

**SmartBits**

*Multipoint Port/Stream/Performance Analysis System*



# SmartApplications User Guide

**Version 2.30**

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**NetCom**  
S Y S T E M S

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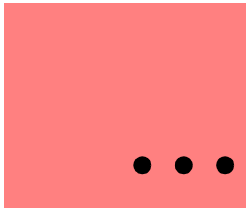
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## About this Guide

### What's in this chapter

This portion of the user guide contains the following sections:

***Section 1: Purpose***

***Section 2: Audience***

***Section 3: Manual Content***

***Section 4: Conventions Used in This Guide***

***Section 5: Related Manuals***

***Section 6: Online Help***

***Section 7: Technical Support***

## About this Guide

### *Purpose*

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## Purpose

This user guide provides information on all procedures required to perform tests using SmartApplications 2.30 application software. This includes details on software installation, test setup, and test result interpretation.

## Audience

This user guide is for users of SmartApplications 2.30 software. It is assumed that users of this guide are familiar with Microsoft Windows and SmartBits equipment, and have an intermediate knowledge level of data communications theory.





## Manual Content

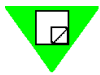
This guide contains the following chapters:

<b>Chapter 1, “SmartApplications Overview.”</b>	Provides an overview of SmartApplications.
<b>Chapter 2, “Basic Test Theory.”</b>	Explains general SmartApplications theory of operation and testing rules.
<b>Chapter 3, “Install and Connect.”</b>	Lists system requirements and explains how to connect your PC to a SmartBits and DUT.
<b>Chapter 4, “Basic Navigation and Tools.”</b>	Describes the SmartApplications main window and results windows, including their menus and task buttons.
<b>Chapter 5, “Set Up Tests.”</b>	Explains procedures that are required to set up any SmartApplications test.
<b>Chapter 6, “Run Tests.”</b>	Explains procedures to start, stop, and run tests, and view reports.
<b>Chapter 7, “Test Scenario.”</b>	Provides example test scenarios and explains test results.

## Conventions Used in This Guide

This guide uses the following conventions:

- *Italics* are used for document names and special terms.
- Menu options, field names, and tab names are **bolded**.
- Paths are shown with “greater than” symbols. For example, for **Test > Setup Options > Throughput**. In this example, you would click on the **Test** menu option, then on the **Setup Options** selection, and then on the **Throughput** tab.
- Notes are delineated by horizontal lines:



**Note:** Notes include related information, tips, and precautions about the topic preceding them.

## Related Manuals

Additional manuals related to this SmartApplications User Guide are listed below:

- *SmartBits Getting Started*
- *SmartBits System Overview and Reference*
- *Using GPS with SmartBits*

## Online Help

SmartApplications provides online Help for all windows and tabs. You can access online Help in two ways:

- Press the **F1** key from the window about which you wish information.
- From the menu bar, select **Help > Contents** to view the entire contents of the Help file or **Help > Search** for Help On to search by a specific topic or word.

### Chart Facility Help

SmartApplications includes a chart facility for graphically representing test results. It contains a separate Help file titled First Impression. If you can access Help from a chart-related window in either of the ways listed above, you will view chart-related Help only. Once you return to the Results window, you can view SmartApplications Help.

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# 1

## SmartApplications Overview



### What's in this Chapter

This chapter contains the following sections:

***Section 1: What is SmartApplications***

***Section 2: What are SmartCards, SmartModules and MiniModules***



## What is SmartApplications

SmartApplications is an easy-to-use suite of tests for LAN switches and routers connecting to Ethernet, Token Ring, Frame Relay, and/or Token Ring networks. With SmartApplications, you can test devices with up to 768 ports.

You can test how well a device performs with either packet-based or stream-based network traffic that is simulated by SmartBits SmartCards. These tests are based on:

- RFC 1242, Benchmarking Terminology for Network Interconnection Devices, edited by Scott Bradner ([sob@harvard.edu](mailto:sob@harvard.edu))
- An informational document Benchmarking Methodology for Network Interconnect Devices, edited by Scott Bradner
- RFC 2544, Benchmarking Methodology for Network Interconnect Devices, edited by Scott Bradner and Jim McQuaid ([mcquaidj@netscout.com](mailto:mcquaidj@netscout.com))

RFC 1242 and RFC 2544 outline the following SmartApplications tests for network devices:

- Throughput
- Latency
- Frame Loss Rate
- Back-to-Back

RFC 1242 contains a complete definition of the terms for which the tests are named. RFC 2544 describes how to measure and test performance, including specific formats in which to report test results and maximum frame rates to use with specific frame sizes.

Both RFCs are included in an appendix to the *SmartBits System Overview* manual, and RFC 1242 and the informational document are also available at the NDTL ftp site: [ndtl.harvard.edu](ftp://ndtl.harvard.edu) to view RFC 2544 or [www.ietf.org](http://www.ietf.org).



## What are SmartCards, SmartModules and MiniModules

**SmartCards** are custom-designed printed circuit boards (PCBs) that fit within a SmartBits chassis to generate, capture and track network packet data. They fit into the SMB-2000 and SMB-200 chassis.

**SmartModules** are made up of two PCBs within a specially designed tray which fits into the SMB-6000 chassis. SmartModules provide a higher port density than SmartCards.

**MiniModules** consist of only one PCB, but have a higher port density than the SmartCard. They are attached to a tray specially designed for the SMB-600.

The term “card” can refer to any SmartCard or any printed circuit board within a SmartModule or MiniModule.

## Chapter 1: SmartApplications Overview

*What are SmartCards, SmartModules and MiniModules*

---





# 2

## Basic Test Theory



### What's in this Chapter

This chapter contains the following sections:

***Section 1: Starting a Test***

***Section 2: General Testing Methodology***

***Section 3: Throughput Test Methodology***

***Section 4: Latency Test Methodology***

***Section 5: Packet Loss Rate Test Methodology***

***Section 6: Back-to-Back Test Methodology***



## Starting a Test

When you have set up the comm port and test parameters and selected the ports to test, you are ready to start running the test.

To start a test, you can either:

- Click the appropriate launch button on the main SmartApplications window  
or
- Select **Run** from the menu bar.

You can also set all tests to run from the **Preferences** tab of the Test Setup window. The next time you open SmartApplications they will begin running automatically.



**Note:** If you checked the **Stop on Error** box on the Test Setup window **Preferences** tab, the test will stop running when it encounters error conditions such as “Latency packet not received.” If you want the test to run regardless of errors, leave the box unchecked. If you plan to run a long test, Netcom Systems recommends that you do NOT check this option.

## Stopping a Test

To stop a test while it is running, click the **Stop** button on the Results window.

## General Testing Methodology

Each SmartApplications test has these features in common:

- Measures device forwarding capabilities
- Requires a pair of SmartBits SmartCards to test frame forwarding: one is the transmitter, the other is the receiver.

Before testing a device you must:

- 1 Identify the number of the ports you want to test
- 2 Ensure that each port to be tested has a unique MAC address

You can chose multiple packet sizes and test durations as specified in the RFC.

SmartApplications logs test results into individual standard ASCII files that you can view or print with standard utilities.

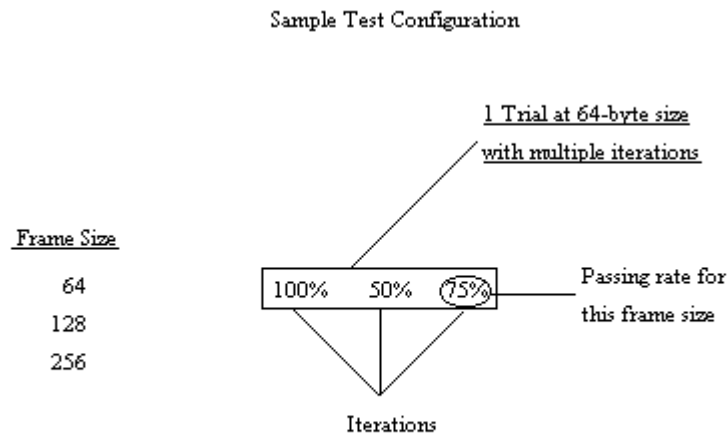
## Test Terminology

The term *test* refers to the test (such as Throughput or Latency) run for a particular frame size.

An *iteration* is when SmartApplications, while maintaining the frame size, varies the transmission rate based on the last failed rate. The resolution and number of repetitions determines the accuracy of results.

A *trial* is one set of iterations for a specific frame size and varying transmission rates. Tests use trials to determine the optimal rate of traffic for that frame size. It is possible to have multiple trials for the same frame size. The detailed results displays multiple trial results. You can specify the number of trials in the Setup Test Configuration window.

The following diagram illustrates these terms:



## Address Learning for SmartCards

SmartApplications assumes that the device under test (DUT) has no knowledge of any forwarding or routing required. Device forwarding tables are initialized by learning packets. You can also send learning packets in between every test trial in order to refresh a device forwarding table before an address is eliminated by aging.

This table lists the contents of learning packets:

*Table 2-1. Learning Packet contents*

Area	Size	How Used
Destination	6	MAC address
Source	6	MAC address
Protocol	variable	Matching user selection of IP, UDP, IPX, or 32 bytes of All zeros, or All 0xFF's
Test type	12	For Packet Loss and Back-to-Back: 6 bytes of the Netcom stamp in an ASCII string, and 6 bytes of the destination address.  For Throughput: a 6 byte incrementing counter with 6 bytes of destination MAC address.  For Latency: a 6 byte decrementing counter with 6 bytes of destination MAC address.
Rest of packet	n	Quantity varies depending on the selected protocol type's fill pattern.
CRC	4	



## Throughput Test Methodology

The Throughput test tests the fastest rate at which a device can forward frames without error. If a single frame is dropped the test fails and the test is repeated at a lower throughput rate.

The throughput test satisfies the terminology criteria of RFC 1242 and the test methodology specified in RFC 2544. From RFC 1242, throughput is “the maximum rate at which none of the offered frames are dropped by the device.” From RFC 2544, the methodology to measure throughput is to “Send a specific number of frames at a specific rate through the DUT and then count the frames that are transmitted by the DUT.” SmartApplications measures throughput by first sending a series of frames with a particular source and destination MAC address to the device under test. These frames are sent from a particular SmartBits port intended to be received by another SmartBits port.

Gap is determined by the initial rate in the test setup. If the initial rate is set to 100%, frames are sent initially with the gap set to the minimum legal size for the topology and speed of the transmitting SmartCard. The number of frames sent is determined by the length of time the test is to run. Frames are validated by counting only frames generated by the sending port, not any packets sent by the switch. Keep-alive and routing update frames are not counted as received frames.

If the initial rate is 100%, the first throughput test trial frame rate for a given frame length is the maximum rate at for the topology and speed of the transmitting SmartCard. If all frames from the transmitting SmartBits port are received by the receiving port, no further trials are attempted and the maximum frame rate is recorded as the throughput.

If the first trial fails (if even a single frame is lost), the second trial frame rate drops to 20% lower than the rate at which it failed. The third and each subsequent trial uses a binary search to determine a rate that is halfway between the last failed rate and the last successful rate. The test will not finish until the frame loss percent is less than or equal to the resolution value in the test setup.

Results of the test are automatically logged to a file showing maximum data rate by port pair and aggregate frame data rate. Percentage achieved of maximum theoretical frame data rate for each selected frame size is also logged.

This test is performed for a user-specified number of times and the results averaged.

## Latency Test Methodology

The SmartApplications Latency test measures latency as defined in RFC 1242.

### How SmartApplications Calculates Latency

The sending SmartCard sends a burst of frames at a user-specified frame size through the DUT at a user-specified throughput rate. In the middle of the burst stream it inserts one frame with an identifying trigger (tag). The time when the trigger frame is fully transmitted is the Transmit Timestamp. The time the receiving SmartCard recognizes the trigger frame is the Receive Timestamp. SmartApps calculates Latency as:

$$(\text{Receive Timestamp}) \text{ minus } (\text{Transmit Timestamp}) = \text{Latency}$$

Specifically, SmartApps first measures the cut-through rate and then calculates the store and forward rate with this calculation:

$$(\text{Cut Through Rate}) \text{ minus } (\text{Frame Bit Time}) = \text{Store and Forward Rate}$$

The Latency test is performed at a user-specified frame rate.

### Cut Through (Bit-forwarding) Latency Calculation

For Cut Through device measurements, SmartApps calculates Latency as FIFO (first in-first out), meaning it calculates the difference between the time that the end of the *first* bit of a transmitted frame reaches the DUT's input port (Transmit Timestamp) and the time that the end of the *first* bit of the same frame leaves the DUT's output port (Receive Timestamp).

### Store and Forward Device Latency Calculation

For Store and Forward device measurements, SmartApps calculates Latency as LIFO (last in-first out), meaning it calculates the difference between the time that the end of the *last* bit of a transmitted frame reaches the DUT's input port (Transmit Timestamp) and the time that the end of the *first* bit of the same frame leaves the DUT's output port (Receive Timestamp).



#### Note:

- 1) It is recommended that you run the Throughput test before you run the Latency test in order to obtain the optimum throughput rate of the DUT. Then use the throughput rate obtained from the Throughput test for the Max Rate in the Latency test. Using a proven optimum rate prevents the tagged frame from being lost due to performance rate issues.
- 2) SmartApplications always measures Latency and yields results for both store and forward devices and bit-forwarding (cut-through) devices regardless of the DUT. When viewing results, use the result that is appropriate for your type of device.

## Packet Loss Rate Test Methodology

This test measures the percentage of frames lost by the DUT that should have been forwarded.

The Frame Loss Rate test satisfies the terminology criteria of RFC 1242 and the test methodology specified in RFC 2544. From RFC 1242, Frame Loss Rate is the “Percentage of frames that should have been forwarded by a network device under steady state (constant) load that were not forwarded due to a lack of resources”. The test allows for varying frame sizes from 64 bytes to 1518 bytes for Ethernet ports, and up to 8188 for Token Ring ports.

From RFC 2544, the methodology to measure frame loss is to “Send a specific number of frames at a specific rate through the DUT to be tested and count the frames that are transmitted by the DUT.”

Frames are validated by counting only frames generated by the sending port, not any packets sent by the switch. Keep-alive and routing update frames are not counted as received frames.

The Frame Loss Rate test operates in essentially the same manner as the Throughput test. First a packet burst is performed at the maximum possible rate for a user-specified period of time. After all packets are sent, the receiving port is queried to determine how many packets were received. The number of packets not received is determined and the percentage of loss is calculated.



**Note:** For Many to 1/1 to Many test configurations between ATM and Ethernet or ATM and Frame Relay: if the DUT bundles multiple streams into one virtual circuit, SmartApps counters reflect the number of packets received on a per virtual circuit basis (not per stream).

This test is performed a user-specified number of times and the results averaged.

## Back-to-Back Test Methodology

Back-to-Back tests the buffering capability of the device under test.

The Back-to-Back test satisfies the terminology criteria of RFC 1242 and the test methodology specified in RFC 2544. From RFC 1242, the Back-to-Back test is performed by “fixed length frames presented at a rate such that there is the minimum legal separation (maximum rate) for a given medium between frames over a sort to medium period of time, starting from an idle state.” The test allows for varying frame sizes from 64 bytes to 1518 bytes for Ethernet ports, and 8188 for Token Ring ports.

From RFC 2544, the methodology to measure back-to-back frames is to “Send a burst of frames with minimum inter-frame gaps to the DUT and count the number of frames forwarded by the DUT.” Frames are validated by counting only frames generated by the sending port, not any packets sent by the switch. Keep-alive and routing update frames are not counted as received frames.

The Back-to-Back test operates in essentially the same manner as the Throughput test. First a packet burst is performed for a user specified period. If all packets are received at the receiving port, the test is successful and testing is stopped. If even one packet is lost, the number of packets sent in the burst is halved and retried. If all packets are successfully received at this point, the packet burst is then chosen half way between the successful and unsuccessful trials, and retried. This pattern repeats until the actual number of packets that can be forwarded in a burst is determined.

This test is performed a user-specified number of times and the results are averaged.





# 3

## Install and Connect



### What's in this Chapter

This chapter contains the following sections:

**Section 1: *Installation***

**Section 2: *Open SmartApplications***



## Installation

It is assumed that you are familiar with Microsoft Windows and basic SmartBits operation.

### System Requirements

To run SmartApplications 2.30, you must have the following:

#### Hardware

- SMB-2000/200 or SMB-6000/600
- At least two SmartCards
- IBM PC™ or 100% compatible
- Pentium 200 or above
- VGA video or better is recommended
- 16 MB of RAM for Windows 95 / 98
- 32 MB of RAM for Windows NT
- 10 MB free hard disk space

#### Software

- Windows 95™, Windows 98™ or Windows NT™ 4.0
- SmartBits Firmware 10.10 or higher
- SmartApplications software

### Installing from a CD

Please refer to installation instructions on the SmartApplications CD case.

