds. Timeout occurs in 25 seconds.

This parameter is valid only if BofL is set to Enable.

Instructions: Either accept the default, 5 seconds, or specify a new value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.8

Parameter: **MTU Size (bytes)**

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: 1600 bytes

Options: 3 to 4608 bytes

Function: Specifies the largest frame (Maximum Transmission Unit) that the router can transmit on this line.

Instructions: Set this parameter to a value appropriate for your network. For X.25, use a value at least 5 bytes more than the maximum packet size for the packet level.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.9

Parameter: Promiscuous

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: Disable

Options: Enable | Disable

Function: Specifies whether address filtering based on the local and remote address is enabled. If you set this parameter to Enable, all frames are received. If you set this parameter to Disable, only frames destined for this local address are received.

Instructions: Set this parameter to Enable or Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.11

Parameter: Service

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: LLC1 (when the WAN protocol is Standard)
LAPB (when the WAN protocol is X.25)
Transparent (when the WAN protocol is Frame Relay)

Options: Transparent | LLC1 | LAPB

Function: Specifies the link-level protocol for this circuit. If you set this parameter to Transparent, then raw HDLC (high-level data link control) mode is in effect. LLC1 specifies connectionless datagram service; it prefixes the HDLC address and control fields to the frame.

Instructions: Set this parameter as appropriate for the circuit. For Single, Dual, or Quad Sync circuits, you must set this parameter to LAPB when X.25 is enabled and the WAN Protocol parameter is set to X.25. For Octal Sync, ASN, and AN circuits, always set this parameter to Transparent. (Note that the WAN Protocol parameter is LAPB on AN, ASN, or Octal Sync lines when X.25 is enabled.)

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.18

Parameter: Minimum Frame Spacing

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: 1 flag

Options: 1 to 32 flags

Function: Specifies the number of flags that are transmitted between adjacent frames.

Instructions: Set this parameter to the appropriate number of flags.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.29

Parameter: Local HDLC Address

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: 7

Options: 1 to 255

Function: Specifies the local HDLC address of this synchronous interface.

Instructions: Select the 1-byte local HDLC address for this interface. Specify 1 for DCE, 3 for DTE, or any other address between 1 and 255.

Use unique HDLC addresses for the local and remote interfaces at either end of a point-to-point circuit. If you configure a device at one end of the point-to-point connection with a local address of DCE and a remote address of DTE, you must configure the device at the other end with a local address of DTE and a remote address of DCE.

If you configure X.25 on this line, set this parameter to either 1 (DCE) or 3 (DTE).

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.30

Parameter: Remote HDLC Address

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: 7

Options: 1 to 255

Function: Specifies the 1-byte HDLC address of the remote synchronous interface.

Instructions: Specify 1 for remote DCE, 3 for remote DTE, or any other remote HDLC address between 1 and 255.

Use unique HDLC addresses for the local and remote interfaces at either end of a point-to-point circuit. If you configure a device at one end of the point-to-point connection with a local address of DCE and a remote address of DTE, you must configure the device at the other end with a local address of DTE and a remote address of DCE.

If you configure X.25 on this line, set this parameter to either 1 (DCE) or 3 (DTE).

When you send packets to this interface, use this HDLC address.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.31

Parameter: WAN Protocol

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: Standard

Options: Standard | Pass Thru | PPP | SMDS | Frame Relay | X.25 | ATM DXI | LAPB | SDLC | AOT

Function: Indicates which WAN protocol has been enabled on this synchronous circuit.

Instructions: Accept the current value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.34

Parameter: CRC Size

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: 16 bit

Options: 16 bit | 32 bit

Function: Specifies an error detection scheme. You can chose either 16 bit (standard) or 32 bit (extended) frame check sequence (FCS) to detect errors in the packet.

Instructions: Set this parameter to either 16 bit or 32 bit.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.35

Parameter: Sync Line Coding

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: NRZ

Options: NRZ | NRZI | NRZI Mark

Function: Specifies the line coding of the physical synchronous line. On AN or ASN routers, and on a router with an Octal Sync link module, you can change the value to match the line coding of a device at the other end of the line.

- NRZ indicates Non-Return to Zero coding
- NRZI indicates Non-Return to Zero Inverted coding
- NRZI Mark indicates Non-Return to Zero Inverted Mark coding

Instructions: Select the appropriate coding for this synchronous line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.88

Parameter: Extended Address

Path: Configured **FE1** Connector > Adapter Module FE1 Logical Lines

Default: Disable

Options: Enable | Disable

Function: Enables or disables testing of the address length. When you set this parameter to Enable, the router tests the first bit of the address to determine the length of the address, in octets.

Instructions: Accept the default or select Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.22

Parameter:	**Remote Loopback Detection**
Path:	Configured **FE1** Connector > Adapter Module FE1 Logical Lines
Default:	Disable
Options:	Enable | Disable
Function:	Enables or disables Remote Loopback Detection. If BofL is enabled, the device driver detects when it is receiving its own BofL packets and disables the interface assuming that the link has been put into loopback.
Instructions:	Select Enable or Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.91

Parameter:	**Line Resources**
Path:	Configured **FE1** Connector > Adapter Module FE1 Logical Lines
Default:	Edit
Options:	Edit
Function:	Provides access to the Edit Line Resources window to manage reservable bandwidth for ST2 traffic.
Instructions:	Select the parameter and click on **Values**. The Edit Connector window appears. Click on **Edit Line Resources** to access the Resource Manager.
MIB Object ID:	None

Synchronous Line Parameters

You access the synchronous line parameters from the Configuration Manager window.

Parameter:	**Enable**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables this synchronous line.
Instructions:	Set this parameter to Enable or Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.2

Parameter: BofL

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Enable

Options: Enable | Disable

Function: Enables the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer.

Instructions: Set to Enable or Disable, depending on whether you want to transmit BofL messages over this synchronous interface. If you enable BofL locally, the remote peer must also be configured to enable BofL.

Nortel Networks recommends that you enable BofL for point-to-point connections between Nortel Networks peers. However, if such a connection is established through a wide area transport service such as frame relay, X.25, or SMDS, you must disable BofL.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.7

Parameter: BofL Timeout

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 5 seconds

Options: 1 to 60 seconds

Function: Specifies the time between transmissions of BofL messages from this synchronous interface. Timeout will occur if five periods elapse without both a successful frame transmission and a successful reception. When timeout occurs, the router disables and reenables the synchronous line. For example, if you set this parameter to 5 seconds, the interface must successfully transmit and receive a frame within 25 seconds. Timeout occurs in 25 seconds.

This parameter is valid only if you set the BofL parameter to Enable.

Instructions: Accept the default, 5 seconds, or specify a new value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.8

Parameter:	**MTU**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	1600 bytes
Options:	3 to 4608 bytes
Function:	Specifies the largest frame (MTU) that the router can transmit on this line.
Instructions:	Set this parameter to a value appropriate for your network. For X.25, specify a value of at least 5 bytes more than the maximum packet size for the packet level.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.9

Parameter:	**Promiscuous**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Disable
Options:	Enable | Disable
Function:	Specifies whether the interface filters packets for addresses other than its own local address, or whether address filtering is based on both the local and remote addresses. When this parameter is set to Enable, the interface receives all frames. When this parameter is set to Disable, the interface receives only frames destined for its local address.
Instructions:	Set this parameter to Enable or Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.11

Parameter: **Clock Source**

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: External

Options: External | Internal

Function: Specifies the origin of the synchronous timing signals (clock). If you set this parameter to Internal, the router supplies the required timing signals. If you set this parameter to External, an external network device supplies the required timing signals. In most cases, this parameter should be set to External.

Instructions: Set this parameter to Internal or External, as appropriate for your network.

For direct connection to a control unit, such as an IBM 3174, set this parameter to Internal. For connection to a modem, set this parameter to External. For direct connection to an IBM 3745, either the router or the IBM 3745 can provide the clock source. If the IBM 3745 does not provide clocking, set this parameter to Internal.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.13

Parameter: **Internal Clock Speed**

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 64 KB (19200 KB for SDLC)

Options: 1200 B | 2400 B | 4800 B | 7200 B | 9600 B | 19200 B | 32000 B | 38400 B | 56 KB | 64 KB | 125 KB | 230 KB | 420 KB | 625 KB | 833 KB | 1.25 MB | 2.5 MB | 5 MB

Function: Sets the clock speed of an internally supplied clock when the Clock Source parameter is set to Internal. Attached devices must be able to operate at the specified speed.

Instructions: Set the clock speed for the internal clock to the desired data transmission rate across the synchronous line.

Some of the more common speeds for IBM products are as follows:

An IBM 3274 with a V.24/RS-232 interface supports up to 9600 b/s. Some support speeds of up to 19200 b/s.
An IBM 3274 with a V.35 interface supports up to 64 Kb/s.
An IBM 3174 with a V.24/RS-232 interface supports up to 19200 b/s.
An IBM 3174 with a V.35 interface and running Licensed Internal Code-C supports up to 256 Kb/s.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.14

Parameter:	**Signal Mode**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Balanced
Options:	Balanced | Unbalanced
Function:	Specifies balanced or unbalanced transmission. Balanced transmission uses two conductors to carry signals; unbalanced transmission uses one conductor to carry a signal, with a ground providing the return path.
Instructions:	Set this parameter to Balanced or Unbalanced, depending on the signaling mode of the connected device.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.15

Parameter:	**RTS Enable**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Disable
Options:	Enable | Disable
Function:	Enables or disables the detection of RTS signals on this interface.
Instructions:	Set this parameter to Enable if the connected device (for example, a modem or a KG84A cryptographic device) uses RTS/CTS flow control. For manual dial modems (2-wire), set this parameter to Enable. For leased-line modems (4-wire), set this parameter to Disable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.16

Parameter: Burst Count

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Enable

Options: Enable | Disable

Function: This is a performance-tuning parameter. Enable sets single-word DMA burst cycles; Disable sets eight-word burst cycles.