### Installing from Windows 95 or Windows NT

SmartApplications is provided on one CD-ROM disk. To install SmartApplications, perform the following steps:

- 1 Insert the SmartApplications installation CD in the CD-ROM drive.  
The Install Shield window is displayed.
- 2 Select *Install SmartApplications [Ver#]*.
- 3 Follow the instructions until all Netcom software is installed.



If your PC does not support the automatic install process, you can use the following alternative procedure.

- 1 From the Start Menu, select **Run**.
- 2 When the Run dialog box appears, type "<cd-rom drive>:\SETUP" in the Command Line, then click the **OK** button.
- 3 Follow instructions as the installation program installs the software.



## Open SmartApplications

From the **Start** menu, select **Programs > SmartApplications**. The SmartApplications main window is displayed.

### Close SmartApplications

To close SmartApplications, click the **Close** button at the top right corner of the screen.  
or

Select **File > Exit** from the menu bar.



# 4

## Basic Navigation and Tools



### What's in this Chapter

This chapter contains the following sections:

***Section 1: The Main Window***

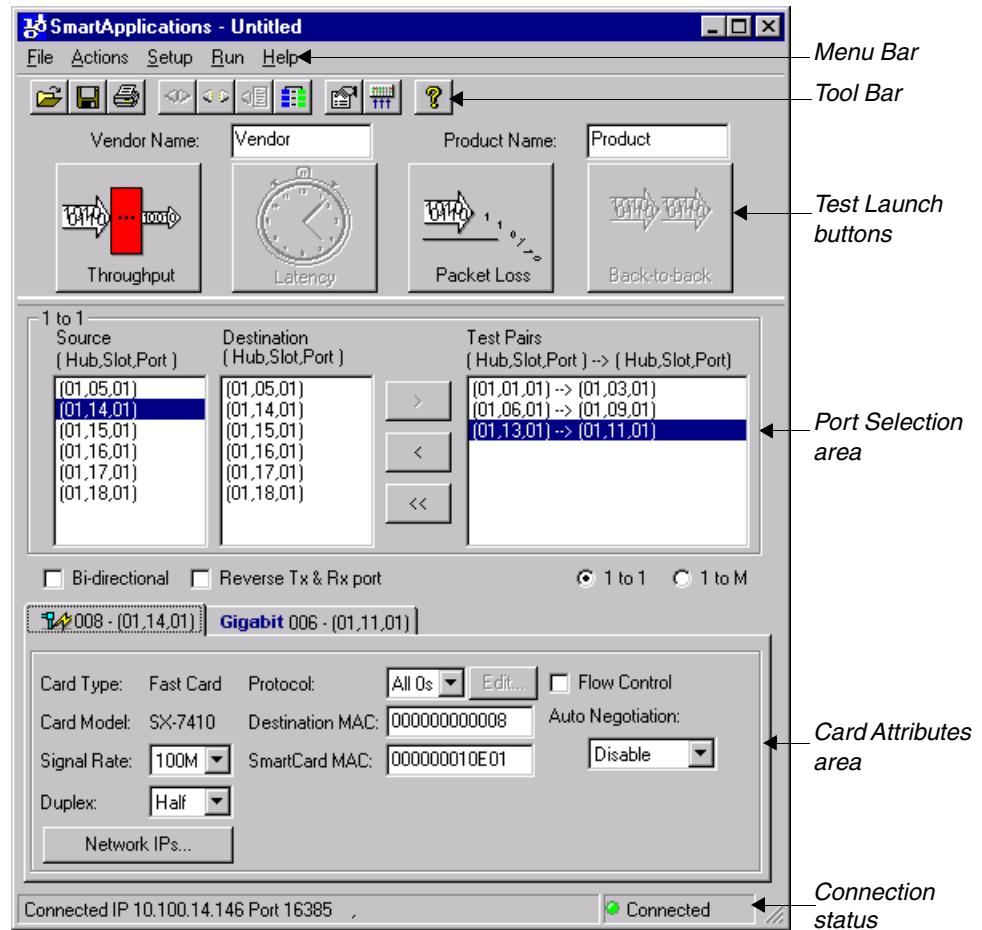
***Section 2: Charting Test Results***



## The Main Window

The SmartApplications main window is a dynamic window that changes according to the selections you make, such as selecting 1 to Many or 1 to 1 testing.

### Parts of the Main Window



## Menus

### File Menu

The File Menu contains the following options:

- **New**  
Opens the default SmartApplications test configuration (.sig) file. If you changed the default values, this option allows you to reset the values to the defaults.
- **Open**  
Opens a previously saved SmartApplications test configuration (.sig) file.
- **Save**  
Saves the current settings as a .sig file.
- **Save As**  
Saves the current test configuration under a new name.
- **View Results File**  
Opens the Results window. Once the Results window opens you can view results for the current configuration or for saved results for any previous configuration.
- **Print**  
Prints the current configuration file.
- **Print Setup**  
Allows the user to select the printer and setup printer options.
- **Exit**  
Terminates the SmartApplications program.

### Actions Menu

These menu options allow you to connect or disconnect to the SmartBits chassis.

- **Connect**  
Establishes the logical connection from your PC to the SmartBits chassis.
- **Disconnect**  
Breaks the logical connection from your PC to the SmartBits chassis.

**Note:** You must first disconnect from the SmartBits chassis in order to access the Connection setup.

### Setup Menu

All of the Setup menu options except **All SmartCards** are active only when you are disconnected from the SmartBits chassis. The Setup menu contains the following options:



- **Test Configuration**  
Accesses the Setup Test Configuration window where you specify test parameters such as the duration, learning packet information, and global test preferences.
- **All SmartCards**  
Accesses the Setup All SmartCards window where you can specify setup information for all SmartCards from one window instead of by individual card attribute tab, and make test-by-test or global changes to all cards, such as the speed. You can also access the Network IPs window and Token Ring Properties window from this window.
- **ATM Traffic Descriptor Type**  
Accesses the Traffic Configuration window where you specify call setup broadband capabilities, and forward and backward traffic descriptor specifications.
- **SmartBits Connections**  
Accesses the Setup SmartBits Connections window where you select a Serial (Com) port or an IP address connection.
- **SmartCards Reservation**  
Enables you to change the Reserved or Available status of slots when multiple users are running tests on the same chassis.

### Run Menu

The Run menu allows you to select one test to start running or to start all tests running in succession. You can also use the test launch buttons on the main window to start a test. The menu contains these options:

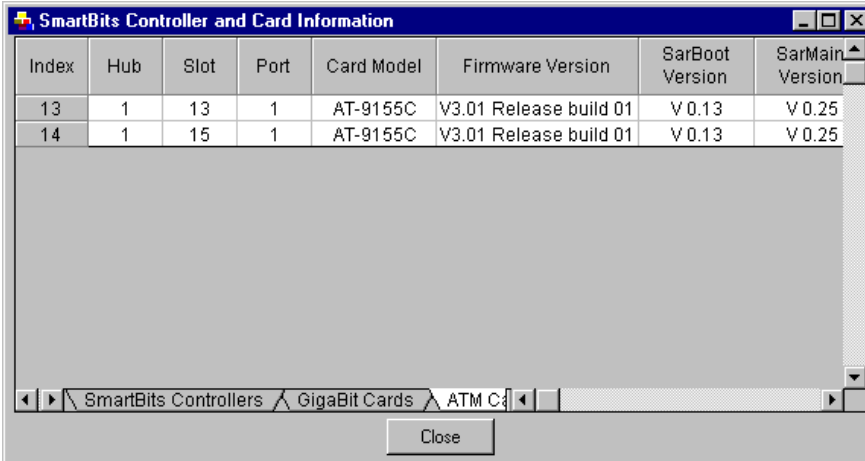
- **Throughput**  
The Throughput test tests the fastest rate at which a device can forward frames without error. If a single frame is dropped the test fails and the test is repeated at a lower throughput rate. You can perform bi-directional Throughput testing in half-duplex mode.
- **Latency**  
The time the receiving SmartCard recognizes the trigger frame is the Receive Timestamp. SmartApps calculates Latency as: (Receive Timestamp) minus (Transmit Timestamp) = Latency
- **Packet Loss**  
This test measures the percentage of frames lost by the DUT that should have been forwarded.
- **Back to Back**  
Back to Back tests the buffering capability of the device under test.
- **All**  
Performs all four tests.



## Help Menu

This menu contains two options:

- **Contents**  
Accesses SmartApplications online Help.
- **About SmartApplications**  
Displays the current application version number, firmware number, SmartBits Programming Library number used, and the serial number of the SmartBits controller. From the About window you can also access the Card Information window, which automatically displays information about SmartCards such as firmware version information.



The screenshot shows a window titled "SmartBits Controller and Card Information" with a table containing the following data:

Index	Hub	Slot	Port	Card Model	Firmware Version	SarBoot Version	SarMain Version
13	1	13	1	AT-9155C	V3.01 Release build 01	V 0.13	V 0.25
14	1	15	1	AT-9155C	V3.01 Release build 01	V 0.13	V 0.25

Below the table is a tree view showing a folder structure: SmartBits Controllers > GigaBit Cards > ATM C... and a "Close" button at the bottom.

## Launch Buttons

Click one of these buttons to start running a test:

- **Throughput**
- **Latency**
- **Packet Loss**
- **Back-to-back**

You can also start these tests from the **Run** option in the menu bar or select **All** from the **Run** menu to select all of the tests.

## Toolbar Buttons

*Table 4-1 Toolbar Buttons*










	Opens an existing configuration file.
	Saves the current configuration to a file.
	Prints the current configuration file.
	Connects SmartApplications to the SmartBits chassis. This allows you to display the card attributes for the SmartCards in the chassis.
	Disconnects SmartApplications from the SmartBits chassis. In order to set up the Ethernet or serial port in SmartApplications, you must first disconnect from the chassis.
	Displays the Setup SmartBits Connections window from which you select a serial (Com) port or an IP connection.
	Displays the SmartCard Status window from which you check the status of, reserve, or release SmartCard ports in multi-user configurations.
	Displays the Setup Test Configuration window where you can specify test configurations and preferences.
	Displays the Set Up All SmartCards window where you can configure the attributes for all or multiple ports from a single window.

Table 4-1 Toolbar Buttons



Accesses the About SmartApplications window, which displays the current application version number, firmware number, SmartBits Programming Library number used, and the serial number of the SmartBits controller.

From the About window you can also access the Card Information window, which automatically displays information about SmartCards such as firmware version information.

The screenshot shows a window titled "SmartBits Controller and Card Information". It contains a table with the following data:

Index	Hub	Slot	Port	Card Model	Firmware Version	SarBoot Version	SarMain Version
13	1	13	1	AT-9155C	V3.01 Release build 01	V 0.13	V 0.25
14	1	15	1	AT-9155C	V3.01 Release build 01	V 0.13	V 0.25

Below the table is a navigation pane with a tree view showing "SmartBits Controllers", "GigaBit Cards", and "ATM C...". A "Close" button is located at the bottom center of the window.

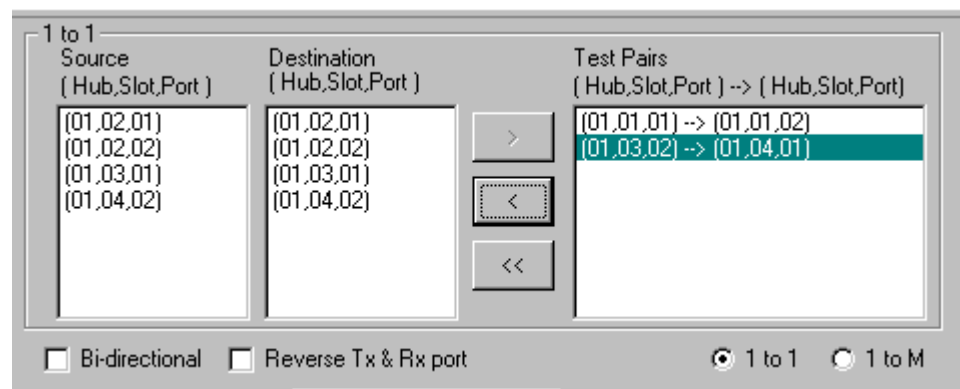
## Port Selection Area

This part of the window is where you specify the SmartCard ports that you want to include in a test. Checking the **Bi-directional** box causes the selected port pairs to transmit simultaneously in both directions as in full duplex operation. Checking **Reverse Tx & Rx port** reverses the transmission direction.

You also select the type of tests you plan to run: **1 to 1** or **1 to M** from this part of the window.

### Selecting Ports for 1-to-1 Tests

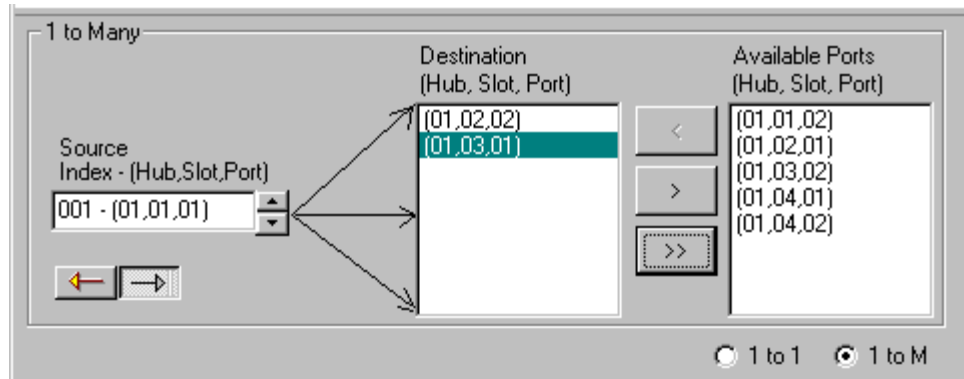
- 1 Click the **1 to 1** box. The main window displays the following 1 to 1 port selection area:



- 2 Select at least one pair of **Source** and **Destination** ports.
- 3 Click the **Bi-directional** box if you want the selected port pair(s) to transmit and receive simultaneously.  
or  
Click the **Reverse Tx & Rx port** box to reverse the direction of the transmission.

## Selecting Ports for 1 to Many Tests

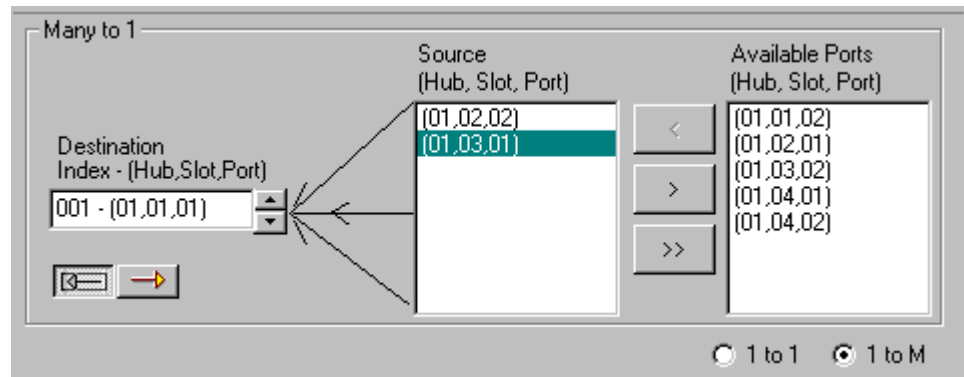
- 1 Click the **1 to M** box. The main window displays the following 1 to M port selection area:



**Note:** 1 to Many and Many to 1 tests are not compliant with RFC 2544.

- 2 Select the direction for the test using one of the direction buttons. The Source and Destination fields will change locations depending on the direction you select.
 

**Note:** If you change the direction, the Destination MAC and SmartCard MAC addresses on the card attributes tab remain unchanged. Ensure that you enter the correct destination MAC address for the DUT.
- 3 Select a Source card(s) and Destination card(s).  
The last card that you select in the **Source** (Many to 1), or **Destination** (1 to Many) or **Available Ports** field will be the card whose attributes appear as the second tab, as illustrated in this Destination Index example:



## Connection Status

In the bottom right-hand corner of the main window, a green light with the word “Connected” displays when you are connected to SmartBits. The light is grayed out and the word “Disconnected” displays when you are not connected.

## Charting Test Results

Once a test has finished running, you can present the results of the test in graph form. You can create a wide variety of charts to graphically represent test results by using the Chart Wizard. Charts range from 2D or 3D pie and bar charts to Gantt charts. You can also customize titles, layouts, legends, and axes. The Chart Wizard is a separate charting facility provided with SmartApplications.

To create a chart from the appropriate Results window tab do these steps:

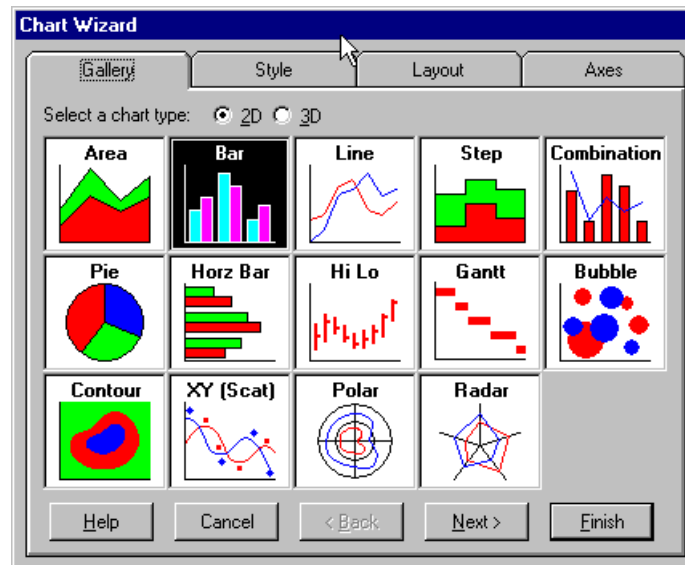
- 1 Select the rows and columns you want to appear on the chart. To do this, click on the first cell and then hold down the **Shift** key and click on the last cell to include. The block of cells will be highlighted.

Frame Size	Rate Tested(%)	(01,02,01) to (01,01,01) (%)	(01,03,01) to (01,01,01) (%)	Average
		100M - 100M	100M - 100M	
64	100.00	50.000	50.000	50.000
128	100.00	50.000	50.000	50.000
256	100.00	50.000	50.000	50.000
512	100.00	50.000	50.000	50.000
1024	100.00	50.000	50.000	50.000
1280	100.00	50.000	50.000	50.000
1518	100.00	50.000	50.000	50.000

- 2 Click the **Create Chart** button to display the Chart Wizard.



- 3 Select the type of chart you want to create from the Chart Wizard. The chart will be attached to the spreadsheet.



- 4 Double click on the outside of the chart to access the Format Chart window and customize the format.

For more information about how to use the Chart Wizard, refer to the Chart Wizard's online help user guide. To access the online Help click the **Help** button from the Chart Wizard window. The online Help system is called First Impression.





# 5

## Set Up Tests



This chapter contains the following sections:

***Section 1: Summary of Steps to Set Up a Test***

***Section 2: Connecting the Device Under Test***

***Section 3: Modifying the SmartBits Connection Setup***

***Section 4: Setting Up Test Configurations***

***Section 5: Selecting Test Ports***

***Section 6: Configuring Test Ports***

***Section 7: Router Testing***



## Summary of Steps to Set Up a Test

Connect the device under test to your SmartBits chassis. Refer to the next section for more information.

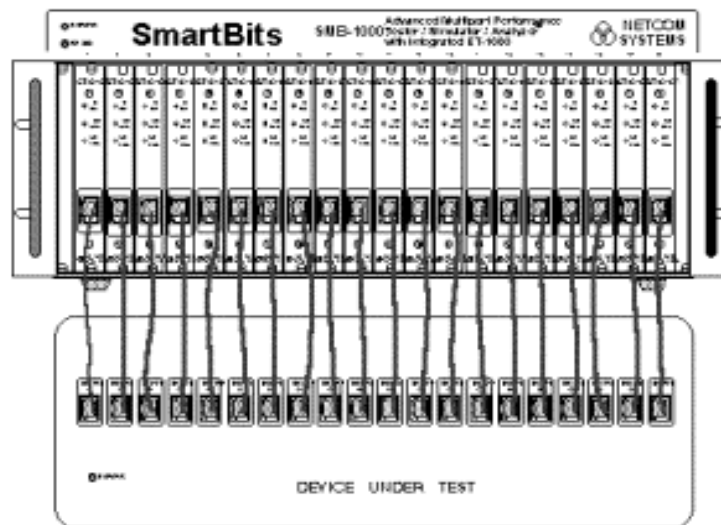
- 1 If you are running SmartApplications for the first time, set up the communications port between your PC and the SmartBits chassis at the Setup SmartBits Connections window.
- 2 Set up the test configuration and preferences from the Setup Test Configuration window or open a previously saved configuration file that you want to use for the tests.
- 3 Select the ports for the test(s) and the traffic direction from the SmartApplications main window.
- 4 Configure the ports, such as assign the MAC address for the card, from the main window. If you are using an ATM card, you must also set up line and ELAN parameters.



**Note:** If you are testing a router, you must check the Router Test box at the Test Setup window **Preference** tab.

## Connecting the Device Under Test

For simplicity, connect Port 1 on SmartBits to Port 1 on the device under test, Port 2 to Port 2 and so on (if possible).



Verify that the cable is correctly connected by checking that the device's link light is on.

For more information about setting up the hardware and your SmartBits chassis refer to the *Getting Started* manual or the *SmartBits System Overview and Reference* manual.

## Modifying the SmartBits Connection Setup

The SmartBits Connections setup defines to SmartApplications the communications port that your PC is using to connect to SmartBits. SmartApplications uses the serial port *COM2* as the default, which runs at 9600 baud.

If you have a SmartBits SMB-2000, SMB-200, SMB-6000, or SMB-600 chassis, you can connect your PC to either the serial or the Ethernet port on the SmartBits chassis. Connect to the Ethernet port if you want to:

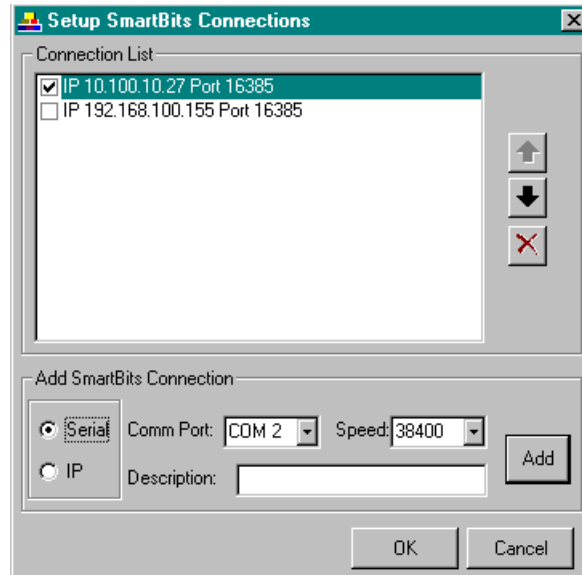
- Control the SMB-2000, SMB-200, SMB-6000, or SMB-600 chassis over a local network
- Retrieve data and execute tests faster

### Summary of Steps to Modify Comm Port Setup

- 1 Disconnect from SmartBits by selecting **Actions > Disconnect** from the menu bar.
- 2 Select **Setup > SmartBits Connection**. The Setup SmartBits Connections window is displayed.
- 3 Define the port using the appropriate tab, and check or uncheck the **Serial** checkbox. If you use the Ethernet port, check the box beside the port in the Connection List field to activate the one you want.
- 4 Reconnect to SmartBits by selecting **Actions > Connect** from the menu bar.

## Connecting to the Serial Port

If you want to connect your PC to SmartBits using the serial port, check **Serial** on the Setup SmartBits Connections window:



### Serial Port Tab

This table lists and describes the **Serial Port** tab fields.

Table 5-1 Serial Port tab fields.

Field	Description
<b>Available Comm Port</b>	Lists all available serial communication ports from which you can select. Select the ports from this list and click the > button.
<b>Selected Comm Port</b>	Lists the ports to which you want to connect. COM2 is the default.
<b>Speed</b>	Select a baud rate. The default is 9600. <b>Note:</b> Make sure to check the <b>Serial</b> checkbox. If you do not check this box, the following can happen: <ul style="list-style-type: none"><li>If you have an SMB-2000 or -200 the Ethernet port will be used instead.</li></ul>

## Connecting to the Ethernet Port

If you want to connect your PC to SmartBits using the Ethernet port, use the **Ethernet/TCP** (SMB-2000, SMB-200, SMB-6000, or SMB-600 chassis only) tab of the Setup SmartBits Connections window. You can define up to eight Ethernet ports.

### To access the Comm Port Setup window

Select **Setup > SmartBits Connections** from the menu bar.

### To activate or deactivate a port

In the **Connection List** field, check the box beside the port to activate it, or uncheck to deactivate it.



**Note:** Be sure to uncheck the **Serial** checkbox in the Setup SmartBits Connections window. If you do not uncheck this box, the serial port will be used instead.

## Ethernet/TCP Port Tab

This table lists and describes the **Ethernet/TCP Port** tab fields.

Table 5-2 Ethernet/TCP Port tab fields.

Field	Description
SmartBits IP Addr	The IP address of the SMB-2000/200 or SMB-6000/600.
TCP Port	The port on which the connection will be made. This is the listener port of the SMB-2000/200 or SMB-6000/600. Netcom Systems assigns this number (16385) to the SmartBits chassis.

## Linking Multiple SmartBits Chassis

You can connect multiple controlling SmartBits chassis by assigning each controlling chassis an IP address, as shown in the following graphic:

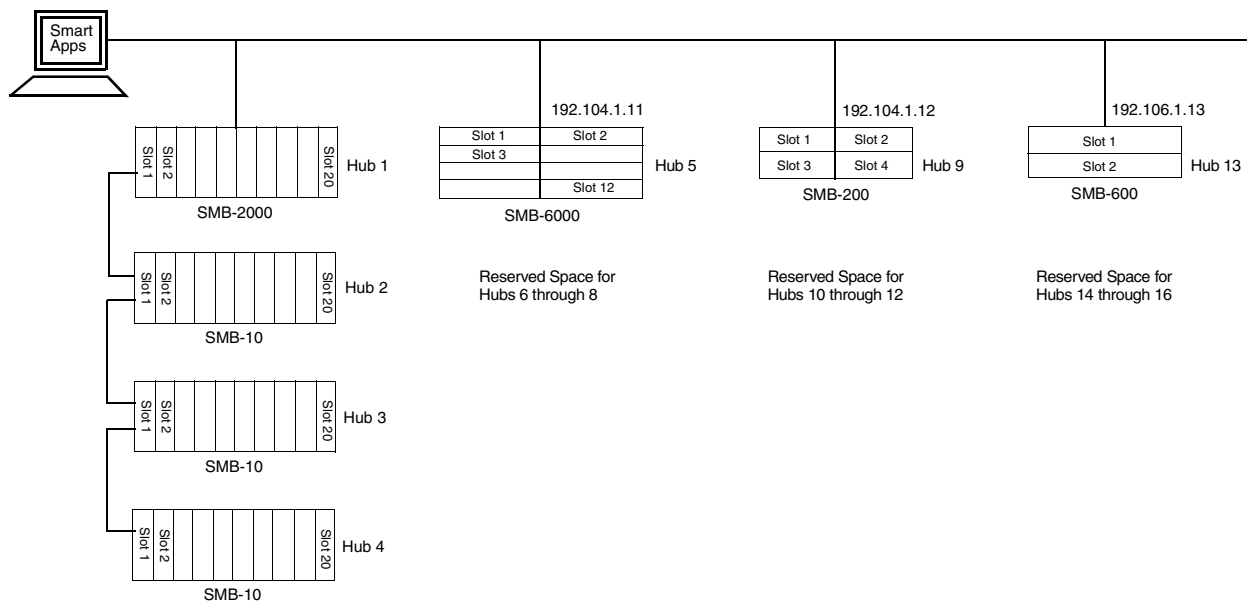


Figure 5-1. Numbering Stacked and Daisy-chained chassis

### Rules for Selecting Hub/Slot/Port Configurations

To understand hub/slot/port designations in SmartApplications, keep the following rules in mind:

- You can link a maximum of eight chassis across, each with a unique IP address.
- You can stack SMB-2000 chassis in arrangements of up to four individual chassis. The top hub in the stack must be an SMB-2000. The bottom three chassis may be either SMB-2000s or SMB-10s.



**Note:** You cannot stack SMB-6000s, SMB-600s, or SMB-200s chassis.

- When you link SmartBits chassis, four (real or virtual) hubs are allocated to each IP address (for each chassis linked across). Space is reserved for these hubs whether or not actual physical chassis are installed.
- The number of ports per slot depends on the type of card installed in the slot. The maximum configuration for a SmartBits chassis stack is 96 ports. This results in a maximum port capacity of 768 ports per SmartBits chain (eight SMB-6000, each populated with 96 ports).

- Hub/slot/port information appears in port selection and in test reports. Information displays in the format [xx,xx,xx]. For example, [05,04,03] represents hub 5, slot 4, port 3.
- The arrangement of hub/slot/port information in the connection list is based on the order in which IP addresses are arranged on the list. For example, with the chassis illustrated above, the IP address for Hub 13 (192.106.1.13) is listed fourth in the connection list. If this IP address had been listed first, Hub 13 would now be Hub 1. The IP address listed next would then become Hub 5, and so on.

### Synchronizing Clocks in Remote Chassis

To synchronize the clocks in multiple controllers that are remote from each other and start and stop tests simultaneously among those SmartBits chassis, use a GPS (Global Positioning System). The GPS becomes the clock source for each chassis by providing each SmartBits with an atomic clock. A 10 MHz frequency signal replaces the SmartBits backplane clock and guarantees very precise latency measurements.

SmartApplications automatically recognizes GPS and will synchronize the start of traffic between chassis. Netcom Systems currently supports the Hewlett Packard™ HP58503B GPS Time and Frequency Reference Receiver.



**Note:** Prior to running a latency test between two remote SmartBits chassis in GPS mode, ensure that the GPS receiver has been on for several hours. This is necessary for the GPS receiver components to be locked on. If you fail to do this, error messages may occur within SmartApplications.

For more information about how to set up the GPS receiver and cable information, refer to the *Using GPS with SmartBits Application Note #15* that accompanies your GPS unit.

### Multi-User Access

SmartBits chassis currently supports up to 10 simultaneous users. When online, SmartApplications displays the cards and their current status, which can be Reserved or Available.

Multi-user capability requires a SmartBits chassis with version 6.50 firmware or higher. SMB-2000 chassis must display a multi-user ready sticker.



**Note:** You can not use any card until you have reserved it.

### Multi-Users on the SMB-2000

A multi-user ready SMB-2000 has an identifying sticker on it. Unlike the SMB-6000 chassis which is multi-user ready, any SMB-2000 chassis without a sticker must be refitted at the Netcom factory to be multi-user compliant. At the factory, the following modifications are made:

- A SMB-2000 multi-user compliant backplane is installed.

## Chapter 5: Set Up Tests

### Modifying the SmartBits Connection Setup

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- Chassis firmware 6.50 or later is installed.

The SMB-200 is a single-user only chassis.

When these modifications are present on an SMB-2000, SmartWindow displays the multi-user interface. Otherwise, connected to an SMB-2000 without the above modifications, SmartWindow displays the single-user interface.

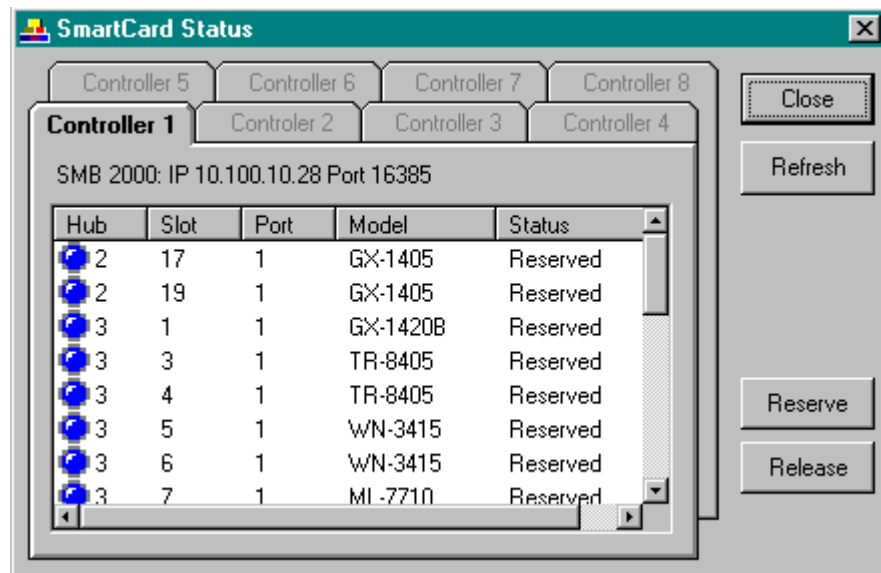
## Reserving SmartCards

In multi-user configurations, you must reserve SmartCards before you can use them for running tests. To use SmartCards in multi-user configurations, you first check the status of the SmartCards in chassis you are using for the test, then reserve available SmartCards for your use. In the same manner, you release SmartCards you no longer need.