Instructions: Leave this parameter enabled except when excessive TxUflo or RxOflo errors occur on the Ethernet ports of the following:

- DSDE (5430 - Dual Synchronous, Dual Ethernet) link module
- DSE (5420 - Dual Synchronous, Single Ethernet) link module

Disable this parameter on the synchronous interface that is either running at a lower clock speed or carrying lower-priority traffic. If disabling Burst Count on only one DSDE interface does not eliminate errors on both Ethernet interfaces, disable it on both synchronous interfaces.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.17

Parameter: Service

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: LLC1

Options: Transparent | LLC1 | LAPB

Function: Specifies the link-level protocol for this line. If you set this parameter to Transparent, then raw HDLC mode is in effect. LLC1 specifies connectionless datagram service; it adds the HDLC address and control fields to the beginning of the frame.

Instructions: Set this parameter as appropriate for this line. If X.25 is enabled on this line, you must set this parameter to LAPB.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.18

Parameter:	**Retry Count**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	16 attempts
Options:	1 to 64 attempts
Function:	Indicates the number of retransmission attempts allowed per frame before a line is declared down.
Instructions:	Accept the default, 16, or specify a number from 1 to 64.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.19

Parameter:	**Link Idle Timer**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	9 seconds
Options:	1 to 9999 seconds
Function:	Indicates the number of seconds that can pass before a line is considered idle. An idle line is disabled.
Instructions:	Accept the default, 9 seconds, or specify a number from 1 to 9999.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.20

Parameter:	**Retry Timer**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	300 tenths of a second (3 seconds)
Options:	1 to 99999 tenths of a second
Function:	Indicates the time the router waits for a response from the link. The router sends link control frames when this timer expires, resends the frames up to the value of the Retry Count parameter, then disconnects the link.
Instructions:	Specify a timeout value, in tenths of a second.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.21

Parameter:	**Extended Address**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Disable
Options:	Enable | Disable
Function:	Enables or disables testing of the address length. When you set this parameter to Enable, the router tests the first bit of the address to determine the length of the address, in octets.
Instructions:	Accept the default or select Enable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.22

Parameter:	**Extended Control (S and I frames)**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Disable
Options:	Enable | Disable
Function:	Allows the control fields of all S- and I- frames to 2 octets in length instead of 1 octet. Numbering of all I-frames becomes Modulo 128 instead of Modulo 8.
Instructions:	Accept the default or select Enable.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.24

Parameter:	**Transmit Window Size**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	1 frame
Options:	1 to 7 frames
Function:	Specifies the number of I-frames that can be transmitted without acknowledgment.
Instructions:	Accept the default, 1 frame, or specify a new value.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.27

Parameter:	**Minimum Frame Spacing**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	1 flag
Options:	1 to 32 flags
Function:	Specifies the number of flags transmitted between adjacent frames.
Instructions:	Set this parameter to the appropriate number of flags.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.29

Parameter:	**Local Address**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	7
Options:	1 to 255
Function:	Specifies the 1-byte HDLC address of this synchronous interface. This interface will receive only frames whose HDLC address matches this address.
Instructions:	Specify 1 for DCE, 3 for DTE, or any other address from 1 to 255. If you configure X.25 on this line, set this parameter to 1 (DCE) or 3 (DTE). Specify a unique HDLC address for the local and remote interfaces at either end of a point-to-point connection. If you configure a device at one end with a local address of 1 (DCE) and remote address of 3 (DTE), you must configure the device at the other end with a local address of 3 (DTE) and remote address of 1 (DCE).
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.30

Parameter:	**Remote Address**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	7
Options:	1 to 255
Function:	Specifies the 1-byte HDLC address of the remote synchronous interface. This HDLC address is used to address all frames transmitted by this interface.
Instructions:	Specify a unique HDLC address for the local and remote interfaces at either end of a point-to-point connection. If you configure a device at one end with a local address of 1 (DCE) and remote address of 3 (DTE), you must configure the device at the other end with a local address of 3 (DTE) and remote address of 1 (DCE).
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.31

Parameter:	**Pass Thru Local Address**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	None
Options:	Any unique MAC address of exactly 12 hexadecimal digits
Function:	Assigns a MAC address to the local interface. This address becomes the source address of packets that are bridged to the destination MAC address. You assign the destination MAC address using the Pass Thru Remote Address parameter.
Instructions:	Specify a unique MAC address for the local interface, making sure that the second digit is a zero; for example, 10fffabc5432. Be sure to reverse the local and remote MAC addresses at the remote synchronous pass-through interface.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.32

Parameter:	**Pass Thru Remote Address**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	None
Options:	Any unique MAC address of exactly 12 hexadecimal digits
Function:	Assigns a MAC address to the remote interface. This address becomes the destination MAC address of packets that are bridged to the local MAC address. You assign the source MAC address using the Pass Thru Local Address parameter.
Instructions:	Specify a unique MAC address for the remote interface, making sure that the second digit is a zero; for example, 10fffabc5432. Be sure to reverse the local and remote MAC addresses at the remote synchronous pass-through interface.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.33

Parameter:	**WAN Protocol**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	None
Options:	Standard | PassThru | PPP | SMDS | Frame Relay | X.25 | ATM DXI | LAPB | SDLC
Function:	Indicates which WAN protocol has been enabled on this synchronous circuit.
Instructions:	Accept the current value. Use the Circuit List window to change WAN protocols.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.34

Parameter:	**CRC Size**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	16 bit
Options:	16 bit | 32 bit
Function:	Specifies an error-detection scheme. You can choose either 16 bit (standard) or 32 bit (extended) frame check sequence (FCS) to detect errors in the packet.
Instructions:	Set this parameter to 16 bit or 32 bit.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.35

Parameter: Sync Media Type

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Default

Options: Default | T1 | E1 | RAISEDTR | V25BIS | ISDN (BRI) | ISDNLEASEDLINE | HAYES

Function: Specifies the signaling method that the router uses for this line.

Instructions: Select the media type appropriate for this line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.54

Parameter: Idle RR Frames

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Off

Options: On | Off

Function: Indicates whether the router sends a receiver ready (RR) signal when the Link Idle Timer expires.

Instructions: Accept the default or select On if you want the router to send RR signals.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.61

Parameter: KG84A Cycle

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 100 milliseconds

Options: 5 | 10 | 25 | 50 | 100 | 200 | 500

Function: Specifies the timer cycle, in milliseconds. This cycle value is used by the timers on the other KG84A devices on the network, and becomes the polling cycle for monitoring FCS errors.

Instructions: Accept the default, 100 milliseconds, or select one of the valid options. Be sure to set the RTS Enable parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.67

Parameter: KG84A Sync Loss Interval

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 50 cycles

Options: 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500

Function: Specifies how many cycles the router should wait after detecting an FCS error. If the router does not receive a valid frame within the specified number of cycles, the router declares a loss of synchronization.

Instructions: Accept the default, 50 cycles, or select one of the valid options. Be sure to set the RTS Enable parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.68

Parameter: KG84A Remote Resync Wait

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 200 cycles

Options: 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500

Function: Specifies the number of cycles that the router waits for the remote KG84A device to complete a resynchronization operation, when synchronization is lost and a remotely initiated resynchronization has been detected. After this number of cycles, the router software determines that the resynchronization has failed and initiates another resynchronization.

Note that if you press the RESYNC button on the local KG84A device, the router responds as if it were a remotely initiated resynchronization.

Instructions: Specify a different setting at each end of the point-to-point link to avoid a possible race condition. Be sure to set the RTS Enable parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.69

Parameter: KG84A Sync Pulse

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 10 milliseconds

Options: 2 to 4096 milliseconds

Function: Specifies the length of the pulse, in milliseconds, that the router transmits to the KG84A device when it needs to initiate KG84A resynchronization.

The router uses the RTS signal of the V.35 interface. Using a special cable, the interface connects to the KG84A device's synchronous signal to initiate KG84A resynchronization. When the router needs to initiate KG84A resynchronization, it changes the value of the synchronous signal from low to high. This parameter specifies the number of milliseconds that the synchronous signal retains its high value.

Instructions: Accept the default, 10 milliseconds, or select one of the valid options. Be sure to set the RTS Enable parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.70

Parameter: Sync Polling

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Disable

Options: Enable | Disable

Function: Indicates whether the data set ready (DSR) signal will be monitored. If you set this parameter to Enable, the synchronous driver will be enabled when the DSR signal is detected. When the DSR signal is no longer detected, the driver will be disabled. Enable this parameter only if you will be using dial-up services.

Instructions: Accept the default or set this parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.76

Parameter: Hold Down Time

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 0 seconds

Options: 0 to 9999 seconds

Function: Specifies the time that the router waits before bringing up this line when using dial services. This delay allows time for the primary line to recover before deactivating a backup line.

Instructions: Specify the number of seconds to wait before bringing up this line.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.80

Parameter: Network Link Level

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: NET2

Options: NET2 | GOSIP | SYNC_TYPE_C03

Function: Indicates the link level for this synchronous point-to-point connection.

Instructions: Accept the default, NET2, for most configurations, or do the following:

- Change to GOSIP when this synchronous point-to-point connection is part of a GOSIP-compliant network, such as the Department of Defense (DoD).
- Change to SYNC_TYPE_C03 when you are running X.25 on the QSync, DST, or ESAF synchronous link modules.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.81

Parameter: Cable Type

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Null

Options: Null | RS232 | RS422 | V35 | X21

Function: Specifies the cable interface to the network.