### Checking SmartCard Status

To check the status of SmartCards in your multi-user configuration, do one of the following:

- 1 Click the **Reserve/Release SmartCards** toolbar button on the SmartApplications main window  
or  
Select **Setup > SmartCard Reservation**.  
The SmartCard Status window displays:



- 2 Click the tab for the controller (chassis) you wish to view.



The controller tab displays the hub, slot, and number of each port, the SmartCard model number, and the status of the port: Reserved or Available. In the Hub column, a blue light indicates Reserved status and a green light indicates Available status.

### **Reserving SmartCards**

To reserve an available SmartCard from a tab in the SmartCard Status window, follow these steps:

- 1** Click on the port you wish to reserve to highlight it.
- 2** Click **Reserve**.  
SmartApplications automatically updates the controller field to show your selection. You can also click **Refresh** to update the field.
- 3** Click **Close** when you are finished reserving SmartCards.

### **Releasing SmartCards**

To release a SmartCard you have reserved, follow these steps:

- 1** From a tab in the SmartCard Status window, click on the port you wish to release to highlight it.
- 2** Click **Release**.  
SmartApplications automatically updates the controller field to show your selection. You can also click **Refresh** to update the field.
- 3** Click **Close** when you are finished reserving SmartCards.

## Setting Up Test Configurations

SmartApplications allows you to specify test parameters that you can save to a file for future use. For example, for each test you can specify how long you want the test to run and the range of packet sizes to be sent. You can also select all tests by selecting **Run > All**.

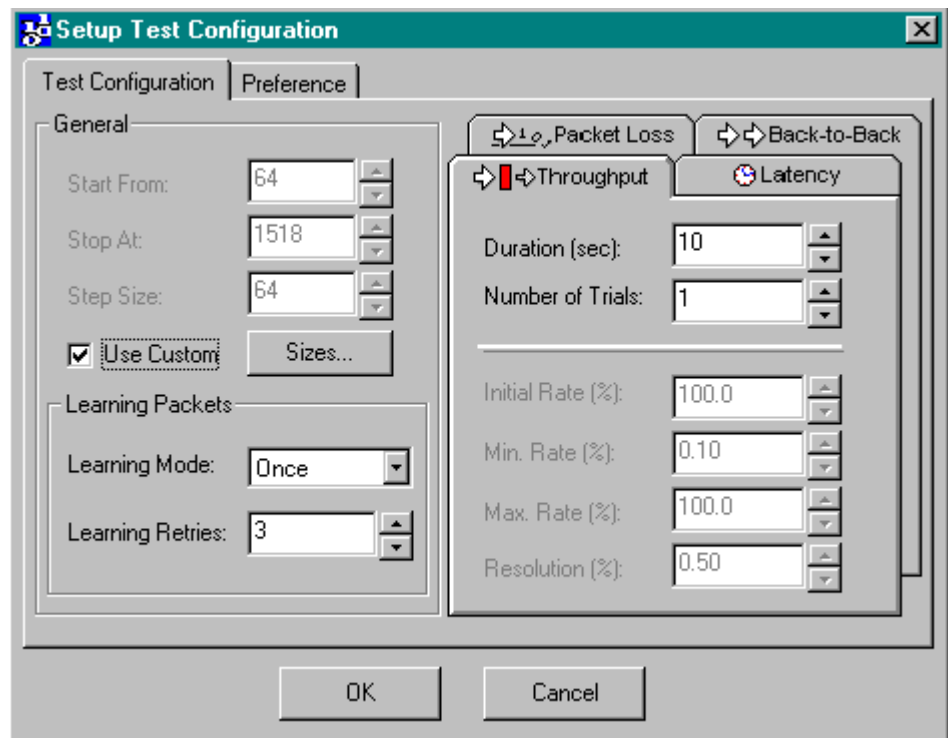
From the Test Setup window you can select test parameters such as the test duration, how many iterations are to be performed, and what packet sizes are to be tested. To access the Test Setup window, select **Setup > Test Configuration** from the menu bar.

The Test Setup window contains two tabs:

- **Test Configuration**
- **Preference**

### Test Configuration Tab

Use the **Test Configuration** tab to set options for all tests and for each individual test.



## General Area options

These options on the **Test Configuration** tab enable you to specify the range of packet sizes to transmit during the test. Tests do not necessarily run until the maximum (**Stop At**) packet size is sent. For example, if the **Start From** field is set to 64, the **Stop At** field is set to 200, and the Step Size is 64, the test will send packet sizes of 64, 128, and 192. It will not continue to send the 256-byte packet since the **Stop At** field specifies 200.



**Note:** If the value in the **Step Size** field increments the current packet size to a number larger than that in the **Stop At** field, the test will stop.

- **Start From**  
Enter or select the size of the smallest packet to send. The default size is 64 bytes.
- **Stop At**  
Enter or select the size of the largest packet to send. The default size is 1518 bytes.
- **Step Size**  
Enter or select the number of bytes that the current packet size will be incremented with each test.  
For example if the step size is 10 bytes, the first test transmits packets that are 64 bytes, and the next test transmits packets that are 74 bytes.
- **Use Custom**
  - **Unchecked:** Runs tests with the settings in the **Test Configuration** tab. Default custom sizes are: 64, 128, 256, 512, 1024, 1280 and 1518.
  - **Checked:** Runs tests according to the packet sizes specified at the Custom Packet Sizes window. Enables the **Sizes** button.

## Learning Packets options

Learning packets inform the test device's forwarding tables of the MAC addresses for sending and receiving SmartCards. You can send learning packets in between every test trial to refresh a device forwarding table before an address is eliminated by aging.

- **Learning Mode**  
Select the mode by which SmartApplications sends out learning packets to update the device's forwarding tables. Possible modes:
  - **Never**  
SmartApplications never sends learning packets to the device under test.
  - **Once**  
Sends learning packets once at the beginning of each test. For example, if you select packet sizes of 64 and 128 bytes, SmartApplications sends learning packets before the 64-byte test and again before the 128-byte packet test.
  - **Every Trial**  
Sends learning packets before each trial. For example, if you were testing at a packet size of 64 bytes, starting at 50% and incrementing 10% each time, learning packets would be sent before the 50% trial, before the 60% trial and so on.

- **Learning Retries**

Enter or select the number of times SmartApplications should retry sending learning packets before it starts the actual test. Some devices require more packets to learn an address. This value is used to loop on the transmission of the learning packets. There is a 1 second delay between retries.



**Note:** If your device shows signs of flooding during testing, you might need to use more than the Learning Packets default of Once per test and the Learning Retries of 3 retries, or increase the aging timer in the DUT.

## Individual Test options

You must run the Throughput test before you run the Latency test. Use the throughput rate obtained from the Throughput test for the Latency test. Using a proven optimum rate prevents the tagged frame from being lost due to rate (gap size) issues. Fill out a tab for each test that you want to run.

- **Duration (sec)**

Enter or select the length in seconds for which you want to run each trial of the test. It is the amount of time that SmartBits will send data for each packet for the selected test. Possible values range from 1 to 999 seconds.



**Note:** For 100 Mbps SmartCards, do not use a value greater than 110 seconds or you will get the error message “Parameter out of range.” when you run the test

- **Number of Trials**

Enter or select the number of times that you want SmartApplications to repeat the selected test(s) (for example, Packet Loss, Throughput). Values range from 1 to 25 for each packet length. After the test SmartApplications averages the results before reporting a summary of all trials for each test.

- **Initial Rate (%)**

The rate at which packets will be transmitted at the start of a trial.

- **Step Rate (%)**

*This field does not apply to the Throughput test.*

The percentage that the test increments with each trial. Step rate specifies how quickly the test rate will increase after a trial finishes. Select a number or enter an integer or decimal value. The minimum decimal value you can enter is .1.

- **Min. Rate (%)**

The rate at which transmission trials will stop. Select a number or enter an integer or decimal value. The minimum decimal value you can enter is .1.

This field does not apply to Latency tests.

- **Max. Rate (%)**

The maximum rate at which each packet size should be transmitted. Select a number or enter an integer or decimal value. The minimum decimal value you can enter is .1. When selecting this rate for the Latency test, the Latency measurement should be at

the rate where the Throughput test passed. Setting a value of 100% may not be measuring the true latency of your device under test. Set this value accordingly. For example, if you know a particular device cannot exceed 90% of wire speed, you could set the maximum to 90% to save time.



**Note:** It is recommended that you run the Throughput test before you run the Latency test in order to obtain the maximum throughput rate of the DUT. Then use the throughput rate obtained from the Throughput test for the Max Rate in the Latency test. Using a proven rate prevents the tagged frame from being lost due to rate (gap size) issues.

- **Resolution (%)**

This field applies only to the Throughput test. Resolution determines how exact the test result is. Lower settings yield a more precise result but usually results in longer test times.

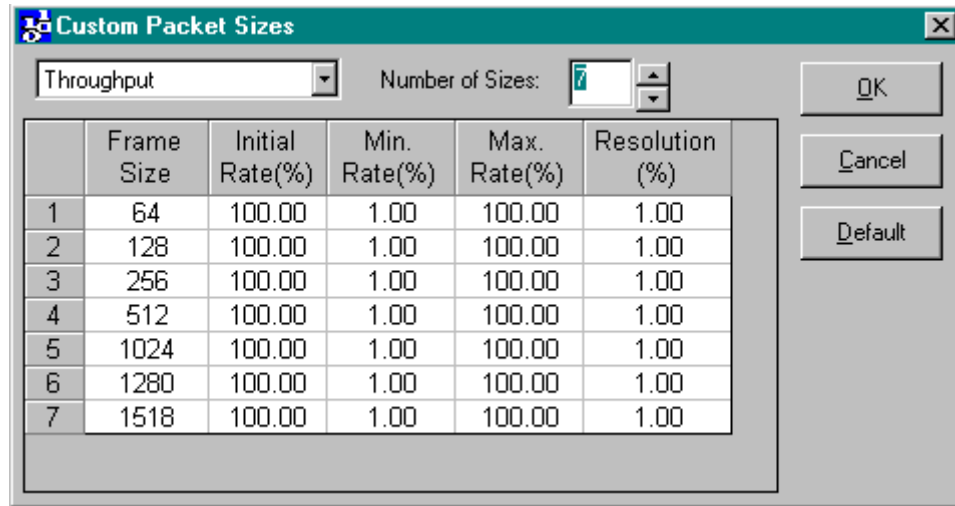
### Example of How Test Configuration Settings Work

If you set the resolution to 2%, the testing will stop when the difference between the last successful test and the last unsuccessful test is less than 2%. If the initial trial failed at 100%, the second trial might run at 50%. Assuming no packets were dropped at 50%, the next trial would increase to 75%. Again assuming no lost packets, the rate of the next trial might increase to 87.5% and so on. Eventually, you might run a trial at 98.2%. Since the resolution was set to 2% the testing would stop here since  $100 - 98.2 = 1.8\%$  which is less than 2%. If the resolution had been set to 1% another trial would be run, since 1.8% is greater than 1%.



## Customizing Test Packets

The **Use Custom** option on the **Test Configuration** tab allows you to set your own test packet sizes. Click the **Sizes** button on the Custom Packet Sizes window to access the Custom Packet Sizes window:

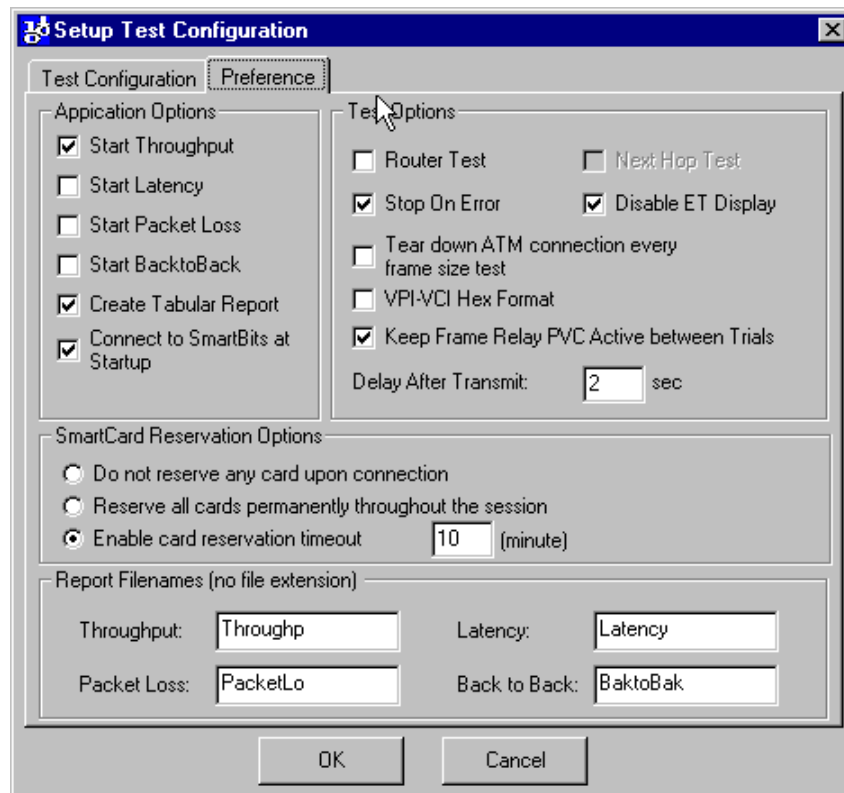


The default values are the seven packet sizes specified for Ethernet testing in Section 9.1 of RFC 1242. To change the number of **Packet Size** fields, enter or select a new value in the **Number of Sizes** box. The maximum number of packet sizes is 25. To enter a custom value for a packet size, click on a **Packet Size** field and type in a value.

Click the **OK** button to close the window and make the selected changes the current settings. Click **Cancel** to close the window without making changes. Click **Default** to revert to the seven default packet sizes.

## Preference Tab

Use the Preference tab of the Test Setup window to specify report filenames and other test options. To access this window, select **Setup > Test Configuration** from the menu bar and click the **Preferences** tab:



### Preference Tab Fields

This table lists and describes the **Preference** tab fields:

Table 5-3 Preference tab fields.

Field	Description
<b>Start Throughput</b>	Check to automatically start this test when you start SmartApplications.
<b>Start Latency</b>	Check to automatically start this test when you start SmartApplications.
<b>Start Packet Loss</b>	Check to automatically start this test when you start SmartApplications.

Table 5-3 Preference tab fields.


Field	Description
<b>Start Back to Back</b>	Check to automatically start this test when you start SmartApplications.
<b>Create Tabular Report</b>	Check to generate reports in tabular format with results by packet size running horizontally across the page. Uncheck the box if you want to use the non-tabular format.
<b>Connect to SmartBits at Startup</b>	Check to automatically connect to the SmartBits chassis when SmartApplications starts. This speeds up application startup time.
<b>Router Test</b>	Check this box if you are testing a router. Checking this box enables the <b>Next Hop Test</b> checkbox.
<b>Stop On Error</b>	<p><b>Checked:</b> When errors are encountered the test stops running and error message boxes are displayed so that you can correct the condition. For example, for ATM cards, you might see the message:</p> <pre>ILMI is not established.</pre> <p><b>Unchecked:</b> Any errors are ignored and the test continues. Errors messages are logged to the results file. Leave this box unchecked if you want the test to run regardless of error conditions such as “Latency packet not received.”</p> <p><b>Note:</b> If you check the <b>Stop on Error</b> box on the Test Setup window <b>Preferences</b> tab, the test will stop running when it encounters error conditions such as “Latency packet not received.” If you want the test to run regardless of errors, leave the box unchecked. If you plan to run a long test, Netcom Systems recommends that you do NOT check this option.</p>
	
<b>Next Hop Test</b>	Enables you to test the Next Hop gateway address.
<b>Disable ET Display</b>	<p><b>Checked:</b> the SmartBits controller does not try to track updates for the front panel of an attached ET-1000.</p> <p><b>Unchecked:</b> Uncheck this box only if your test bay has an ET-1000 controller, and you want to track some particular ET-1000 counters through the front panel display.</p>
<b>Tear down ATM connection every frame size test</b>	Disconnect the stream and connection for each trial when testing ATM cards.
<b>VPI-VCI Hex Format</b>	Check to view VPI and VCI values in hex format.



Table 5-3 Preference tab fields.

Field	Description
<b>Keep Frame Relay PVC Active between Trials</b>	Check to prevent the teardown of the PVC between trials, i.e., between going from one packet size to the next or from one frame rate to the next.
<b>Delay After Transmit</b>	Select the number of seconds to wait after all Tx cards have finished transmitting.
<b>SmartCard Reservation Options</b>	Select the option for reserving or releasing SmartCards in multi-user environments. You can elect to reserve one to all SmartCards for yourself throughout the session. You may also elect to reserve no SmartCards for yourself when you connect to a chassis.  You can specify a SmartCards reservation timeout in the <b>Minutes</b> field. If you select this option, the timer starts every time you connect. If the timeout you specify occurs, all of the unselected SmartCards in the multi-user chassis are released.