Instructions: When the interface connects to a dial-up device for switched services, set this parameter to reflect the cable interface type that connects the dial unit. For an SDLC interface, specify RS232.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.83

Parameter: Sync Line Coding

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: NRZ

Options: NRZ | NRZI | NRZI Mark

Function: Specifies the line coding of the physical synchronous line. On AN and ASN routers, and on a router with an Octal Sync link module, you can change the value to match the line coding of a device at the other end of the line.

Instructions: Select NRZ for nonreturn to zero coding.

Select NRZI for nonreturn to zero inverted coding.

Select NRZI Mark for nonreturn to zero inverted mark coding.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.88

Parameter: Remote Loopback Detection

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: Disable

Options: Enable | Disable

Function: Enables or disables remote loopback detection. If BofL is enabled, the device driver detects when it is receiving its own BofL packets and disables the interface, assuming that the link has been put into loopback mode.

Instructions: Select Enable or Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.91

Parameter: External Clock Speed

Path: **COM** Connector > **Edit Line** > Edit SYNC Parameters

Default: 64102 b/s

Options: 1200 to 6000000 b/s

Function: Sets the clock speed of an externally supplied clock when the Clock Source parameter is set to External.

Instructions: Set the clock speed for the external clock to the data transmission rate that most closely corresponds to the speed of the external clock. You cannot set this parameter when the Clock Source parameter is set to Internal.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.93

Parameter:	**Sync B Channel Override**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Default
Options:	BCHANNEL1 | BCHANNEL2 | DEFAULT | FLOATINGB
Function:	Specifies which B channel this line is using for ISDN. By default, the B channel is associated with the selected connector. On AN and ANH routers, you can use this parameter to override the Site Manager default and connect the B channel to a specific serial communications controller (SCC).
Instructions:	Select DEFAULT to use the channel Site Manager assigns. Select BCHANNEL1 or BCHANNEL2 to explicitly assign the B channel. Select FLOATINGB to use only one B channel of ISDN, which becomes BCHANNEL1 or BCHANNEL2, depending on the call setup procedures. COM1 and COM2 become available in this mode.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.94

Parameter:	**Sync Force IFTF**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Default
Options:	Default | HDLC Flags | Idles
Function:	Specifies an interframe time fill (IFTF) pattern that the router transmits when there is no data to transmit on a synchronous line. There are two IFTF patterns: • HDLC Flags, an 0x7E pattern (0 1 1 1 1 1 1 0) • Idles, an 0xFF pattern (1 1 1 1 1 1 1 1)
Instructions:	HDLC Flags is the default IFTF pattern for all synchronous media types except ISDN BRI. For ISDN BRI, the default pattern is Idles. To use these defaults, leave the Sync Force IFTF parameter set to Default. To override the defaults, set this parameter to HDLC Flags or Idles. For a dial-on-demand interface, set this parameter to Idles.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.96

Parameter:	**Sync Priority**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	1
Options:	1 to 50
Function:	Used by dial or switched services to assign priority to lines in the same demand or backup pool. For example, the router uses a line of priority 1 before it uses a line of priority 2.
Instructions:	Assign a priority number to each line in the backup pool. The lower the number, the higher the priority.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.97

Parameter:	**WAN Serial Interface Type**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	Sync
Options:	Sync | Async
Function:	Determines whether this interface uses synchronous or asynchronous communication.
Instructions:	If you are using asynchronous PPP, select Async; otherwise, accept the default.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.109

Parameter:	**Async Baud Rate**
Path:	**COM** Connector > **Edit Line** > Edit SYNC Parameters
Default:	9600
Options:	1200 | 2400 | 4800 | 9600 | 14400 | 19200 | 28800 | 38400 | 57600 | 64000 | 76800 | 96000 | 115200
Function:	When the WAN Serial Interface Type parameter is set to Async, determines the transmission speed between the modem and this interface.
Instructions:	Select a value that is greater than or equal to the speed of the modem.
MIB Object ID:	1.3.6.1.4.1.18.3.4.5.1.110

Parameter: **Pasync Parity Type**

Path: **COM** Connector > **Edit Line** > AOT > Edit SYNC Parameters

Default: Even

Options: Odd | Even | High | Low | None

Function: Sets the error-detection method for isolating altered or damaged AOT packets during transmission. Asynchronous equipment typically adds a parity bit to the end of a packet before transmission. This allows the receiving router to detect a transmission error if it receives a packet with an unexpected parity.

Instructions: Click on Values and select a value that is appropriate for your network: Odd, Even, High (1), Low (0), or None.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.116

Parameter: **Pasync Data Bits**

Path: **COM** Connector > **Edit Line** > AOT > Edit SYNC Parameters

Default: Eight

Options: Five | Six | Seven | Eight

Function: Sets the length of a polled AOT packet to a specific number of data bits.

Instructions: Click on Values and select a value that is appropriate for your network.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.117

Parameter: **Pasync Stop Bits**

Path: **COM** Connector > **Edit Line** > AOT > Edit SYNC Parameters

Default: Two

Options: One | Two

Function: Sets the interval at the end of a transmitted polled AOT packet, allowing the receiving router to pause before accepting the next packet. More stop bits create a longer pause at the receiving router.

Instructions: Click on Values and select a value that is appropriate for your network.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.118

Parameter: Pasync Baud Rate

Path: **COM** Connector > **Edit Line** > AOT > Edit SYNC Parameters
Default: 600
Options: 150 | 300 | 600 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600
Function: Sets the transmission speed for polled AOT packets between primary and secondary routers over a TCP connection.
Instructions: Click on Values and select a baud rate that is appropriate for your network.
MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.119

T1 Line Parameters

You access the T1 line parameters from the Configuration Manager window.

Parameter: Enable

Path: **T1** Connector > **Edit Line** > Edit T1 Parameters
Default: Enable
Options: Enable | Disable
Function: Enables or disables the T1 line.
Instructions: Set to Disable if you want to disable the T1 line.
MIB Object ID: 1.3.6.1.4.1.18.3.4.10.1.2

Parameter: Frame Type

Path: **T1** Connector > **Edit Line** > Edit T1 Parameters
Default: ESF
Options: ESF | D4
Function: Selects either ESF (extended superframe) or D4 frame format. D4 transmits superframes consisting of 12 individual frames. ESF, in contrast, transmits superframes consisting of 24 individual D4 frames and provides enhanced signaling and synchronization.
Instructions: Select ESF or D4, based on the frame format that the associated T1 equipment requires.
MIB Object ID: 1.3.6.1.4.1.18.3.4.10.1.7

Parameter: **B8ZS Support**

Path: **T1** Connector > **Edit Line** > Edit T1 Parameters

Default: Disable

Options: Disable | Enable

Function: Enables or disables B8ZS (bipolar with 8 zero substitution), a mechanism that maintains T1 synchronization.

Instructions: Select Enable or Disable, depending on whether the associated T1 equipment supports B8ZS.

MIB Object ID: 1.3.6.1.4.1.18.3.4.10.1.9

Parameter: **Line Buildout**

Path: **T1** Connector > **Edit Line** > Edit T1 Parameters

Default: 1 ft.

Options: 1 to 655 ft.

Function: Conditions router signals to mitigate attenuation. Line buildout depends on the physical length of the T1 line.

Instructions: Specify the approximate length of the cable connecting the router and the associated T1 equipment.

MIB Object ID: 1.3.6.1.4.1.18.3.4.10.1.8

Parameter: **Clock Mode**

Path: **T1** Connector > **Edit Line** > Edit T1 Parameters

Default: Internal

Options: Internal | Slave | Manual

Function: Specifies the source of the T1 transmit clock.

Instructions: Specify the clocking mode, making sure that the associated T1 equipment is compatible.

Select Internal to indicate that the router sets the clock.

Select Slave to indicate that the incoming data stream sets the clock.

Select Manual to indicate that the jumpers on the E1 link module set the clock. See *Installing and Maintaining BN Routers* or *Installing and Maintaining ASN Routers and BNX Platforms* for information on hardware configurations.

MIB Object ID: 1.3.6.1.4.1.18.3.4.10.1.10

Parameter:	**Mini Dacs**
Path:	**T1** Connector > **Edit Line** > Edit T1 Parameters
Default:	Idle
Options:	Idle | Data | Voice | Circuit 1 | Circuit 2
Function:	Assigns a specific function to each T1 channel.
Instructions:	Assign the appropriate function to the T1 channels. Select Idle to make the channel idle. Select Data to assign the channel to voice pass-through (E1 connector to E1 connector). To configure data and voice pass-through, assign identical channels to data or voice on both T1 connectors. Select Circuit 1 to assign the channel to the first E1 connector. Note that you cannot allocate T1 channels to both T1 circuits. Select Circuit 2 to assign the channel to the second E1 connector.
MIB Object ID:	1.3.6.1.4.1.18.3.4.10.1.11

Multiline Configuration Parameter

You access the Data Path Chooser parameter from the Configuration Manager window.

Parameter:	**Data Path Chooser**
Path:	Interface Connector for a Multiline Circuit > **Edit Circuit** > Lines > Multiline > Edit Multiline Options
Default:	Address Based
Options:	Address Based | Random
Function:	Specifies how this multiline circuit distributes outbound traffic over its data paths.
Instructions:	Select Address Based if the router always uses the same data path to send traffic between the same source and destination address. This method ensures that packets arrive in the correct sequence. Select Random if the router assigns a set of numbers to each data path. The router then generates a random number for each outbound packet, and assigns the packet to the data path with the matching number. This method ensures even distribution of traffic among the data paths in a multiline circuit, but does not ensure that packets arrive in the correct sequence.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.1.1.23

Appendix B
BCC show Commands

Use the BCC **show** command to display configuration and statistical information about WAN line services.