## Saving a Test Configuration

You can save the test settings you specify for ports and tests by saving it to a configuration (.sig) file. Using .sig files saves a lot of time in protocol header editing and is highly recommended.

### To save to a file

Select **File > Save As** and enter the name of the file.

The last saved configuration becomes the default configuration for any future tests.

### To load the configuration file at a later time

Select **File > Open** and select the file.

## Selecting Test Ports

You must select at least two ports: one to send (Source) and one to receive (Destination) the test traffic generated when you run a test. Source ports generate traffic to the device under test (DUT). Destination ports receive and check the data received from the DUT. If you have four SmartBits chassis each filled with 20 SmartCards on an SMB-2000, for example, you can have up to 80 ports.

The category of test determines what configuration you use the for a test:

- 1 to 1 Tests use one or more ports *pairs* only.
- 1 to Many/Many to 1 Tests use more than two ports for destination or source, respectively.

For either category, use the > button to add a port(s) to a field. Use the < button to remove a port(s) from a field. Use the >> or << button to add or remove all ports from a list.

## Identifying Hubs, Slots, and Ports

To identify a port in a SmartBits chassis, you specify three values:

**Hub #** The SmartBits chassis that contains the SmartCard or module

**Slot #** The slot where the card or module is inserted

**Port #** The port on the card or module

These are referred to collectively as the Hub/Slot/Port triple. For all three values, numbering starts at 1.



**Note:** Slot numbers increment sequentially whether ports are physically installed or not.

## Port Numbering

### SMB-2000/200

The SmartBits 200 (SMB-200) is a four-port chassis with four vertical SmartCard slots. The SmartBits 2000 (SMB-2000) is a 20-port chassis with 20 vertical SmartCard slots.

Refer to “[Linking Multiple SmartBits Chassis](#)” on page 40 for additional information.

### SMB-6000/600

The SmartBits 600 (SMB-600) is a 2- to 16-port chassis with two MiniModule slots. The SmartBits 6000 (SMB-6000) is a 12- to 96-port chassis with six multi-port SmartModule slots arranged horizontally in trays.

On the SMB-600/6000, SmartModules are numbered one through six from top to bottom. See the numbers located on both sides of the interface. Each SmartModule is made up of

two cards designated A and B. The A card is located in the left side of the chassis and the B card is on the right. Each port is numbered from left to right.

Refer to [“Linking Multiple SmartBits Chassis” on page 40](#) for additional information.

For example, in the designation “LAN 6100A SMB-6000 2A2”, LAN 6100A is the SmartModule type, SMB-6000 is the SmartBits type, 2 is the SmartModule number or slot within the chassis, B is the card within the SmartModule, and 2 is the port number on the SmartModule.

## **Allowable Port Pair Combinations**

SmartApplications allows you to test various mixed or same topologies. Select a type of test for which you want to see allowable SmartCard port pair combinations:

## One to One Test Port Pair Combinations Allowed

SmartApplications supports all models of SmartCards currently available. All 4 tests are supported with exceptions listed below.

*Table 5-4 Allowable One to One port pair combinations*

	TO:	Ethernet	Token Ring	ATM	Frame Relay
FROM:					
Ethernet		Y	Y*	Y†	Y‡
Token Ring		Y**	Y	N	Y
ATM		Y††	N	Y‡‡	Y***
Frame Relay		Y†††	Y	Y‡‡‡	Y****

- \* Router testing only.
- † Supports LANE 1.0 SVCs and Classical IP PVCs only.
- ‡ Frame Relay cards only support one DLCI. Only one connection between topologies is supported.
- \*\* Router testing only.
- †† ATM to Ethernet supports Packet Loss tests using LANE SVCs and Classical IP PVCs only.
- ‡‡ ATM to ATM supports Throughput and Packet Loss tests for PVC Classical IP only. Router or ATM switch testing.
- \*\*\* Router testing only. ATM to Frame Relay supports Throughput and Packet Loss for PVC Classical IP only.
- ††† Frame Relay cards only support one DLCI. Only one connection between topologies is supported.
- ‡‡‡ Router testing only. Frame Relay to ATM supports all tests for PVC Classical IP only. Frame Relay supports only one DLCI.
- \*\*\*\* Frame Relay cards only support one DLCI. Only one connection between topologies is supported.

## 1 to Many/Many to 1 Test Allowable Port Combinations

SmartApplications supports all models of SmartCards currently available. Only Packet Loss and Back-to-back tests are supported.

For configurations between ATM and Ethernet or ATM and Frame Relay: if the DUT bundles multiple streams into one virtual circuit, SmartApplications counters reflect the number of packets received on a per virtual circuit basis (not per stream).

Exceptions are listed in this table:

Table 5-5 Allowable 1 to Many and Many to 1 port combinations

	TO:	Ethernet	Token Ring	ATM	Frame Relay
FROM:					
Ethernet		Y	Y*	Y†	Y‡
Token Ring		Y**	Y	N	Y
ATM		Y††	N	Y‡‡	Y***
Frame Relay		N†††	N‡‡‡	N****	N††††

\* Router testing only.

† Ethernet to ATM supports LANE 1.0 SVCs and Classical IP PVCs only.

‡ Frame Relay only supports one DLCI. Only one connection between topologies is supported.

\*\* Router testing only.

†† ATM to Ethernet only supports Packet Loss and Throughput tests.

‡‡ ATM to ATM only supports Packet Loss test for PVC CLIP.

\*\*\*Router testing only. ATM to FR via PVC CLIP only.

†††Requires FR card to support multiple DLCIs. Currently, only one DLCI is supported.

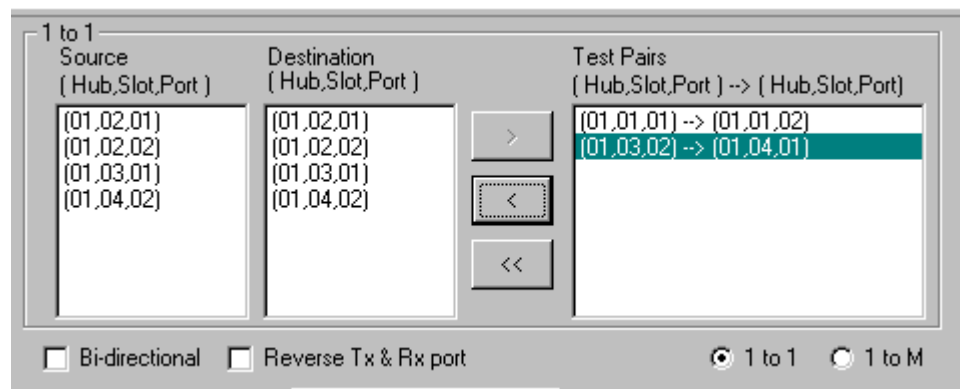
‡‡‡Requires FR card to support multiple DLCIs. Currently, only one DLCI is supported.

\*\*\*\*Requires FR card to support multiple DLCIs. Currently, only one DLCI is supported.

††††Requires FR card to support multiple DLCIs. Currently, only one DLCI is supported.

## Running 1 to 1 Tests

This category sends traffic from one port to another port. The **Source** and **Destination** fields display ports for each of the cards in your SmartBits chassis. Checking the **Bi-directional** box causes the selected port pairs to transmit simultaneously in both directions as in full duplex operation.



- 1 Click the **1 to 1** radio button.
- 2 Select a port number from the *Source* list box and from the **Destination** list box. With both ports highlighted, click the > button to add the pair to the **Test Pairs** list box.
- 3 Check the **Bi-directional** box if you want both cards to transmit.



**Note:** When you run bi-directional Latency tests, SmartApplications determines results for only one direction. For example, if you select source Port 1 and destination Port 3, the results would reflect the Port 1 to Port 3 direction only.

## Bi-directional Traffic

Checking the **Bi-directional** box causes the selected port pairs to transmit simultaneously in both directions for full duplex implementations. This option is only available for 1 to 1 Tests.

Netcom Systems does not recommend using bi-directional testing when the link speeds and/or topology of the transmitting and receiving SmartCards differ. For example, if you test a router with an Ethernet and ATM port pair, the bi-directional results would not be meaningful, because the percentage of traffic offered on each side would not be equal.



### Note:

- 1) Performing bi-directional throughput tests in half-duplex mode at high rates will result in line collisions. Excessive collisions will effectively increase the total transmission time which may render the test results invalid. When this occurs, throughput is calculated based on the intended load as opposed to the actual offered load.
- 2) When you run bi-directional Latency tests, SmartApplications determines results for only one direction. For example, if you select source Port 1 and destination Port 3, the results would reflect the Port 1 to Port 3 direction only.

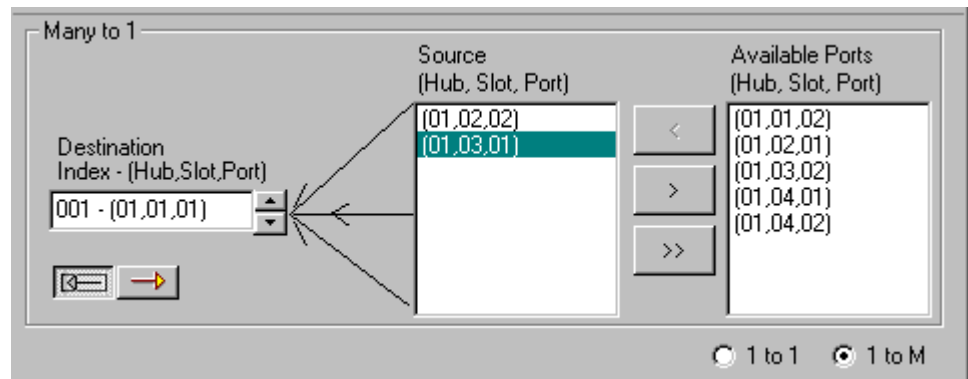


## Running 1 to Many/Many to 1 Tests

This category sends traffic from one port to many ports or from many ports to one port.



**Note:** In the 1 to Many mode only Packet Loss and Back-to-back tests are available.



### To run a 1 to Many or Many to 1 test

- 1 Click the **1 to M** radio button.
- 2 Click the direction button to specify the test should run from 1 port to many ports or many ports to one. You can do this step at any time.
- 3 Select a port(s) from the **Available Ports** list box, and click the < button. The port(s) appear in the Source or Destination box, depending on the direction you select. The Destination box is shown in the graphic above.

On startup, SmartApplications queries SmartBits to see how many SmartCards exist in the connected chassis and displays them in the **Available Ports** box by default.



**Note:**

- 1) If you change the direction, the Destination MAC and SmartCard MAC addresses on the card attributes tab remain unchanged. Ensure that you enter the correct destination MAC address for the DUT.
- 2) For configurations between ATM and Ethernet or ATM and Frame Relay: if the DUT bundles multiple streams into one virtual circuit, SmartApplications counters reflect the number of packets received on a per virtual circuit basis (not per stream).



## Configuring Test Ports

Once you define the communications port between your PC and the SmartBits chassis, you can configure the SmartBits ports you want to use in the tests.

Index - (Hub,Slot,Port)	Card Model	Speed	Duplex	Auto Negotiate	Flow Control	Protocol	Destination MAC	SmartCard's MAC	SmartCard's IP/PX	Router'
001 - (01,01,01)	ST-6405	10M	Half			All 0s	00 00 00 00 00 02	00 00 00 00 00 01	000.000.000.000	000.000
002 - (01,02,01)	ST-6410	10M	Half			All 0s	00 00 00 00 00 01	00 00 00 00 00 02	000.000.000.000	000.000
003 - (01,03,01)	SX-7410	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 03	00 00 00 00 00 03	000.000.000.000	000.000
004 - (01,04,01)	WN-3415					All 0s	00 00 00 00 00 04	00 00 00 00 00 04	000.000.000.000	000.000
005 - (01,05,01)	SX-7210	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 05	00 00 00 00 00 05	000.000.000.000	000.000
006 - (01,06,01)	SX-7205	10M	Half	Disable		All 0s	00 00 00 00 00 07	00 00 00 00 00 06	000.000.000.000	000.000
007 - (01,07,01)	ML-7710	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 06	00 00 00 00 00 07	000.000.000.000	000.000
008 - (01,08,01)	ML-7710	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 08	00 00 00 00 00 08	000.000.000.000	000.000
009 - (01,09,01)	AT-9025					All 0s	00 00 00 00 00 09	00 00 00 00 00 09		
010 - (01,11,01)	WN-3405					All 0s	00 00 00 00 00 0A	00 00 00 00 00 0A	000.000.000.000	000.000
011 - (01,12,01)	ML-7710	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 0B	00 00 00 00 00 0B	000.000.000.000	000.000
012 - (01,13,01)	ML-7710	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 0C	00 00 00 00 00 0C	000.000.000.000	000.000
013 - (01,14,01)	L3-6710	10M	Half			All 0s	00 00 00 00 00 0D	00 00 00 00 00 0D	000.000.000.000	000.000
014 - (01,15,01)	AT-9155C	155M	Full			All 0s	00 00 00 00 00 0E	00 00 00 00 00 0E		
015 - (01,17,01)	AT-9155C	155M	Full			All 0s	00 00 00 00 00 0F	00 00 00 00 00 0F		
016 - (01,19,01)	ML-7710	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 10	00 00 00 00 00 10	000.000.000.000	000.000
017 - (01,20,01)	ML-7710	10M	Half	Disable	Disable	All 0s	00 00 00 00 00 11	00 00 00 00 00 11	000.000.000.000	000.000

You can set up test ports in either of these ways:

- All or multiple ports at once from one window (Setup All SmartCards). This is a convenient and faster method if you have many ports because it allows global attribute changes.
- A pair of ports at a time using individual card attribute tab pairs at the main window.

SmartApplications stores the last four setup configuration (.sig) files that were used in a SMARTAPP.INI file in your Windows directory. Every time you open SmartApplications, the last configuration file is recalled.

## Configuring All or Multiple Ports at Once

You can configure the attributes for all or multiple ports from a single window called the Setup All SmartCards window instead of setting each port's attributes individually. To access this window, select **Setup > All SmartCards** from the SmartApplications main window:

Index - (Hub,Slot,Port)	Card Model	Speed	Duplex	Auto Negotiate	Flow Control	Protocol	Destination MAC	SmartCard's MAC	SmartCard's IP/PPX	Router
001 - (01,01,01)	ST-6405	10M	Half			All Os	00 00 00 00 00 02	00 00 00 00 00 01	000.000.000.000	000.000
002 - (01,02,01)	ST-6410	10M	Half			All Os	00 00 00 00 00 01	00 00 00 00 00 02	000.000.000.000	000.000
003 - (01,03,01)	SX-7410	10M	Half	Disable	Disable	All Os	00 00 00 00 00 03	00 00 00 00 00 03	000.000.000.000	000.000
004 - (01,04,01)	WN-3415					All Os	00 00 00 00 00 04	00 00 00 00 00 04	000.000.000.000	000.000
005 - (01,05,01)	SX-7210	10M	Half	Disable	Disable	All Os	00 00 00 00 00 05	00 00 00 00 00 05	000.000.000.000	000.000
006 - (01,06,01)	SX-7205	10M	Half	Disable		All Os	00 00 00 00 00 07	00 00 00 00 00 06	000.000.000.000	000.000
007 - (01,07,01)	ML-7710	10M	Half	Disable	Disable	All Os	00 00 00 00 00 06	00 00 00 00 00 07	000.000.000.000	000.000
008 - (01,08,01)	ML-7710	10M	Half	Disable	Disable	All Os	00 00 00 00 00 08	00 00 00 00 00 08	000.000.000.000	000.000
009 - (01,09,01)	AT-9025		Full			All Os	00 00 00 00 00 09	00 00 00 00 00 09		
010 - (01,11,01)	WN-3405					All Os	00 00 00 00 00 0A	00 00 00 00 00 0A	000.000.000.000	000.000
011 - (01,12,01)	ML-7710	10M	Half	Disable	Disable	All Os	00 00 00 00 00 0B	00 00 00 00 00 0B	000.000.000.000	000.000
012 - (01,13,01)	ML-7710	10M	Half	Disable	Disable	All Os	00 00 00 00 00 0C	00 00 00 00 00 0C	000.000.000.000	000.000
013 - (01,14,01)	L3-6710	10M	Half			All Os	00 00 00 00 00 0D	00 00 00 00 00 0D	000.000.000.000	000.000
014 - (01,15,01)	AT-9155C	155M	Full			All Os	00 00 00 00 00 0E	00 00 00 00 00 0E		
015 - (01,17,01)	AT-9155C	155M	Full			All Os	00 00 00 00 00 0F	00 00 00 00 00 0F		
016 - (01,19,01)	ML-7710	10M	Half	Disable	Disable	All Os	00 00 00 00 00 10	00 00 00 00 00 10	000.000.000.000	000.000
017 - (01,20,01)	ML-7710	10M	Half	Disable	Disable	All Os	00 00 00 00 00 11	00 00 00 00 00 11	000.000.000.000	000.000



**Note:** Highlighted fields are not modifiable.

## Changing Individual Cell Values in the Setup All SmartCards Window

The way to modify a cell on the Setup All SmartCards window depends on the attribute (field).

### To Modify Speed, Duplex, and Protocol Fields

- 1 Click on a cell to highlight it.
- 2 Right click on the cell to display the popup menu and select a value.

**Example:** You right click on an SX-7410 card's **Speed** field currently set to 100M. Since this card is capable of two speeds (10 or 100 Mbps), the popup menu displays two options: **Low** and **High**. If you select **High**, the value stays the same. If you select **Low**, the value changes to 10M. SmartApplications automatically enters the correct specific values for the SmartCard.

### To Modify Destination MAC and IP/IPX fields

To Modify Destination MAC, SmartCard's MAC, and SmartCard's IP/IPX, Router's IP/IPX Fields, click on a cell and enter the new value.

### For \*Net IPs/+Ring Field

- 1 Click on a cell to highlight it.
- 2 Right click on the cell to display the popup menu. If Network IPs or Token Ring does not apply to the port, the option is greyed out on the popup menu. Select a value.
  - If \* appears in the field, you can access the Network IPs window from the popup menu to modify the Network IPs for Next Hop tests.
  - If + appears in the field, you can access the Token Ring Properties window for Token Ring networks. If \*/+ appears, you can access either window.

### Changing Values by Column in the Setup All SmartCards Window

You can change a field for all ports at once by changing the appropriate column. For example, you can change the Protocol column for all cards.



**Note:** You must specify MAC and IP fields individually by port.

### To change all the fields in a column

- 1 Click the column header to highlight the entire column.
- 2 Right-click the header. A popup appears with the options available for that column.
- 3 Select an option from the popup. All modifiable cells will be changed to the option you selected.

## **Configuring a Pair of Ports at a Time**

- 1** Select the ports for the test from the SmartApplications main window, if not yet done.
- 2** Expand the SmartApplications main window to view the card attribute tabs. Two tabs display for the source and destination ports that you last selected. Ensure that these are the ports with which you want to run tests.
- 3** Define the MAC addresses for source and destination ports. For routers this is the MAC address of the local router port. If you are doing 1 to Many/Many to 1 tests, then you must define addresses for each card included in the test.
- 4** Define any other information relevant to the selected port type, such as
  - Next hop network IPs for Next Hop tests
  - Token Ring properties for Token Ring cards
  - Line and ELAN parameters for ATM cards
  - Line or LMP or Address information for WAN cards

Each card attribute tab displays different fields, depending on the type of port (Ethernet, Token Ring, ATM or Frame Relay/WAN) you selected.

## Configuring Ethernet Ports

When you select an Ethernet port, the appropriate Ethernet card attribute tab is displayed. Some of the fields are specific to Ethernet.



**Note:** For Ethernet cards, SmartApplications sends out Ethernet 802.3 test frames.

### Ethernet Card Attribute Tab

This table lists and describes the **Ethernet** card attribute tab fields:

Table 5-6 Ethernet card attributes fields.

Field	Description
<b>Card Type</b>	Displays the type of Ethernet SmartCard for that port, such as Fast Card for 100 Mbps.
<b>Card Model</b>	Displays the model number of the card, such as SX-7410.
<b>Signal Rate</b>	The transmission rate in megabits per second of the SmartCard. You set the rate for each card in a pair separately. For Ethernet cards, possible values are: 10, 100. For Token Ring cards the value is 16.
<b>Duplex</b>	Select the Duplex Mode for the test card. The test card will be configured to run in a Full or Half Duplex mode (for Token Ring, both TXI or TKP are allowed). The default is <i>Half</i> .

Table 5-6 Ethernet card attributes fields.

Field	Description
<b>Protocol</b>	<p>Select the protocol to use for the port. The protocol you select affects other fields displayed on the tab. For example, if you select <b>IP</b> or <b>UDP</b>, the <b>SmartCard's IP</b> and <b>Router's IP</b> fields are displayed, and if you selected <b>IPX</b>, the <b>Source Net</b> and <b>Destination Net</b> fields are displayed. If you are testing a router you must use either <b>IP</b>, <b>UDP</b>, or <b>IPX</b>. Options such as the <b>All 0s</b> option refer to the packet contents (excluding MAC addresses).</p> <p><b>Note:</b> You must use the same type of protocol within a port pair. For example, you cannot configure the transmitting card with IP and the receiving card with UDP.</p>
<b>SmartCard's IP</b>	<p>Enter the IP address of the SmartCard displayed on this tab. The SmartCard IP address should have the same network address as the router port to which the SmartCard is connected, but with a different host address.</p>
<b>Router's IP</b>	<p>Enter the IP address of the router's port to which the SmartCard is connected. If you are testing a switch, you can use the default value.</p> <p><b>Note:</b> If you change direction in the port selection area of the main window, the Destination MAC and SmartCard MAC and SmartCard's IP addresses on the card attributes tab for each port remain unchanged. Verify that these fields reflect the correct addresses.</p>
<b>Source Net</b>	<p>The 4-byte network address of the transmitting card.</p>
<b>Destination Net</b>	<p>The 4-byte network address of the router port (for router testing) or receiving card.</p>
<b>Destination MAC</b>	<p>Once you define the test pair, you can specify the MAC addresses used. Default addresses correspond to the port numbers. For example, for Ports 1 and 2 the Destination MAC are 000000000001 and 000000000002 respectively. To specify a different address, enter a different value in the field. Repeat this process until all the addresses are specified correctly for your test pairs.</p> <ul style="list-style-type: none"> <li>• <b>Special conditions:</b>            If you are testing a router, this is the MAC address of the local router port.</li> <li>• If you are testing a switch, this is the MAC address of the destination SmartCard.</li> </ul>
<b>SmartCard MAC</b>	<p>The MAC address of the sending SmartCard.</p>

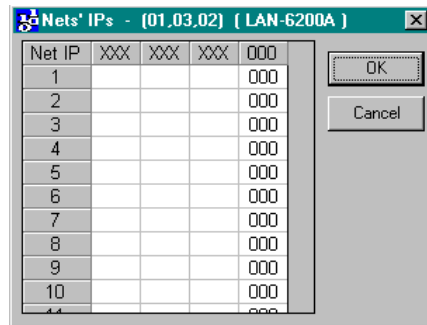
Table 5-6 Ethernet card attributes fields.

Field	Description
<p><b>Flow Control</b></p>	<p>Enables traffic flow control.</p> <p><b>Note:</b> This field only appears for 7x10 and GX-1405 SmartCards. When this box is checked and the SmartCard receives a pause frame, the card will stop transmitting for the number of slot times specified in the pause frame. Default: OFF.</p>
<p><b>Auto Negotiation</b></p>	<p>Auto-negotiation enables SmartApplications to achieve the best possible mode of operation over a link segment by providing a means for them to exchange information about their speed and duplex capabilities over the link. There are four options available:</p> <ul style="list-style-type: none"> <li>• <b>None:</b> No values are written for speed and duplex settings.</li> <li>• <b>Enable:</b> Sets register 0 (zero) and register 4 to the user-selected flow control, speed, and duplex (if applicable) settings. It sets register 0 to Enable AN on this port.</li> <li>• <b>Disable:</b> Sets register 0 and register 4 to the user-selected flow control, speed, and duplex (if applicable) settings. It sets register 0 to Disable AN on this port. With this option, the port <i>does not</i> participate in the AN protocol.</li> <li>• <b>Force:</b> Sets register 0 and register 4 to the user-selected flow control, speed, and duplex (if applicable) settings. It sets register 0 to Enable AN on this port and sets the appropriate bit to signal a restart of the AN process.</li> </ul>

### Button

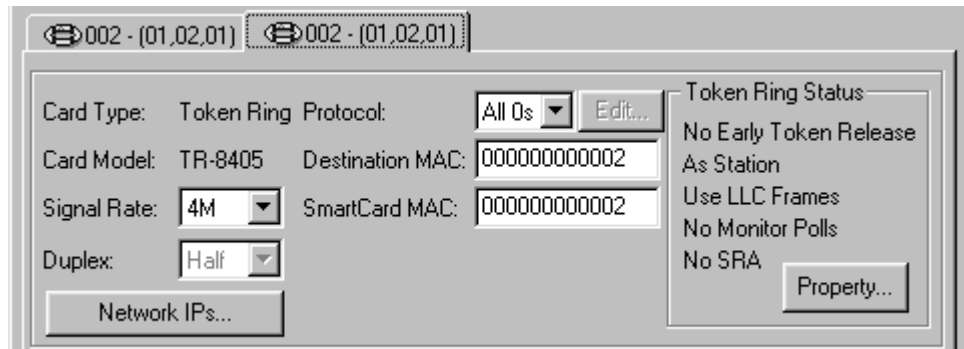
- **Network IPs**

Click this button to access the Network IPs window to define the contents of the RIP (routing information protocol) packet. The RIP packet, sent out when testing over multiple hops, updates the routing table.



## Configuring Token Ring Ports

When you select a Token Ring port and the **Show Card Attribute** box is checked, the appropriate **Token Ring** card attribute tab is displayed. Some of the fields are specific to Token Ring





## Token Ring Card Attribute Tab

This table lists and describes the **Token Ring** card attribute tab fields:

Table 5-7 Token Ring card attribute tab fields.

Field	Description
<b>Card Type</b>	Displays the type of SmartCard for that port, which in this case is Token Ring.
<b>Card Model</b>	Displays the model number of the card, such as TR-8405.
<b>Signal Rate</b>	The transmission rate in megabits per second of the card. You set the rate for each card in a pair separately. For Token Ring cards, possible values are: 4, 16. This sets the rate for each cards in 1 to 1 tests.
<b>Duplex</b>	Select the Duplex Mode. The test card will be configured to run in a Full or Half Duplex mode (for Token Ring both TXI or TKP are allowed). The default is <b>Half</b> .
<b>Protocol</b>	Select the protocol to use for the port. The protocol you select affects other fields displayed on the tab. For example, if you select <b>IP</b> or <b>UDP</b> , the <b>SmartCard's IP</b> and <b>Router's IP</b> fields are displayed, and if you selected <b>IPX</b> , the <b>Source Net</b> and <b>Destination Net</b> fields are displayed. If you are testing a router you must use either <b>IP</b> , <b>UDP</b> , or <b>IPX</b> . Options such as the <b>All 0s</b> option refer to the packet contents (excluding MAC addresses).  <b>Note:</b> You must use the same type of protocol within a port pair. For example, you cannot configure the transmitting card with IP and the receiving card with UDP.
<b>SmartCard's IP</b>	Enter the IP address of the SmartCard displayed on this tab. The SmartCard IP address should have the same network address as the router port to which the SmartCard is connected, but with a different host address.
<b>Router's IP</b>	Enter the IP address of the router's port to which the SmartCard is connected. If you are testing a switch, this field can be the packet contents.
<b>Source Net</b>	The 4-byte network address of the transmitting card.
<b>Destination Net</b>	The 4-byte network address of the router port (for router testing) or receiving card.

Table 5-7 Token Ring card attribute tab fields.

Field	Description
<b>Destination MAC</b>	<p>For router testing, this is the MAC address of the local router port. The SmartCard's MAC destination address must be set to be the MAC address of the router port to which the card is connected.</p> <p>For switch testing using 1 to Many or Many to 1 tests, this is the MAC address of the destination SmartCard.</p>
<b>SmartCard MAC</b>	<p>The MAC address of the SmartCard. MAC addresses are 48 bits long, usually written as 6 bytes in hexadecimal. For the sake of simplicity, set this to match the port number in the SmartBits system. For example, port 1 would be 00 00 00 00 00 01 for the transmitter and port 2 would be 00 00 00 00 00 02 for the receiver.</p> <p><b>Note:</b> If you selected <b>IP</b> or <b>UDP</b> for the <b>Protocol</b> field, the following two fields (<b>Smart Card's IP</b> and <b>Router's IP</b>) also appear on the tab.</p>

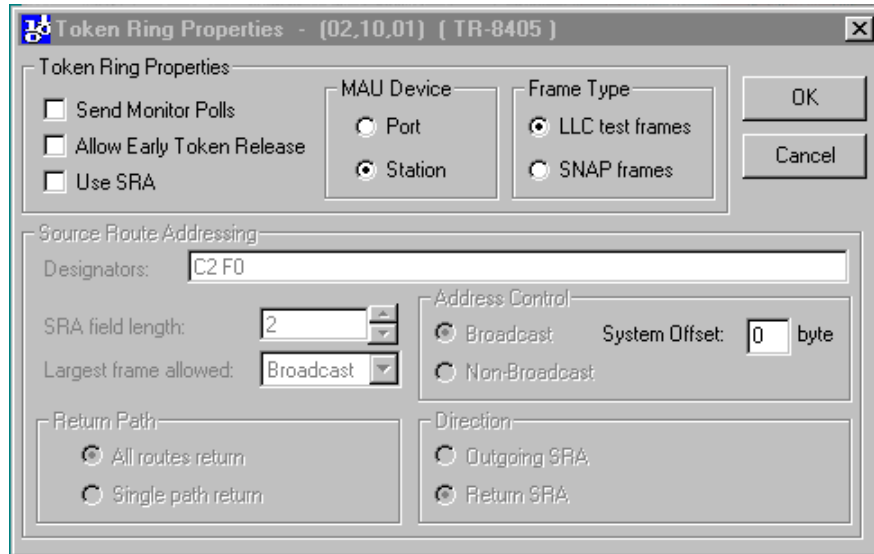
### **Token Ring Card Attribute Tab Status Buttons**

This area of the **Token Ring** card attributes tab displays the current status of the Token Ring port, such as if Early Token Release is enabled. It reflects the settings from the Token Ring Properties window.

- **Network IPs**  
Click this button to access the Network IPs window to define the contents of the RIP (routing information protocol) packet. The RIP packet, sent out when testing over multiple hops, updates the routing table.
- **Property**  
Click this button to access the Token Ring Properties window to define the properties of the Token Ring SmartCard.

## Defining Token Ring Properties

To specify properties for the Token Ring port, click the **Property** button on a **Token Ring** card attribute tab at the main window to access the Token Ring Properties window.



## Token Ring Properties

This table lists and describes the Token Ring Properties area fields:

Table 5-8 Token Ring Properties area fields.

Field	Description
<b>Send Monitor Polls</b>	This checkbox enables the card to send out standby monitor polls in response to active monitor polls.
<b>Allow Early Token Release</b>	For 16MHz operation only, this selection allows the SmartCard to release a token prior to receiving its own transmitted frame back. This can improve throughput, especially for small frames.
<b>Use SRA</b>	The source routing field for a Token Ring frame is created by selecting this checkbox. When selected, the fields for entering source routing information become active.  If this option is selected, then the source address for the frame is automatically modified before transmit to have its uppermost bit set to indicate to the network that the frame contains source routing information. You must ensure that the field contents are correct, i.e. the length specification etc. must be valid in order to be interpreted correctly by the network devices.

*Table 5-8 Token Ring Properties area fields.*

Field	Description
<b>Port</b>	Select this radio button to configure the SmartCard port as a Media Adapter Unit (MAU) port.
<b>Station</b>	Select this radio button to configure the SmartCard port as a station.
<b>LLC test frames</b>	Select this radio button to use LLC test frames in the test.
<b>SNAP frames</b>	Select this radio button to use SNAP frames in the test.

### Source Route Addressing Area

The control bytes (first two bytes) in the **Designators** field is automatically updated when you select any combination of options in this area of the window.

This table lists and describes the Source Route Addressing area fields:

*Table 5-9 Source Route Addressing area fields.*

Field	Description
<b>Designators</b>	<p>Defines how you want to route source packets. Enter hexadecimal values directly into this field or make selections from the other fields in the Source Route Addressing area. As you select other fields the Designators field reflects the changes in hexadecimal code for:</p> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin: 10px 0;"> <p>SRA Length  Largest frame allowed  Address Control  Return Path  Direction</p> </div> <p>=&gt; 2-byte control field</p>
<b>SRA field length</b>	Enter or select the length of the routing information field in bytes, including the control field. Range: 2 to 30 bytes.
<b>Largest frame allowed</b>	Enter or select the largest frame size that can be transmitted between two communicating stations on a specific route. Available values are: 516, 1470, 2052, 4472, 8144, 11407, 17800, and Broadcast. The Broadcast setting is normally used in explorer frames.



Table 5-9 Source Route Addressing area fields.