Online Help

You can display a list of available command options by entering **show** or **show** *<option>* without additional options or with a question mark as an option. For example, entering **show** or **show dsu ?** at the BCC prompt displays the list of all **show** or **show dsu** keyword (subcommand) options.

Commands for DSU/CSU Services

The **show dsucsu** *<container>* commands display status and statistical information about DSU/CSU drivers.

Table B-1 lists all of the **dsucsu show** commands. The filter flags and filter arguments are options that you can use with each keyword (also called subcommand).

Table B-1. DSU/CSU show Commands

<container>	***<keyword>***	***<arguments>***	***<filter_flags>***	***<filter_arguments>***
alerts			-circuit -slot	*<circuit_name>* *<slot>*
detail			-circuit -slot	*<circuit_name>* *<slot>*
errors			-circuit -slot	*<circuit_name>* *<slot>*
sample			-period -circuit -slot	*<period_in_seconds>* *<circuit_name>* *<slot>*
stats			-circuit -slot	*<circuit_name>* *<slot>*
summary			-circuit -slot	*<circuit_name>* *<slot>*

show dsucsu alerts

The **show dsucsu alerts** command displays all DSU/CSU circuits that are enabled but not up. Use this display to identify the interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>* Displays information about the specified circuit only.

-slot *<slot>* Displays information about the specified slot only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the DSU/CSU module.
HW Address	Physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
WAN Protocol	WAN protocol enabled on this interface.
Operational State	Current operating state of the DSU/CSU card.
Errors	Number of errors for a specific circuit.
MTU	Maximum transfer unit size -- the buffer size for the DSU/CSU port (also the largest frame that can be transmitted or received across the DSU/CSU port). The value ranges from 3 to 4608 bytes.

show dsucsu detail

The **show dsucsu detail** command displays detailed configuration and statistical information.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Name	Name of the circuit associated with this line.
Number	Number of the circuit associated with this line.
Slot/Connector	Name of the physical interface.
Admin State	Configured state of the DSU/CSU module.
Operational State	Current operating state of the DSU/CSU card.
Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
MAC Address	Media access control address: the physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
MTU	Maximum transfer unit size -- the buffer size for the DSU/CSU port (also the largest frame that can be transmitted or received across the DSU/CSU port). The value ranges from 3 to 4608 bytes.
WAN Protocol	WAN protocol enabled on this interface.
Local Address	The 1-byte local HDLC address of this interface.
Remote Address	The 1-byte remote HDLC address of this interface.
BofL	Enables the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer.
BofL TMO	BofL Timeout -- the time between transmissions of BofL messages from this interface.
Receive Bytes	Number of octets received without error.
Receive Frames	Number of frames received without error.

(continued)

Receive Average Packet	Average number of packets received without error.
Transmit Bytes	Number of octets transmitted without error.
Transmit Frames	Number of frames transmitted without error.
Transmit Average Packet	Average number of packets transmitted without error.
Total Errors/Receive	Total number of errors received.
Total Errors/Transmit	Total number of errors transmitted.
Number of Buffers/ Receive	Number of packets received without error.
Number of Buffers/ Transmit	Number of packets transmitted without error.
Protocols Configured	Protocols configured on this interface.

Receive Errors

The output contains the following information.

Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow frames received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information.

Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information.

Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show dsucsu errors

The **show dsucsu errors** command displays receive, transmission, or system errors for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

Receive Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.

(continued)

Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow errors received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information:

Slot/Connector	Name of the physical interface.
Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show dsucsu sample

The **show dsucsu sample** command displays data sampled from DSU/CSU lines over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Input Rate (bytes/sec)	Number of octets received without error.
Input Rate (pkts/sec)	Number of packets received without error.
Output Rate (bytes/sec)	Number of octets transmitted without error.
Output Rate (pkts/sec)	Number of packets transmitted without error.
Input Lack of Resource	Number of packets received and discarded because of lack of resources; for example, buffers.
Output Lack of Resource	Number of transmit packets discarded because of lack of resources; for example, buffers.

show dsucsu stats

The **show dsucsu stats** command displays DSU/CSU input/output statistical information for all DSU/CSU modules or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Slot location of the DSU/CSU module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line driver: Down, Init (initializing), Not Present (enabled but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of receive errors.
Transmit	Number of transmit errors.
Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.

(continued)

Avg. Pkt.:

Receive	Average packet size (number of bytes divided by number of frames) received without error.
Transmit	Average packet size (number of bytes divided by number of frames) transmitted without error.

Multicast:

Receive	Number of packets received that are not unicast packets.

show dsucsu summary

The **show dsucsu summary** command displays summary information for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interfaces.
Circuit	Name of the circuits associated with these lines.
Admin State	Configured state of the DSU/CSU modules.
HW Address	Physical addresses of the lines. Each line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
WAN Protocol	WAN protocols enabled on these interfaces.
Operational State	Current operating state for each line driver.
Errors	Number of errors for each circuit.
MTU	Maximum transfer unit size -- the buffer size for each DSU/CSU port (also the largest frame that can be transmitted or received across the DSU/CSU port). The value ranges from 3 to 4608 bytes.

Commands for FT1 and FE1 Services

The **show ft1e1** *<container>* commands display status and statistical information about the FT1 or FE1 drivers.

Table B-2 lists all of the **ft1e1 show** commands. The filter flags and filter arguments are options that you can use with each keyword (also called subcommand).

Table B-2. show ft1e1 Commands

<container>	***<keyword>***	***<arguments>***	***<filter_flags>***	***<filter_arguments>***
alerts			-circuit	*<circuit_name>*
bert-stats			-circuit	*<circuit_name>*
detail			-circuit	*<circuit_name>*
errors			-circuit	*<circuit_name>*
fdl-ansi				
fdl-att				
framer				
port				
sample			-circuit	*<circuit_name>*
stats			-circuit	*<circuit_name>*
summary			-circuit	*<circuit_name>*
timeslot				

show ft1e1 alerts

The **show ft1e1 alerts** command displays all circuits that are enabled but not up. Use this display to identify the interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the FT1 or FE1 module.
HW Address	Physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
WAN Protocol	WAN protocol enabled on this interface.
Operational State	Current operating state of the FT1 or FE1 line driver.
Errors	Displays errors for a specific circuit.
MTU	Maximum transfer unit size -- the buffer size for the FT1 or FE1 port (also the largest frame that can be transmitted or received across the Ft1 or FE1 port). The value ranges from 3 to 4608 bytes.

show ft1e1 bert-stats

The **show ft1e1 bert-stats** command displays statistics about BERT testing for the circuit.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Connector	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Bert Mode	Indicates whether BERT Mode is enabled or disabled on this line.
Bits	Number of bits tested
Bit Errors	Number of bit errors detected.

show ft1e1 detail

The **show ft1e1 detail** command displays detailed configuration and statistical information.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Name	Name of the circuit associated with this line.
Number	Number of the circuit associated with this line.
Slot/Connector	Name of the physical interface.
Admin State	Configured state of the FT1 or FE1 module.
Operational State	Current operating state of the FT1 or FE1 line driver.

(continued)

Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
MAC Address	Media access control address: the physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
MTU	Maximum transfer unit size -- the buffer size for the FT1 or FE1 port (also the largest frame that can be transmitted or received across the FT1 or FE1 port). The value ranges from 3 to 4608 bytes.
WAN Protocol	WAN protocol enabled on this interface.
Local Address	The 1-byte local HDLC address of this interface.
Remote Address	The 1-byte remote HDLC address of this interface.
BOFL	Enables the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer.
BOFL TMO	BofL Timeout -- the time between transmissions of BofL messages from this interface.
Receive Bytes	Number of octets received without error.
Receive Frames	Number of frames received without error.
Receive Average Packet	Average number of packets received without error.
Transmit Bytes	Number of octets transmitted without error.
Transmit Frames	Number of frames transmitted without error.
Transmit Average Packet	Average number of packets transmitted without error.
Total Errors/Receive	Total number of errors received.
Total Errors/Transmit	Total number of errors transmitted.

(continued)

Number of Buffers/ Receive	Number of packets received without error.
Number of Buffers/ Transmit	Number of packets transmitted without error.
Protocols Configured	Protocols configured on this interface.

Receive Errors

The output contains the following information.

Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow frames received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information.

Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information.

Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 or E1 Timeouts	Number of T1 or E1 timeouts detected. The T1or E1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 or e1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show ft1e1 errors

The **show ft1e1 errors** command displays receive, transmission, or system errors for all circuits or for a specific circuit.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

Receive Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow errors received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show ft1e1 fdl-ansi

The **show ft1e1 fdl-ansi** command displays the Facility Data Link (FDL) error statistics in ANSI-403 mode. This command shows information only for FT1.

The output contains the following information:

Slot/Connector	Name of the physical interface.
Line Number	Number assigned to this line.
CRC Counts	Number of CRC-6 error events.
BPV Counts	Number of bipolar violations.
OOF Counts	Number of out-of-frame error events.
FE Counts	Number of errors in the FPS framing pattern.
ES Counts	Number of erroneous seconds.
SES Counts	Number of severely erroneous seconds.
UAS Counts	Number of unavailable seconds.
PRMES Counts	Number of erroneous seconds as reported in the performance report messages.
PRMSES Counts	Number of severely erroneous seconds as reported in the performance report messages.
PRME Counts	Number of erroneous performance report messages received.

show ft1e1 fdl-att

The **show ft1e1 fdl-att** command displays the Facility Data Link (FDL) error statistics. This command shows information only for FT1.