Field	Description
<b>Access Control</b>	<p>This bit specifies the route through the network that the frame should travel. The two options are:</p> <ul style="list-style-type: none"> <li>• <b>Broadcast</b> Select this radio button if you want the frame transmitted along every route in the network to the destination station, often resulting in many copies of the frame. When you select <b>Broadcast</b>, the <b>Number of Hops</b> field displays. Select this option to test the Token Ring source routing number of bytes that will be in the system offset.</li> <li>• <b>Non-Broadcast</b> Select this radio button if you want the segment number fields to contain the specified route through the network that the frame is to travel.</li> <li>• <b>System Offset</b> Enter the number of bytes offset by the source routing information inserted by the DUT into each frame.</li> </ul>
<b>Return Path</b>	<p>This bit defines a single path return or return through all available paths. The two options are:</p> <ul style="list-style-type: none"> <li>• <b>All routes return</b> Select this radio button for a single path return.</li> <li>• <b>Single path return</b> Select this radio button for return through all available paths.</li> </ul>
<b>Direction</b>	<p>This bit determines whether the of ring numbers and bridge numbers in the routing information field are read from left to right or right to left by the network devices.</p> <ul style="list-style-type: none"> <li>• <b>Outgoing SRA</b> Select this radio button for the bridge to interpret the routing information field from left to right</li> <li>• <b>Return SRA</b> Select this radio button for the bridge to interpret the routing information field from right to left.</li> </ul>

## Configuring ATM Ports

When you select an ATM port, the appropriate ATM card attribute tab is displayed. Some of the fields are specific to ATM.

### Summary of Steps to Configure an ATM Port

To configure an ATM port, from the ATM card attributes tab follow these steps:

- 1 Set up the line parameters. Click the **Line Param** button to access the Port Configuration window.
- 2 Set up the protocol. Click the **ELAN Param** button to access the ELAN registration window.
- 3 Add and configure at least one ELAN from the ELAN Registration window.
- 4 Specify the MAC addresses for the local router port and the SmartCard and the remainder of the other options on the ATM card attributes tab.

The following is an example of the card attributes tab for an ATM SmartCard.

The screenshot shows a configuration window for an ATM card. At the top, there are two tabs: "ATM 014 - (01,15,01)" and "ATM 013 - (01,13,01)". The main area contains the following fields and buttons:

Card Model:	AT-9155C	Fill Pattern:	IP
ELAN Name:	ELAN 1	Destination MAC:	000000010D01
Connection Type:	SVC	SmartCard MAC:	000000010F01
Encapsulation:	802.3	SmartCard's IP:	000.000.000.000
Line Param...	ELAN Param...	Destination IP:	000.000.000.000

## ATM Card Attribute Tab

This table lists and describes the **ATM** card attribute tab fields:

Table 5-10 ATM Card Attribute tab fields.

Field	Description
<b>Card Model</b>	Displays the model number of the card, such as AT-9025.
<b>ELAN Name</b>	This field is displayed if you select <b>SVC</b> for the Connection Type field. Select the name of the ELAN you want to use for the test. This field is blank if you have not yet set up any ELANs. Click the <b>ELAN Param</b> button to access the ELAN Registration window to set up ELANs.
<b>VPI-VCI</b>	This field is displayed if you select <b>PVC</b> for the Connection Type field. Enter the contents in decimal or hexadecimal of the header portion of the cell.
<b>Connection Type</b>	<p>The type of virtual circuit for the connection between the SmartBits chassis and the device under test. This field controls the option in the Encapsulation field. The two options are:</p> <ul style="list-style-type: none"> <li>• <b>SVC</b> Switched Virtual Circuit. The connection is established only when needed.</li> <li>• <b>PVC</b> Permanent Virtual Circuit. The connection is permanently established.</li> </ul> <p>If you selected <b>PVC</b> for the <b>Connection Type</b> field, the <b>Smart Card's IP</b> and two fields also appear on the tab.</p>
<b>SmartCard's IP</b>	Enter the IP address of the SmartCard displayed on this tab. The SmartCard IP address must have the same network number and subnet address as the router port to which the SmartCard is connected. Use the IP address of the outer port with its last digit modified as the IP source address of the port.
<b>Destination IP</b>	Enter the IP address of the receiving SmartCards.

Table 5-10 ATM Card Attribute tab fields.

Field	Description
<b>Encapsulation</b>	<p>This field is controlled by the Connection Type selection. If the connection type is SVC, the encapsulation type is LANE 802.3 (Ethernet). If the connection type is PVC, the encapsulation type is Classical IP.</p> <p>If the Connection Type is PVC SNAP, the encapsulation type can be either LANE 802.3 or Classical IP. SNAP (Subnetwork Access Protocol) uses the subnetwork and performs data transfer, connection management, and QoS selection.</p>
<b>Fill Pattern</b>	<p>The protocol to use for the payload. If you selected PVC for the Connection Type, the fill pattern is IP or UDP.</p>
<b>Destination MAC</b>	<p>For switch testing using 1 to Many or Many to 1 tests, this is the MAC address of the destination port.</p> <p>For router testing, this is the MAC address of the local router port. If you do not specify an address, you will get zero throughput. The SmartCard's MAC destination address must be set to be the MAC address of the router port to which the card is connected. For example, a MAC destination is 08 00 02 06 89 22 for the transmitter and 08 00 02 12 27 22 for the receiver.</p>
<b>SmartCard MAC</b>	<p>The MAC address of the SmartCard. MAC addresses are 48 bits long, usually written as 6 bytes in hexadecimal. For the sake of simplicity, set this to match the port number in the SmartBits system. For example, port 1 would be 00 00 00 00 00 01 for the transmitter and port 2 would be 00 00 00 00 00 02 for the receiver.</p>

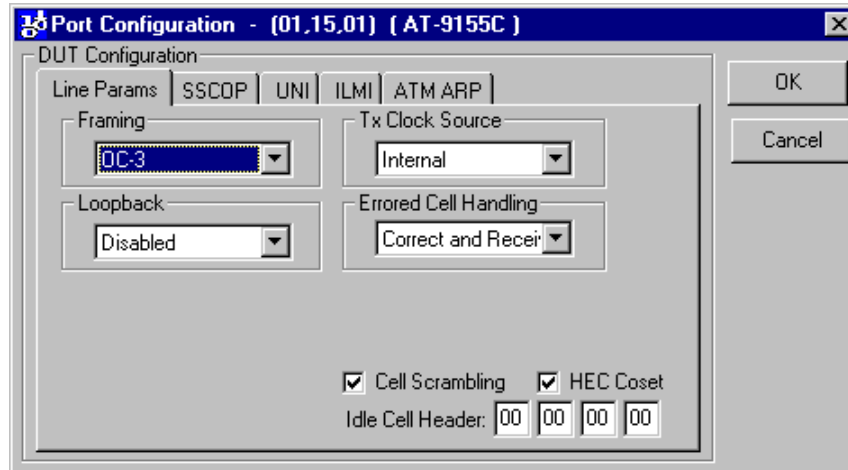
### ATM Card Attribute Tab Buttons

- **Line Param**  
Click this button to access the Port Configuration window in order to specify physical interface parameters such as framing and loopback, and to specify other ATM protocol information.
- **ELAN Param**  
Click this button to access the ELAN registration window in order to specify LAN emulation client information and to register ELANs.



## Defining ATM Line Parameters

In order to configure the ATM port, you must define the physical interface for the ATM card at the Port Configuration window.



The Port Configuration window contains the following tabs:

- **Line Params**  
Use this tab to specify physical interface parameters such as framing and loopback.
- **SSCOP**  
This tab allows you to specify the UNI version and various timer values for SSCOP.
- **UNI**  
This tab allows you to specify the UNI version and various timer values for UNI. Currently used for point-to-point only, the UNI configuration offers the standard user-side timers and a special testing teardown timer.
- **ILMI**  
Use this tab to define the method used by an ATM card to acquire its 20-byte ATM address from the network device to which it is connected.

### Line Params Tab

This table lists and describes the ATM Port Configuration **Line Params** tab fields:

Table 5-11 ATM Port Configuration Line Params tab fields.

Field	Description
<b>Framing Mode</b>	<p>Select to define the physical layer of the frame. The possible values for this field are:</p> <ul style="list-style-type: none"> <li>• <b>AT-9025 25 Mbps SmartCard</b> ATM 25 Indicates direct cell mapping at 25.6 Mbps.</li> <li>• <b>AT-9015 DS1 SmartCard</b> <ul style="list-style-type: none"> <li>• DS1 Cell - Maps the ATM cells directly into the DS1 frame with no intermediate mapping.</li> <li>• DS1 PLCP - Maps the ATM cells into PLCP frames and maps the PLCP frames into the DS1 frame.</li> </ul> </li> <li>• <b>AT-9020 E1 SmartCard</b> <ul style="list-style-type: none"> <li>• E1 Cell - Maps the ATM cells directly into the E1 frame with no intermediate mapping.</li> <li>• E1 PLCP - Maps the ATM cells into PLCP frames and maps the PLCP frames into the E1 frame.</li> </ul> </li> <li>• <b>AT-9034 E3 SmartCard</b> <ul style="list-style-type: none"> <li>• E3 Cell - Maps the ATM cells directly into an E3 G.832 frame with no intermediate mapping.</li> <li>• E3 PLCP - Maps the ATM cells into the PLCP frames and maps the PLCP frames into an E3 G.751 frame.</li> </ul> </li> <li>• <b>AT-9045 DS3 SmartCard</b> <ul style="list-style-type: none"> <li>• DS3 Cell - Maps the ATM cells directly into the DS3 frame with no intermediate mapping.</li> <li>• DS3 PLCP - Maps the ATM cells into PLCP frames and maps the PLCP frames into the DS3 frame.</li> </ul> </li> <li>• <b>AT-9155C ATM OC-3c 155 Mbps</b> <ul style="list-style-type: none"> <li>• OC3 - For SONET, OC-3c type of optical carrier line.</li> <li>• STM1 - Enables the European STM 1 framing method (equivalent to OC-3c)</li> </ul> </li> <li>• <b>AT-9622 ATM OC-12c 622 Mbps SmartCard</b> <ul style="list-style-type: none"> <li>• OC12 - For SONET, OC-12c type of optical carrier line. The SmartCard maps the ATM cells directly into a SONET OC-12c frame.</li> <li>• STM4 - Enables the European STM-4 framing method (equivalent to OC-12c). The SmartCard maps the ATM cells directly into an STM-4 frames.</li> </ul> </li> </ul>

Table 5-11 ATM Port Configuration Line Params tab fields.

Field	Description
<b>Tx Clock Source</b>	<p>This field does not apply to the AT-9025 SmartCard, which uses only an internal clock. Specifies the clock against which you want to run the tests. The possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Internal</b> Uses an internally generated clock as the transmit clock.</li> <li>• <b>Loopback</b> Uses the recovered (received) clock as the transmit clock.</li> </ul>
<b>Loopback</b>	<p>Specifies the type of loopback to be used. The possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Disabled</b> No loopback is used. This is the normal operating mode of the device.</li> <li>• <b>Local</b> Loops card output back to the card's input.</li> <li>• <b>Remote</b> Traffic returns to the remote machine.</li> </ul>
<b>Errored Cells Handling</b>	<p>Specifies the action to take for cells with errors. The possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Drop Errored Cells</b> Drops all cells that have a header error as determined by the HEC byte.</li> <li>• <b>Receive Errored Cells</b> Receives all cells even if they have errors.</li> <li>• <b>Receive and Correct Errored Cells</b> Receives and corrects all cells with single-bit header errors.</li> </ul>

Table 5-11 ATM Port Configuration Line Params tab fields.

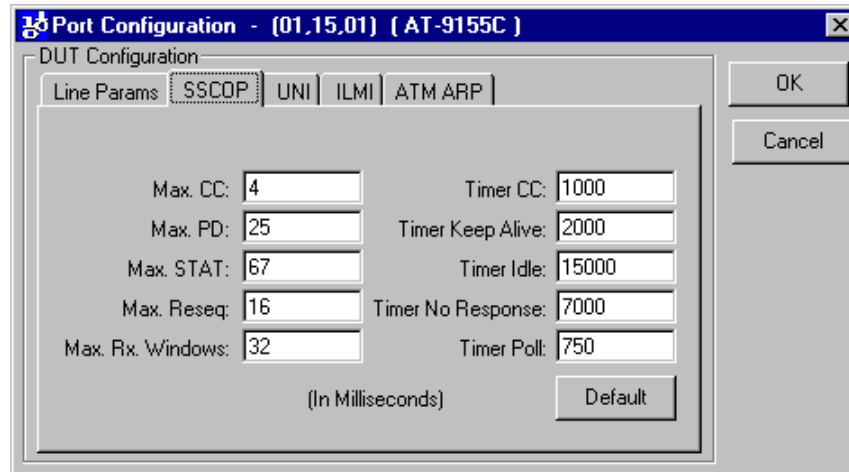
Field	Description
<b>Buildout</b>	<p>This field applies only to the AT-9015 DS1 and AT-9045 DS3 SmartCards. Select to change possible values for the electrical output of the SmartCard to either:</p> <ol style="list-style-type: none"> <li>1 Accommodate the length of the cable with which you are testing or,</li> <li>2 Specify the amount of attenuation to apply to the signal.</li> </ol> <div style="background-color: #f8d7da; padding: 5px; margin-top: 10px;"><b>AT-9015 DS1</b></div> <ul style="list-style-type: none"> <li>• <b>Cable Lengths</b> <ul style="list-style-type: none"> <li>• &lt;=133 Feet Pulse shaping for cable lengths up to 133 feet.</li> <li>• &gt;133, &lt;=266 Feet Pulse shaping for cable lengths more than 133 feet and up to 266 feet.</li> <li>• &gt;266, &lt;=399 Feet Pulse shaping for cable lengths more than 266 feet and up to 399 feet.</li> <li>• &gt;399, &lt;=533 Feet Pulse shaping for cable lengths more than 399 feet and up to 533 feet.</li> <li>• &gt;533, &lt;=655 Feet Pulse shaping for cable lengths more than 533 feet and up to 655 feet.</li> </ul> </li> <li>• <b>Buildout Attenuation Values</b> <ul style="list-style-type: none"> <li>• -7.5 dB Pulse shaping to generate -7.5 dB of attenuation.</li> <li>• -15.0 dB Pulse shaping to generate -15.0 dB of attenuation.</li> <li>• -22.5 dB Pulse shaping to generate -22.5 dB of attenuation.</li> </ul> </li> </ul> <div style="background-color: #f8d7da; padding: 5px; margin-top: 10px;"><b>AT-9045 DS3</b></div> <ul style="list-style-type: none"> <li>• <b>Cable Length</b> <ul style="list-style-type: none"> <li>• &lt;= 225 Feet Pulse shaping for cable lengths up to 225 feet.</li> <li>• &gt;225 Feet Pulse shaping for cable lengths more than 225 feet.</li> </ul> </li> </ul>



Table 5-11 ATM Port Configuration Line Params tab fields.

Field	Description
<b>Line Coding</b>	<p>This field applies only to AT-9015 DS1 and AT-9020 E1 SmartCards. Select the type of encoding to be used for the line. The possible values are:</p> <ul style="list-style-type: none"> <li>• <b>AMI</b> - Uses AMI line encoding.</li> <li>• <b>B8ZS</b> - DS1 mode using B8ZS line encoding. (AT-9015 only).</li> <li>• <b>HDB3</b> - E1 mode using HDB3 line encoding (AT-9020) only.</li> </ul>
<b>Line Framing</b>	<p>This field applies only to the AT-9015 SmartCard. Select the framing mode for the physical layer. The possible values are:</p> <ul style="list-style-type: none"> <li>• <b>D4</b> - Uses D4 line framing.</li> <li>• <b>ESF</b> - Uses Extended Super Frame line framing.</li> </ul>
<b>Cell Scrambling</b>	<p>When checked, the payload of the cells is scrambled to facilitate cell delineation. Most ATM devices require this feature to be on.</p>
<b>HEC Coset</b>	<p>When checked, exclusive ORs the HEC with the bit pattern 0x55. Most ATM devices require this feature to be on.</p>
<b>Idle Cell Header</b>	<p>Specifies the header contents (4-bytes in hexadecimal) of the ATM idle cell payload that is transmitted when no data cells are being transmitted.</p>

## SSCOP Tab



This table lists and describes the ATM Port Configuration **SSCOP** tab fields:

Table 5-12 ATM Port Configuration SSCOP tab fields.