The output contains the following information:

Slot/Connector	Name of the physical interface.
Line Number	Number assigned to this line.
ES Counts	Number of erroneous seconds.
SES Counts	Number of severely erroneous seconds.
SEFS Counts	Number of severely erroneous framing seconds encountered by a DS1 interface in the current 15 minute interval.
UAS Counts	Number of unavailable seconds.
CSS Counts	Number of controlled slip seconds (CSS) encountered by a DS1 interface in the current 15 minute interval.
PVC Counts	Number of path coding violations (PVC) encountered by a DS1 interface in the current 15 minute interval.
LES Counts	Number of line erroneous seconds (LES) encountered by a DS1 interface in the current 15 minute interval.
BES Counts	Number of bursty erroneous seconds (BESs) encountered by a DS1 interface in the current 15 minute interval.
DM Counts	Number of degraded minutes (DMs) encountered by a DS1 interface in the current 15 minute interval.
LCV Counts	Number of line code violations (LCVs) encountered by a DS1 interface in the current 15 minute interval.

show ft1e1 framer

The **show ft1e1 framer** command.

The output contains the following information:

Slot/Connector	Name of the physical interface.
Num Vld Intv	Number of valid intervals.
Bipolar Violation Counts	Number of bipolar violations.
CRC-4 Error Counts	Number of CRC4 errors.
FarEnd Block Errors	Number of far-end block errors.
Loss of Frame Failures	Number of loss-of-frame failures, which result when an out-of-frame event or carrier loss occurs.
Loss of Signal Failures	Number of loss of signal failures, which result when receive carrier loss occurs.
Alarm Indicat Failures	Number of alarm-indication-signal failures, which occur when two consecutive frames have less than 3 zeros (total) in the data stream.
Remote Alarm Failures	Number of remote alarm failures, which occur when the yellow alarm is detected.

show ft1e1 port

The **show ft1e1 port** command.

The output contains the following information:

Slot/Connector	Name of the physical interface.
State	Indicates whether the port is enabled or disabled.
MTU	Maximum transfer unit size -- the buffer size for the FT1 or FE1 port (also the largest frame that can be transmitted or received across the FT1 or FE1 port). The value ranges from 3 to 4608 bytes.
Loopback State	Indicates the current status of the line driver.
Accept Loopback	Whether loopback requests are accepted (enabled) or rejected (disabled) by this port.

(continued)

Bert Mode	Indicates whether BERT Mode is enabled or disabled on this port.
Line Coding	Indicates the line-coding method used for lines configured in association with this port.
FDL Type	The facilities data link (FDL) mode(ANSI 403, AT&T 54016, None) used for this port.
FDL Address	The facilities data link (FDL) address mode (AZ or BY) for this port.

show ft1e1 sample

The **show ft1e1 sample** command displays data sampled from drivers over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Input Rate (bytes/sec)	Number of octets received without error.
Input Rate (pkts/sec)	Number of packets received without error.
Output Rate (bytes/sec)	Number of octets transmitted without error.
Output Rate (pkts/sec)	Number of packets transmitted without error.
Input Lack of Resource	Number of packets received and discarded because of lack of resources; for example, buffers.
Output Lack of Resource	Number of transmit packets discarded because of lack of resources; for example, buffers.

show ft1e1 stats

The **show ft1e1 stats** command displays FT1 or FE1 input/output statistical information for all FT1 or FE1 modules, or for a specific circuit.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Slot location of the FT1 or FE1 module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line driver: Down, Init (initializing), Not Present (enabled, but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of receive errors.
Transmit	Number of transmit errors.
Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.

(continued)

Avg. Pkt.:	
Receive	Average packet size (number of bytes divided by number of frames) received without error.
Transmit	Average packet size (number of bytes divided by number of frames) transmitted without error.
Multicast	
Receive	Number of packets received that are not unicast packets.

show ft1e1 summary

The **show ft1e1 summary** command displays summary information for all circuits, or for a specific circuit.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interfaces.
Circuit	Name of the circuits associated with these lines.
Admin State	Configured state of the FT1 or FE1 module.
HW Address	Physical addresses of the lines. Each line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
WAN Protocol	WAN protocols enabled on these interfaces.
Operational State	Current operating state for each line driver.
Errors	Number of errors for each circuit.
MTU	Maximum transfer unit size -- the buffer size for each FT1 or FE1 port (also the largest frame that can be transmitted or received across the FT1 or FE1 port). The value ranges from 3 to 4608 bytes.

show ft1e1 timeslot

The **show ft1e1 timeslot** command identifies configured timeslots.

The output contains the following information:

Slot/Conn	Name of the physical interface
Line Number	Line number for this line, assigned during configuration. This line number uniquely identifies this interface and is not equal to any of the line numbers assigned to logical lines configured through this port.
Line Name	Name of this line.
Logical Line Index	Index number assigned to the line.
Timeslot	Circuit’s timeslot assignment. An number under the timeslot indicates that the logical line is using the timeslot. FT1 lines have 24 slots and FE1 lines have 31.

Commands for HSSI Services

The **show hssi** *<container>* commands display configuration, status, and statistical information about high-speed serial interface (HSSI) lines.

Table B-3 lists all of the **hssi show** commands. The filter flags and filter arguments are options that you can use with each keyword (also called subcommand).

Table B-3. HSSI show Commands

<container>	***<keyword>***	***<arguments>***	***<filter_flags>***	***<filter_arguments>***
alerts			-circuit -slot	*<circuit_name>* *<slot>*
detail			-circuit -slot	*<circuit_name>* *<slot>*
errors			-circuit -slot	*<circuit_name>* *<slot>*
sample			-period -circuit -slot	*<period_in_seconds>* *<circuit_name>* *<slot>*
stats			-circuit -slot	*<circuit_name>* *<slot>*
summary			-circuit -slot	*<circuit_name>* *<slot>*

show hssi alerts

The **show hssi alerts** command displays all HSSI circuits that are enabled but not up. Use this display to identify the interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the HSSI port.
HW Address	Physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
WAN Protocol	WAN protocol enabled on this interface.
Operational State	Current operating state of the line driver, as follows: • BofLwait -- Driver is waiting for its own Breath-of-Life (BofL) frames to be successfully transmitted or for a BofL frame from the Nortel Networks router at the other end of the WAN connection. This applies only to the Wellfleet Standard protocol. • CAwait -- External equipment, such as a modem, DSU, or CSU, is not currently up. • Init -- Module is initializing. • LMIwait -- Driver is waiting for any of four WAN protocols to indicate that a link layer connection has been established to another entity. This applies to the frame relay, SMDS, ATM, and PPP protocols. • Not Pres -- Module is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis. The software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.

(continued)

Total Time Up/ Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
Errors	Displays errors for a specific circuit.
MTU	Maximum transfer unit size -- the buffer size for the HSSI port (also the largest frame that can be transmitted or received across the HSSI port). The value ranges from 3 to 4608 bytes.

show hssi detail

The **show hssi detail** command displays detailed configuration and statistical information.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Name	Name of the circuit associated with this line.
Number	Number of the circuit associated with this line.
Slot/Connector	Name of the physical interface.
Admin State	Configured state of the HSSI port.

(continued)

Operational State	Current operating state of the line driver, as follows: • BofLwait -- Driver is waiting for its own Breath-of-Life (BofL) frames to be successfully transmitted or for a BofL frame from the Nortel Networks router at the other end of the WAN connection. This applies only to the Wellfleet Standard protocol. • CAwait -- External equipment, such as a modem, DSU, or CSU, is not currently up. • Init -- Module is initializing. • LMIwait -- Driver is waiting for any of four WAN protocols to indicate that a link layer connection has been established to another entity. This applies to the frame relay, SMDS, ATM, and PPP Protocols. • Not Pres -- Module is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis. The software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
MAC Address	Media access control address: the physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
MTU	Maximum transfer unit size -- the buffer size for the HSSI port (also the largest frame that can be transmitted or received across the HSSI port). The value ranges from 3 to 4608 bytes.
WAN Protocol	WAN protocol enabled on this interface.
Local Address	The 1-byte local HDLC address of this interface.
Remote Address	The 1-byte remote HDLC address of this interface.

(continued)

BOFL	Enables the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer.
BOFL TMO	BofL Timeout -- the time between transmissions of BofL messages from this interface.
Receive Bytes	Number of octets received without error.
Receive Frames	Number of frames received without error.
Receive Average Packet	Average packet size (number of bytes divided by number of frames) received without error.
Transmit Bytes	Number of octets transmitted without error.
Transmit Frames	Number of frames transmitted without error.
Transmit Average Packet	Average packet size (number of bytes divided by number of frames) transmitted without error.
Total Errors/Receive	Total number of errors received.
Total Errors/Transmit	Total number of errors transmitted.
Number of Buffers/ Receive	Number of packets received without error.
Number of Buffers/ Transmit	Number of packets transmitted without error.
Protocols Configured	Protocols configured on this interface.

Receive Errors

The output contains the following information.

Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow frames received on this line in which the device’s FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information.

Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information.

Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show hssi errors

The **show hssi errors** command displays receive, transmission, or system errors for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

Receive Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
CRC Errors	Number of frames received with CRC errors.
Overruns	Number of frames received that were aborted due to the memory bandwidth of the FIFO buffer overrunning during DMA.
Aborts	Number of frames received with abort errors.
Frames Too Long	Number of frames received on this line that exceed the MTU.

Transmit Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Aborts	Number of transmit frames with abort errors on this circuit.
Underruns	Number of transmit frames aborted with underrun errors on this circuit.

System Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Rx Ring Errors	Number of errors that the DMA controller has detected while processing the receive ring.
Tx Ring Errors	Number of errors that the DMA controller has detected while processing the transmit ring.
Internal Op Errors	Number of internal operation errors.
Host Errors	Number of parity errors occurring while the host driver accesses a register on the DMA controller. Host errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.
Port Errors	Number of DMA controller port-operation errors. Port errors may indicated faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show hssi sample

The **show hssi sample** command displays data sampled from HSSI lines over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Input Rate (bytes/sec)	Number of octets received without error.
Input Rate (pkts/sec)	Number of packets received without error.
Output Rate (bytes/sec)	Number of octets transmitted without error.
Output Rate (pkts/sec)	Number of packets transmitted without error.
Input Lack of Resource	Number of packets received and discarded because of lack of resources; for example, buffers.
Output Lack of Resource	Number of transmit packets discarded because of lack of resources; for example, buffers.

show hssi stats

The **show hssi stats** command displays HSSI input/output statistical information for all HSSI modules or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Slot location of the HSSI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Operational State	Current operating state of the line driver, as follows: • BofLwait -- Driver is waiting for its own Breath-of-Life (BofL) frames to be successfully transmitted or for a BofL frame from the Nortel Networks router at the other end of the WAN connection. This applies only to the Wellfleet Standard protocol. • CAwait -- External equipment, such as a modem, DSU, or CSU, is not currently up. • Init -- Module is initializing. • LMIwait -- Driver is waiting for any of four WAN protocols to indicate that a link layer connection has been established to another entity. This applies to the frame relay, SMDS, ATM, and PPP protocols. • Not Pres -- Module is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis. The software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of receive errors.
Transmit	Number of transmit errors.
Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.
Avg. Pkt.:	
Receive	Average packet size (number of bytes divided by number of frames) received without error.
Transmit	Average packet size (number of bytes divided by number of frames) transmitted without error.

show hssi summary

The **show hssi summary** command displays summary information for all circuits or a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interfaces.
Circuit	Name of the circuits associated with this line.
Admin State	Configured state of the HSSI ports.
HW Address	Physical addresses of the line. Each line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
WAN Protocol	WAN protocol enabled on this interface.

(continued)

Operational State	State of the line drivers, as follows: • BofLwait -- Driver is waiting for its own Breath-of-Life (BofL) frames to be successfully transmitted or for a BofL frame from the Nortel Networks router at the other end of the WAN connection. This applies only to the Wellfleet Standard protocol. • CAwait -- External equipment, such as a modem, DSU, or CSU, is not currently up. • Init -- Module is initializing. • LMIwait -- Driver is waiting for any of four WAN protocols to indicate that a link layer connection has been established to another entity. This applies to the frame relay, SMDS, ATM, and PPP protocols. • Not Pres -- Module is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis. The software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
Errors	Number of errors for each circuit.
MTU	Maximum transfer unit size -- the buffer size for each HSSI port (also the largest frame that can be transmitted or received across the HSSI port). The value ranges from 3 to 4608 bytes.

Commands for MCT1/MCE1 Services

The **show mct1e1** *<container>* commands display configuration, status, and statistical information about MCT1/MCE1 drivers.

Table B-4 lists all of the **mct1e1 show** commands.

Table B-4. MCT1/MCE1 show Commands

<container>	***<keyword>***	***<arguments>***	***<filter_flags>***	***<filter_arguments>***
alerts			-circuit	*<circuit_name>*
bert-stats-ll			-circuit	*<circuit_name>*
bert-stats-port			-circuit	*<circuit_name>*
clock-state				
clock-summary				
e1port				
fdl-ansi				
fdl-att				
framer				
rx-errors			-circuit	*<circuit_name>*
stats			-circuit	*<circuit_name>*
summary			-circuit	*<circuit_name>*
system-errors			-circuit	*<circuit_name>*
t1port				
timeslot				
tx-errors			-circuit	*<circuit_name>*

show mct1e1 alerts

The **show mct1e1 alerts** command displays all MCT1/MCE1 circuits that are enabled, but not up. Use this display to identify the interfaces that are not working.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Description of circuit.
Logical Line Index	Logical line number for this line.
Line Type	Type of line in use: Unframed T1, ESF, SF, E1, E1CRC, E1MF, E1CRCMF, or Unframed E1.
Line Number	Line number for this line, assigned during configuration. This line number uniquely identifies this interface and is not equal to any of the line numbers assigned to logical lines configured through this port.
State	State of the logical line as follows: Up, Down, Init (initializing), LMI, Wait, Loopback, Dying, Dead, or Not Pres (not present).
WAN Protocol	WAN protocol enabled on this interface: ATM, Frame Relay, LAPB, Passthru, PPP, SMDS, Standard, or X.25.
Rate Adaption	The number of bits and their positions within the timeslot, as follows: • 64K -- Uses all 8 bits in the timeslot. • 56K MSB -- Uses 7 of the 8 bits in the timeslot; does not use the most significant bit. • 56K LSB -- Uses 7 of the 8 bits in the timeslot; does not use the least significant bit.
Local Address	This parameter is used only when the logical line HDLC service is LLC1. It is a value in the range 1 through 7 in the address field of the HDLC packet; 1 indicates DCE, 3 indicates DTE. All other numbers indicate Explicit, which means that the user has selected the address.
Remote Address	This parameter is used only when the logical line HDLC service is LLC1. It is a value in the range 1 through 7 in the address field of the HDLC packet; 1 indicates DCE, 3 indicates DTE. All other numbers indicate Explicit, which means that the user has selected the address.

show mct1e1 bert-stats-ll

The **show mct1e1 bert-status-ll** command displays statistics about BERT logical line testing for the circuit.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Name of the logical line.
Logical Line Index	Index number given to the logical line and assigned by the creation.
Bert Mode	State of BERT mode: enabled or disabled. In BERT mode, the router introduces deliberate error patterns into the transmitted bit stream on a single logical line.
Bits	Continuous bit counter.
Bit Errors	Number of bit errors received on this interface.

show mct1e1 bert-stats-port

The **show mct1e1 bert-stats-port** command displays statistics about BERT testing for the port.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Name of the logical line.
Logical Line Index	Logical line number for this line.
Bert Mode	State of BERT mode: enabled or disabled. In BERT mode, the router introduces deliberate error patterns into the transmitted bit stream on a single logical line.
Bits	Continuous bit counter.
Bit Errors	Number of bit errors received on this interface.

show mct1e1 clock-state

The **show mct1e1 clock-state** command displays the MCT1/MCE1 module’s clock status.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Current Clock	Clock source currently in use.
Primary Clock	Primary source for transmit timing.
Secondary Clock	Secondary source for transmit timing.

show mct1e1 clock-summary

The **show mct1e1 clock-summary** command displays the MCT1/MCE1 port’s clock information.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Current Clock	Current source for transmit timing for this port.
Primary Clock	Primary source for transmit timing for this port.
Secondary Clock	Secondary source for transmit timing for this port.

show mct1e1 e1port

The **show mct1e1 e1port** command displays the MCE1 port information.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
State	State of the MCE1 port: Up, Down, Init (initializing), LMI, Wait, Loopback, Dying, Dead, or Not Pres (not present).
MTU	Maximum transfer unit size -- the buffer size for the MCT1/MCE1 port (also the largest frame that can be transmitted or received across the MCT1/MCE1 port). The value ranges from 3 to 4608 bytes.
Bert Mode	State of BERT mode: enabled or disabled. In BERT mode, the router introduces deliberate error patterns into the transmitted bit stream on a single logical line.
Line Type	Type of line in use: Unframed T1, ESF, SF, E1, E1CRC, E1MF, E1CRCMF, or Unframed E1.
Line Coding	Type of bipolar format MCT1 uses for signals: B8ZS or AMI.
I-Bit	State of international bit: enabled or disabled.

show mct1e1 fdl-ansi

The **show mct1e1 fdl-ansi** command displays the Facility Data Link (FDL) error statistics in ANSI-403 mode.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Line Number	Line number for this line; assigned during configuration. This line number uniquely identifies this interface and is not equal to any of the line numbers assigned to logical lines configured through this port.
CRC Counts	Number of CRC-6 errors. The FDL calculates CRC-6 on the incoming data. Each time the calculation does not match the CRC-6 code word in the incoming enhanced super frame (ESF) data stream, this count increments.
BPV Counts	Number of bipolar (line code) violations. The FDL counts bipolar violations whether its synchronizer is in sync or not. If the FDL is set to receive B8ZS code words, it does not count these code words as bipolar violations.
OOF Counts	Number of out-of-frame errors. An out-of-frame error occurs whenever two or more framing bits out of six in the Framing Pattern Sequence (FPS) are incorrect. This event causes the FDL to resynchronize to the incoming data stream.
FE Counts	Number of individual bit errors in the FPS.
ES Counts	Number of Errored Seconds (ES). An ES is any 1-second time interval with either a frame bit error or a CRC-6 error.
SES Counts	Number of Severely Errored Seconds (SES). An SES is any 1-second time interval with an OOF error or more than 320 CRC-errors.
UAS Counts	Number of Severely Errored Seconds (UAS). A UAS is the number of seconds between 10 consecutive SES events (inclusive) and 10 consecutive non-SES events (exclusive). For more information, refer to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DS1 Metallic Interface*).
PRMES Counts	Number of Errored Seconds reported in the Performance Report Messages (PRMs).
PRMSES Counts	Number of Severely Errored Seconds reported in the PRMs.
PRME Counts	Number of PRMs received in error. *In error* means that the calculated CRC does not match the incoming CRC word.

show mct1e1 fdl-att

The **show mct1e1 fdl-att** command displays the Facility Data Link (FDL) error statistics in ATT-54016 mode.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Line Number	Line number for this line; assigned during configuration. This line number uniquely identifies this interface and is not equal to any of the line numbers assigned to logical lines configured through this port.
ES Counts	Number of Errored Seconds (ES). An ES is any 1-second time interval with either a frame bit error or a CRC-6 error.
SES Counts	Number of Severely Errored Seconds (SES). An SES is any 1-second time interval with an OOF error or more than 320 CRC-errors.
SEFS Counts	Number of Severely Errored Framing Seconds (SEFS) that a DS1 interface encountered in the previous 24-hour interval.
UAS Counts	Number of Severely Errored Seconds (UAS). A UAS is the number of seconds between 10 consecutive SES events (inclusive) and 10 consecutive non-SES events (exclusive). For more information, refer to the 1989 ANSI T1.403 specification (*Carrier-to-Customer Installation DS1 Metallic Interface*).
CSS Counts	Number of Controlled Slip Seconds (CSS) that a DS1 interface encountered in the previous 24-hour interval.
PCV Counts	Number of Path Code Violations (PCV) that a DS1 interface encountered in the previous 24-hour interval.
LES Counts	Number of Line Errored Seconds (LES) that a DS1 interface encountered in the previous 24-hour interval.
BES Counts	Number of Burst Errored Seconds (BES) that a DS1 interface encountered in the previous 24-hour interval.
DM Counts	Number of Degraded Minutes (DM) that a DS1 interface encountered in the previous 24-hour interval.
LCV Counts	Number of Line Code Violations (LCV) that a DS1 interface encountered in the previous 24-hour interval.

show mct1e1 framer

The **show mct1e1 framer** command displays error information about the T1 and E1 framers.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Num Vld Intv	Number of previous time intervals for which valid data was collected. The value is 96 unless the interface was brought on line within the last 24 hours. In this case, the value is the number of complete 15-minute intervals since the interface has been on line.
Bipolar Violation Counts	Number of bipolar (line code) violations. The FDL counts bipolar violations whether its synchronizer is in sync or not. If the FDL is set to receive B8ZS code words, it does not count these code words as bipolar violations.
CRC-4 Error Counts	Number of CRC-4 errors. The FDL calculates CRC-4 on the incoming data. Each time the calculation does not match the CRC-4 code in the incoming enhanced super frame (ESF) data stream, this count increments.
Far End Block Errors	Number of far end block error counts.
Loss of Frame Failures	Number of loss of frame failures; occur when an out-of-frame event or carrier loss occurs. An out-of-frame event occurs when at least two of four consecutive framing bits are in error.
Loss of Signal Failures	Number of loss of signal failures; occur when the receive carrier is lost.
Alarm Indicat Failures	Number of alarm indication failures; occur when two consecutive frames have less than three zeros (total) in the data stream.
Remote Alarm Failures	Number of remote alarm failures; occur when the yellow alarm is detected.

show mct1e1 rx-errors

The **show mct1e1 rx-errors** command displays error for all circuits or for a specific circuit.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Description of circuit.
Logical Line Index	Logical line number for this line.
Null Frames	Number of frames containing no data bytes received.
Short Frames	Number of frames received with only one or two data bytes.
CRC Errors	Number of frames received with CRC errors.
Long Frames	Number of frames received that exceeded the MTU size.
Abort Frames	Number of frames received with abort errors.

show mct1e1 stats

The **show mct1e1 stats** command displays MCT1/MCE1 input/output statistical information for all MCT1/MCE1 circuits or for a specific circuit.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Logical Line Index	Logical line number for this line.
Receive Bytes	Number of octets received without error.
Receive Frames	Number of frames received without error.
Transmit Bytes	Number of octets transmitted without error.
Transmit Frames	Number of frames transmitted without error.
Total Errors	Total number of errors received. A single frame may receive more than one error.

show mct1e1 summary

The **show mct1e1 summary** command displays MCT1/MCE1 summary information for all MCT1/MCE1 circuits or for a specific circuit.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Description of circuit.
Logical Line Index	Logical line number for this line.
Line Type	Type of line in use: Unframed T1, ESF, SF, E1, E1CRC, E1MF, E1CRCMF, or Unframed E1.
Line Number	Line number for this line, assigned during configuration. This line number uniquely identifies this interface and is not equal to any of the line numbers assigned to logical lines configured through this port.
State	State of the logical line as follows: Up, Down, Init (initializing), LMI, Wait, Loopback, Dying, Dead, or Not Pres (not present).
WAN Protocol	WAN protocol enabled on this interface: ATM, Frame Relay, LAPB, Passthru, PPP, SMDS, Standard, or X.25.

(continued)

Rate Adaption	Number of bits and their positions within the timeslot, as follows: • 64K -- Uses all 8 bits in the timeslot. • 56K MSB -- Uses 7 of the 8 bits in the timeslot; does not use the most significant bit. • 56K LSB -- Uses 7 of the 8 bits in the timeslot; does not use the least significant bit.
Local Address	This parameter is used only when the logical line HDLC service is LLC1. It is a value in the range 1 through 7 in the address field of the HDLC packet; 1 indicates DCE, 3 indicates DTE. All other numbers indicate Explicit, which means that the user has selected the address.
Remote Address	This parameter is used only when the logical line HDLC service is LLC1. It is a value in the range 1 through 7 in the address field of the HDLC packet; 1 indicates DCE, 3 indicates DTE. All other numbers indicate Explicit, which means that the user has selected the address.

show mct1e1 system-errors

The **show mct1e1 system-errors** command displays information about system errors for all circuits or for a specific circuit.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Description of circuit.
Logical Line Index	Logical line number for this line.
Unaligned Frames	Number of frames containing a bit count not divisible by eight.
Internal Overflows	Number of frames received with internal overflow errors.
Overflow Frames	Number of overflow errors received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.
Losses of Sync	Number of instances of sync losses detected on this line. This error statistic is equivalent to the "red alarm received" statistic on T1.

show mct1e1 t1port

The **show mct1e1 t1port** command displays MCT1 port information.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
State	State of the logical line as follows: Up, Down, Init (initializing), LMI, Wait, Loopback, Dying, Dead, or Not Pres (not present).
MTU	Maximum transfer unit size -- the buffer size for the MCT1/MCE1 port (also the largest frame that can be transmitted or received across the MCT1/MCE1 port). The value ranges from 3 to 4608 bytes.
Loopback State	State of loopback as follows: payload-loop, line-loop, no-loop.
Accept Loopback	Loopback state: the MCT1 port accepts requests from a remote device to go into loopback mode by default. During loopback, the port loops receive data back onto the T1 transmit path. The remote or intermediate test equipment then performs diagnostics on the network between the equipment and the port. You can disable detection of remote loop-up and loop-down code to prevent the port from accepting loopback requests.
Bert Mode	State of BERT mode: enabled or disabled. In BERT mode, the router introduces deliberate error patterns into the transmitted bit stream on a single logical line.
Line Type	Type of line in use: Unframed T1, ESF, or SF.
Line Coding	The type of bipolar format MCT1 uses for signals: B8ZS or AMI.
FDL Type	Setting of facilities data link (FDL) mode as follows: ansi-403, att-54016, or none.
FDL Address	Setting of the FDL HDLC address mode: by or az. The FDL address mode determines how the local FDL responds to HDLC addresses in messages from the remote FDL.

show mct1e1 timeslot

The **show mct1e1 timeslot** command displays timeslot assignments for all circuits or for a specific circuit.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Line Number	Line number for this line, assigned during configuration. This line number uniquely identifies this interface and is not equal to any of the line numbers assigned to logical lines configured through this port.
Line Name	Name of this logical line.
Logical Line Index	Logical line number for this line.
Timeslot	Circuit's timeslot assignment. A number under the timeslot indicates that the logical line is using the timeslot. T1 lines have 24 slots and E1 lines have 31.

show mct1e1 tx-errors

The **show mct1e1 tx-errors** command displays statistical information about transmission errors for all circuits or for a specific circuit.

This command allows for the following command filter (flag) and filter argument:

-circuit *<circuit_name>*	Displays information about the specified circuit only.

The output contains the following information:

Slot/Module/Conn	Name of the physical interface.
Circuit	Description of circuit.
Logical Line Index	Logical line number for this line.
Underflow Frames	Number of retransmission underflow errors. These occur when the FIFO buffer empties before the device obtains the next DMA request.
Descriptor Errors	Internal device errors.

Commands for Serial Services

The **show serial** *<container>* commands display configuration, status, and statistical information about serial lines.

Table B-5 lists all of the **serial show** commands. The filter flags and filter arguments are options that you can use with each keyword (also called subcommand).

Table B-5. Serial show Commands

<container>	***<keyword>***	***<arguments>***	***<filter_flags>***	***<filter_arguments>***
alerts			-circuit -slot	*<circuit_name>* *<slot>*
detail			-circuit -slot	*<circuit_name>* *<slot>*
eia-status				
errors			-circuit -slot	*<circuit_name>* *<slot>*
sample			-period -circuit -slot	*<period_in_seconds>* *<circuit_name>* *<slot>*
stats			-circuit -slot	*<circuit_name>* *<slot>*
summary			-circuit -slot	*<circuit_name>* *<slot>*

show serial alerts

The **show serial alerts** command displays all serial circuits that are enabled but not up. Use this display to identify the interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the serial port.
HW Address	Physical address of the line. The line driver fills in this address from the 48-bit address stored in the serial number PROM for this connector.
WAN Protocol	WAN protocol enabled on this interface.
Operational State	State of the line driver, as follows: • Down -- Driver is not operational. • DSR Wait -- External equipment, such as a modem, DSU, or CSU, is not currently up and is not asserting a Data Set Ready signal. • Init -- Driver is initializing. • LMI Wait -- Driver is waiting for any of four WAN protocols to indicated that a link layer connection has been established to another entity. This state applies to the frame relay, SMDS, ATM, and PPP protocols. • Not Pres -- Driver is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors	Number of errors for a specific circuit.
MTU	Maximum transfer unit size -- the buffer size for the serial port (also the largest frame that can be transmitted or received across the serial port). The value ranges from 3 to 4608 bytes.

show serial detail

The **show serial detail** command displays detailed configuration and statistical information.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Name	Name of the circuit associated with this line.
Number	Number of the circuit associated with this line.
Slot/Connector	Name of the physical interface.
Admin State	Configured state of the serial port.
Operational State	State of the line driver, as follows: • Down -- Driver is not operational. • DSR Wait -- External equipment, such as a modem, DSU, or CSU, is not currently up and is not asserting a Data Set Ready signal. • Init -- Driver is initializing. • LMI Wait -- Driver is waiting for any of four WAN protocols to indicate that a link layer connection has been established to another entity. This state applies to the frame relay, SMDS, ATM, and PPP protocols. • Not Pres -- Driver is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis. The software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
MAC Address	Media access control address. The physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.

(continued)

MTU	Maximum transfer unit size -- the buffer size for the DSU/CSU port (also the largest frame that can be transmitted or received across the DSU/CSU port). The value ranges from 3 to 4608 bytes.
WAN Protocol	WAN protocol enabled on this interface.
Local Address	The 1-byte local HDLC address of this interface.
Remote Address	The 1-byte remote HDLC address of this interface.
BOFL	Enables the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer.
BOFL TMO	BofL Timeout -- the time between transmissions of BofL messages from this interface.
Receive Bytes	Number of octets received without error.
Receive Frames	Number of frames received without error.
Receive Average Packet	Average packet size (number of bytes divided by number of frames) received without error.
Transmit Bytes	Number of octets transmitted without error.
Transmit Frames	Number of frames transmitted without error.
Transmit Average Packet	Average packet size (number of bytes divided by number of frames) transmitted without error.
Total Errors/Receive	Total number of errors received.
Total Errors/Transmit	Total number of errors transmitted.
Number of Buffers/ Receive	Number of packets received without error.
Number of Buffers/ Transmit	Number of packets transmitted without error.
Protocols Configured	Protocols configured on this interface.

Receive Errors

The output contains the following information.

Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow frames received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information.

Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information.

Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show serial eia-status

The **show serial eia-status** command monitors EIA signals on a specific serial port. An active signal is displayed as H, an inactive signal is displayed as L. An asterisk (*) denotes a signal whose state has changed since the last time the signal status was reset.

The output contains the following information:

Slot/Connector	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
RTS	Return to send.
CTS	Clear to send.
DSR	Data set ready.
DCD	Data carrier detect.
DTR	Data terminal ready.

show serial errors

The **show serial errors** command displays receive, transmission, or system errors for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

Receive Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Bad Frames	Number of bad receive frames, caused by Frame Check Sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceed the MTU.
Overflow Frames	Number of overflow errors received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Underflow Frames	Number of retransmission underflow errors. These occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

The output contains the following information:

Slot/Conn	Name of the physical interface.
Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds five, contact your Nortel Networks Technical Solutions Center.

show serial sample

The **show serial sample** command displays data sampled from serial lines over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Name of the physical interface.
Circuit	Name of the circuit associated with this line.
Input Rate (bytes/sec)	Number of octets received without error.
Input Rate (pkts/sec)	Number of packets received without error.
Output Rate (bytes/sec)	Number of octets transmitted without error.
Output Rate (pkts/sec)	Number of packets transmitted without error.
Input Lack of Resource	Number of packets received and discarded because of lack of resources; for example, buffers.
Output Lack of Resource	Number of transmit packets discarded because of lack of resources; for example, buffers.

show serial stats

The **show serial stats** command displays serial input/output statistical information for all serial modules or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output contains the following information:

Slot/Conn	Slot location of the MCT1/MCE1 module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line driver: Down, Init (initializing), Not Present (enabled but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of receive errors.
Transmit	Number of transmit errors.
Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.
Avg. Pkt.:	
Receive	Average packet size (number of bytes divided by number of frames) received without error.
Transmit	Average packet size (number of bytes divided by number of frames) transmitted without error.
Multicast	
Receive	Number of packets received that are not unicast packets.

show serial summary

The **show serial summary** command displays summary information for all circuits.

The output contains the following information:

Slot/Conn	Name of the physical interfaces.
Circuit	Name of the circuit associated with each line.
Admin State	Configured state of the serial modules.
HW Address	Physical addresses of the lines. Each line driver fills in this address from the 48-bit address stored in the serial number PROM for this connector.
WAN Protocol	WAN protocol enabled on these interfaces.
Operational State	State of the line drivers, as follows: • Down -- Driver is not operational. • DSR Wait -- External equipment, such as a modem, DSU, or CSU, is not currently up and is not asserting a Data Set Ready signal. • Init -- Driver is initializing. • LMI Wait -- Driver is waiting for any of four WAN protocols to indicated that a link layer connection has been established to another entity. This state applies to the frame relay, SMDS, ATM, and PPP protocols. • Not Pres -- Driver is enabled but not yet started. This state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.

(continued)

Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
Errors	Number of errors for each circuit.
MTU	Maximum transfer unit size -- the buffer size for each serial port (also the largest frame that can be transmitted or received across the serial port). The value ranges from 3 to 4608 bytes.

Appendix C
Troubleshooting an MCT1 Connection

This section assumes that you have isolated a problem to a multichannel T1 (MCT1) connection.

To troubleshoot an MCT1 connection:

1. **Filter the log to display only messages from the MCT1 entity running on the slots experiencing the problem.**

   The Technician Interface command is as follows:

   log -fftwid -eDS1E1 -s*<slot_no.>*

   Example

   If you are filtering events from slots 3 and 4, enter the following command:

   log -fftwid -eDS1E1 -s3 -s4

2. **Check the following MCT1 MIB entries by entering the following Technician Interface commands:**

   get wfDrivers.14.0

   Or, use this Quick Get path: wfSoftwareConfig > wfDrivers > wfMunichLoad.

   get wfLinkModules.17.0

   Or, use this Quick Get path: wfSoftwareConfig > wfLinkModules > wfMCT1E1Load.

3. **Make sure that the Line Type and Line Coding supplied by the T1 provider match the associated settings in the MCT1 configuration.**

4. **Make sure that the digital signal, level 0 (DS0) channels match at both the router and the central office.**

5. **Watch the LEDs on the back of the MCT1 module. If the Sync LED keeps flashing, the line build out (LBO) is not in sync. This indicates impedance or resistance on the line. Ask the T1 carrier if you should set it to long haul or short haul, and configure the LBO parameter accordingly.**

   The Sync LED stays on when the framer is in sync with the carrier's clock.

6. **Make sure that you set the LBO appropriately.**

   For example, 0.0 dB is short haul (up to 133 ft).

7. **Use the MCT1 built-in bit error rate test (BERT) and line loop-up, loop-down, and payload loopbacks for troubleshooting. (This feature is available only with Site Manager in dynamic mode.)**

   Note that only one port can be in BERT mode at a time.

   Payload loopbacks are available in extended super frame (ESF) line type mode only.

8. **Make sure that the clocking is set to Port1 Ext Loop or Port2 Ext Loop. These settings are equivalent to Sync External.**

   The internal clocking of the MCT1 link module is the same as the internal clocking of the T1 link module. The MCT1 Slave and Loop settings are equivalent to the T1 master clock in the T1 link module.

9. **Make sure that the CRC16 (cyclic redundancy check) or CRC32 match the carrier's specifications.**

10. **Make sure that the value of the Inter Frame Time Fill parameter matches idles (0xFF) or flags (0x7E) with the remote end of the link.**

11. **Check the events from the entity DS1E1 (multichannel T1/E1 driver service) to view the MCT1 log events.**

    MCT1 uses the wfDS1E1 MIB entries. Therefore, the entity name associated with MCT1 is DS1E1, *not* MCT1.

    MCT1 uses the wfLogicalLineEntry object; T1 uses the wfSyncEntry object.

12. **Enter the Technician Interface** `loadmap` *<slot_no.>* **command and make sure that the software loaded the** *munich.exe* **and** *mct1e1.exe* **files. If it did not, use the Image Builder to add them to the router software image, and transfer the image to the memory card.**

Glossary

attribute — Properties or functional aspects of a configurable MIB object. See *parameter.*

channel — The multiplexed signal for one voice or data conversation, running simultaneously with other channels over a single logical or physical line.

circuit — A data communication path established between two network hosts; for example, a permanent or switched virtual circuit (PVC or SVC) over a packet- or cell-switched network, or over a dial or leased-line connection.

connector — The physical and electrical means to connect an interface module in a network device directly or indirectly to a physical network medium.

interface — A data link/physical layer connection to a physical network transmission medium. An interface includes media-specific driver software.

line — The physical medium that completes a circuit path, typically identified by connector, slot, and media type. In a *multiline* circuit, one circuit uses multiple lines for added bandwidth.

logical line — A logical path on a physical circuit. See *line*.

parameter — A Site Manager variable that defines a specific MIB attribute or a set of MIB attributes. See *attribute*.

port — On a network device or a user end station, a logical point of termination for data sent or received by a specific protocol or application. See *connector.*

slot — The physical and electrical means to connect an interface module in a network device directly or indirectly to a physical network medium.

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