Field	Description
<b>Max. CC</b>	Enter the maximum number of transmissions of a BGN, END, ER, to RS PDU. Valid maximum value is $2^{32} - 1$ (over 4 billion).
<b>Max PD</b>	Enter the maximum number of SD PDUs that may be sent before sending a POLL PDU. Value must be in the following range: $1 \leq \text{Max PD} \leq 25$ .
<b>Max. STAT</b>	Enter the maximum number of list elements placed in a STAT PDU. Value must be an odd number in the following range: $3 \leq \text{Max STAT} \leq 67$ .
<b>Max. Reseq</b>	Enter the maximum receive resequencing queue depth in the following range: $1 \leq \text{Max Reseq} \leq 16$ .
<b>Max. Rx. Windows</b>	Enter the maximum number of unacknowledged SD PDUs that may be received. Value must be in the following range: $1 \leq \text{Max Rx Windows} \leq 32$ .
<b>Timer CC</b>	Enter the interval between transmission of BGN, END, RS, and ER PDUs as long as acknowledgment to these PDUs has not been received.
<b>Timer Keep Alive</b>	Enter the maximum time spent in the transient phase where POLL or STAT PDUs may be lost.
<b>Timer Idle</b>	Enter the maximum time spent in IDLE phase before reverting to transient phase.

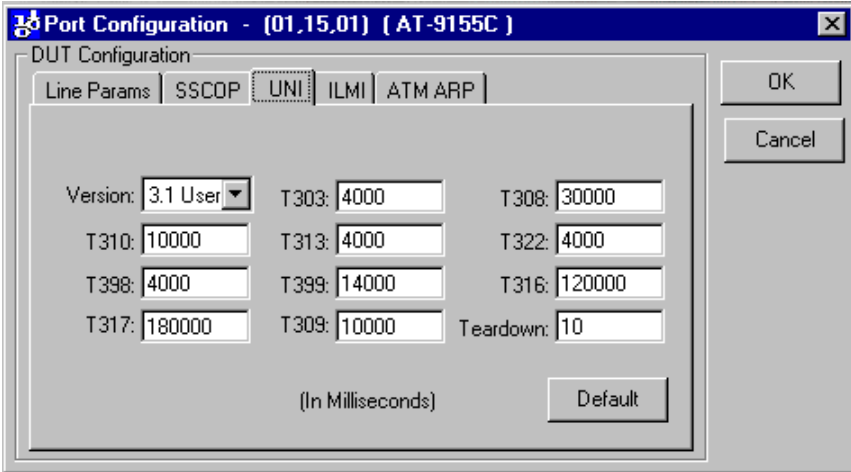
Table 5-12 ATM Port Configuration SSCOP tab fields.

Field	Description
Timer No Response	Enter the maximum time interval during which at least one STAT PDU must be received. Default is 10,000 ms for UNI 3.0; 7,000 ms for UNI 3.1.
Timer Poll	Enter the interval between transmission of POLL PDUs. Default is 100 ms for UNI 3.0; 750 ms for UNI 3.1.  <b>Note:</b> Timer values must not be zero.

**SSCOP Tab Button**

- **Default**  
 Resets all timers to the program-supplied default values.

**UNI Tab**



**Chapter 5: Set Up Tests**  
*Configuring Test Ports*

This table lists and describes the ATM Port Configuration **UNI** tab fields:

*Table 5-13 ATM Port Configuration UNI tab fields*

Field	Description			
<b>Version</b>	Values: 3.0 User or 3.1 User (for SmartBits ATM cards).			
<b>Txx</b>	The following table lists the UNI timers for port configuration:			
	Timer	Default Timeout	State of Call	Cause for Start and Stop
	T303	4s	Call initiated	Start: SETUP sent. Stop: CONNECT, CALL PROCEEDING, or RELEASE COMPLETE received.
	T308	30s	Release Request	Start: RELEASE sent. Stop: RELEASE COMPLETE or RELEASE received.
	T309	10s	Any stable state	Start: SAAL disconnection. Calls in the active state are not lost. Stop: SAAL reconnected.
	T310	10s	Outgoing Call Proceeding	Start: CALL PROCEEDING started. Stop: CONNECT or RELEASE received.
	T313	4s	Connect Request	Start: CONNECT sent. Stop: CONNECT ACKNOWLEDGE received.
	T316	2 min.	Restart Request	Start: RESTART sent. Stop: RESTART ACKNOWLEDGE received.
	T317	< T316	Restart	Start: RESTART received. Stop: Internal clearing of call references.
	T322	4s	Any call state	Start: STATUS ENQUIRY sent. Stop: STATUS, RELEASE, or RELEASE COMPLETE received.
	<b>Note:</b> T398 and T399 will be utilized in a future release.			
<b>Teardown</b>	Enter the timer value (mandatory). This value is the time between teardowns (call release requests) when resetting tests. A minimum of 10 milliseconds is recommended to avoid test failure.			
	<b>Note:</b> Timer values must not be zero.			

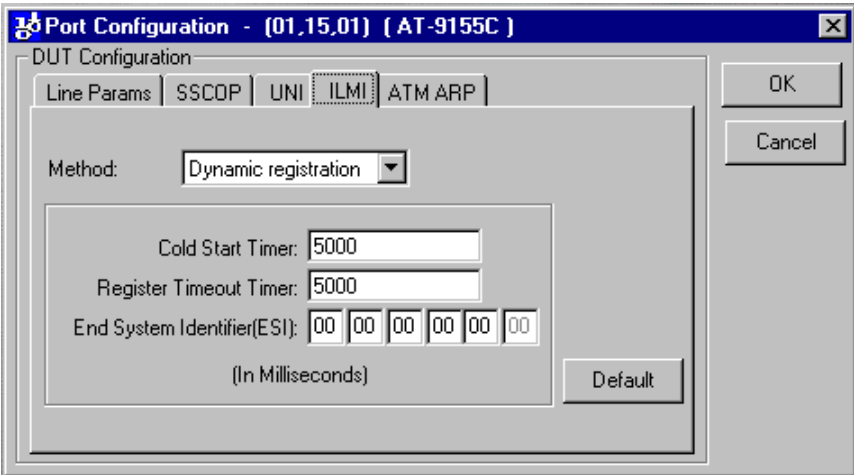




### UNI Tab Button

- **Default**  
Resets all timers to the program-supplied default values.

### ILMI Tab



This table lists and describes the ATM Port Configuration **ILMI** tab fields:

*Table 5-14 ATM Port Configuration ILMI tab fields*

Field	Description
<b>Method</b>	<p>Select the method by which you want to register ILMI information. The possible values:</p> <ul style="list-style-type: none"> <li>• <b>Dynamic registration</b> Assigns the SmartCard address using information from the switch and from the SmartCard.</li> <li>• <b>Static registration</b> You define the 20-byte ATM address of the SmartCard. You must also manually define the ATM address to the switch.</li> </ul> <p>If you select <b>Dynamic registration</b> for the method, the following fields appear:</p> <ul style="list-style-type: none"> <li>• Cold Start Timer</li> <li>• Register Timeout Timer</li> <li>• End System Identifier (ESI)</li> </ul> <p>If you select <b>Static registration</b> for the method, the following fields appear:</p> <ul style="list-style-type: none"> <li>• Prefix</li> <li>• ESI</li> <li>• Sel</li> </ul>
<b>Cold Start Timer</b>	Defines the interval between ILMI Cold Start TRAP requests sent to the switch when no network prefix has been registered. Default is 5000 ms.
<b>Register Timeout Timer</b>	Defines retransmission interval of address registration SET requests when no acknowledgement is received from the switch.
<b>End System Identifier (ESI)</b>	<p>Six bytes in the 20-byte ATM address for identifying the end station (SmartCard in this case) on a particular user-to-network interface. The first five bytes are user-definable. SmartApplications automatically sets the sixth byte to a value that represents a specific SmartCard.</p> <p><b>Note:</b> Timer values must not be zero.</p>
<b>Prefix</b>	The first 13-bytes of the ATM address.
<b>Sel</b>	This field is disabled.

**ILMI Tab Button**

- **Default**  
 Resets all values to the program-supplied default values.

**ATM ARP Tab**

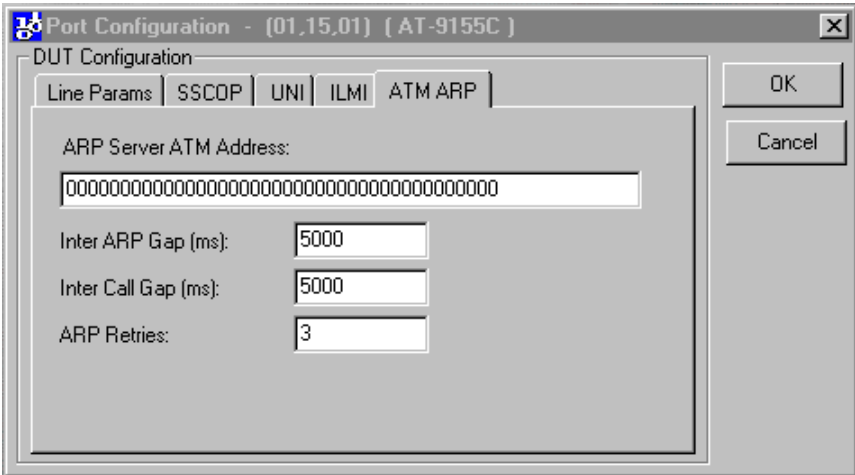


Table 5-15 ATM ARP field definitions

Field	Definition
<b>ARP Server ATM Address</b>	The ATM Address of the ATM ARP Server that must be running in the system under test. This address must be a valid address of the ATM ARP Server in order for Classical IP services to work properly. Right-click on the field to copy/paste contents.
<b>Inter ARP Gap</b>	The time in seconds between successive ARP request transmissions. It is recommended to keep this value larger than 0 to avoid flooding the ATM ARP server with excessive ARP requests.
<b>Inter Call Gap</b>	The time in seconds between successive call setup for calls trying to resolve the same destination IP address. It is recommended to keep this value larger than 0 to avoid overloading the switching device under test.
<b>ARP Retries</b>	Number of ARP retries to attempt before giving up.



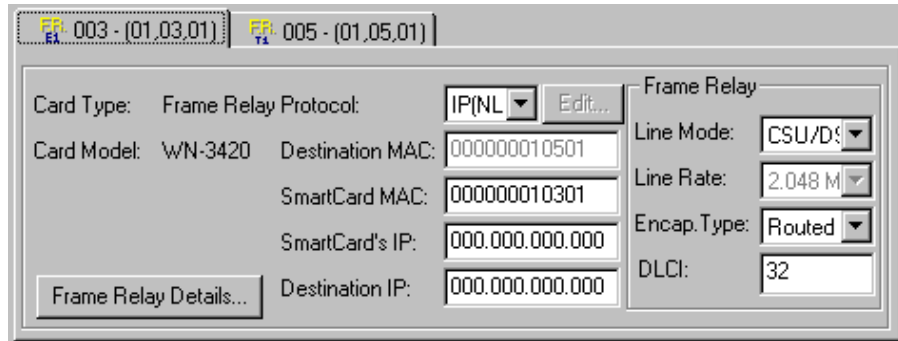
This table lists and describes the ELAN Registration window fields:

*Table 5-16 ELAN Registration Window fields*

Field	Description
<b>ELAN Name</b>	Select the name of an ELAN that you want to join. The name must exactly match (case sensitive) one of the ELAN names specified on the device under test.
<b>MAC Address</b>	The 6-byte MAC address of the LAN Emulation Client on the ATM SmartCard.
<b>ELAN Type</b>	LANE 802.3 is the only type currently supported.
<b>ELANMTU</b>	Specify the maximum transmission unit of this ELAN.
<b>ARP Retry Count</b>	Number of ARP retries to attempt before giving up.
<b>Expected ARP Resp. Time</b>	Amount of time to wait before retrying to send another LE_ARP or expiring (time out).
<b>Init Method</b>	<p>Select the ELAN initialization method to match the setting of the device you are testing. The possible methods are:</p> <ul style="list-style-type: none"> <li>• <b>Normal</b> Default method. The LEC (LAN emulation client) on the ATM SmartCard attempts to contact the LECS (LAN emulation client server) at the default address specified by the ATM Forum to obtain addressing information of the LES and BUS.</li> <li>• <b>LECS Direct</b> Allows you to directly input the ATM address of the LECS. Use this field if LECS does not reside at the default address specified by the ATM Forum.</li> <li>• <b>LES Direct</b> Allows you to input the ATM address of the LES. This method can be used when no LECS service is available and the LES's ATM address is known.</li> </ul>
<b>LEC/LES Address</b>	This field is greyed out if you select <b>Normal</b> for the <b>Init Method</b> field. Enter the ATM address of the LEC or LES.

## Configuring WAN Ports

When you select a WAN port, the appropriate WAN card attribute tab is displayed. Some of the fields are specific to WANs.



Part of configuring a WAN port involves specifying the physical parameters of the port, which you specify at the WAN Port Setup window, including the following:

- **Encapsulation**  
Use to select either Frame Relay or Point-to-Point Protocol (PPP).
- **Line WN-3405, WN-3415 T1, or WN-3420 E1**  
Use to configure the physical characteristics of the port.
- **EIA Leads** (WN-3405 SmartCard only)  
Use to select or deselect control signals on the V.35 line interface.
- **LMI** (Frame Relay only)  
Use to select a Link Management Protocol signaling procedure.
- **Address**  
Use to configure protocol addresses.

This table lists and describes the WAN card attribute tab fields:

Table 5-17 WAN Card Attribute tab fields.

Field	Description
<b>Card Type</b>	Displays the type of SmartCard for that port, which in this case is Frame Relay.
<b>Card Model</b>	Displays the model number of the card, such as WN-3405.
<b>Protocol</b>	Select the type of protocol the port should use. Options such as <b>All 0s</b> refer to the packet contents. If you selected <b>IP</b> or <b>UDP</b> for the <b>Protocol</b> field, the <b>Smart Card's IP</b> and <b>Destination IP</b> fields appear on the tab. If you selected <b>IPX</b> , the <b>Source Net</b> and <b>Destination Net</b> fields appear on the tab.  <b>Note:</b> You must use the same type of protocol within a port pair. For example, you cannot configure the transmitting card with IP and the receiving card with UDP.
<b>SmartCard's IP</b>	Enter the IP address of the SmartCard displayed on this tab. The SmartCard IP address must have the same network number and subnet address as the router port to which the SmartCard is connected. Use the IP address of the outer port with its last digit modified as the IP source address of the port.
<b>Destination IP</b>	Enter the IP address of the receiving SmartCard.
<b>Source Net</b>	The 4-byte network address of the transmitting card.
<b>Destination Net</b>	The 4-byte network address of the router port (for router testing) or receiving card.
<b>Destination MAC</b>	For switch testing using 1 to Many or Many to 1 tests, this is the MAC address of the destination port.  For router testing, this is the MAC address of the local router port. If you do not specify an address, you will get zero throughput. The SmartCard's MAC destination address must be set to be the MAC address of the router port to which the card is connected. For example, a MAC destination is 08 00 02 06 89 22 for the transmitter and 08 00 02 12 27 22 for the receiver.
<b>SmartCard MAC</b>	The MAC address of the SmartCard. MAC addresses are 48 bits long, usually written as 6 bytes in hexadecimal. For the sake of simplicity, set this to match the port number in the SmartBits system. For example, port 1 would be 00 00 00 00 00 01 for the transmitter and port 2 would be 00 00 00 00 00 02 for the receiver.

Table 5-17 WAN Card Attribute tab fields.

Field	Description
<b>Line Mode</b>	<p>This field is the same as the <b>Line Physical Mode</b> field on the WAN Port Setup window Line tab. If you change the value at the WAN Port Setup window, the new value will be displayed here.</p> <p><b>WN-3405 SmartCard</b></p> <p>Select how you want to define the equipment mode (according to the V.35 specification) within the Frame Relay User/Network interface. Normally you configure the SmartCard as a DTE.</p> <ul style="list-style-type: none"> <li>• <b>DTE</b> - User side (also referred to as CPE or Customer Premise Equipment).</li> <li>• <b>DCE</b> - Network side</li> </ul> <p><b>WN-3415 SmartCard</b></p> <p>Select how you want to define the equipment mode within the Frame Relay User/Network interface. Normally you configure the SmartCard as a CSU/DSU.</p> <ul style="list-style-type: none"> <li>• <b>CSU/DSU</b> Channel Service Unit/Data Service Unit. Also known as Customer Premise Equipment. Defines the SmartCard port as residing on the customer (subscriber) side of the T1/E1 connection.</li> <li>• <b>NET</b> Network side. Defines the SmartCard port as residing on the network side of the T1/E1 connection.</li> </ul> <p><b>WN-3420 SmartCard</b></p> <p>Select how you want to define the electrical characteristics of the T1 interface. Normally you configure the SmartCard as a CSU/DSU.</p> <ul style="list-style-type: none"> <li>• <b>CPE</b> Channel Service Unit/Data Service Unit. Also known as Customer Premise Equipment. Defines the SmartCard port to emulate the customer (subscriber) side of the T1/E1 connection.</li> <li>• <b>NET</b> Network side. Defines the SmartCard port to emulate the network side of the T1/E1 connection.</li> </ul>



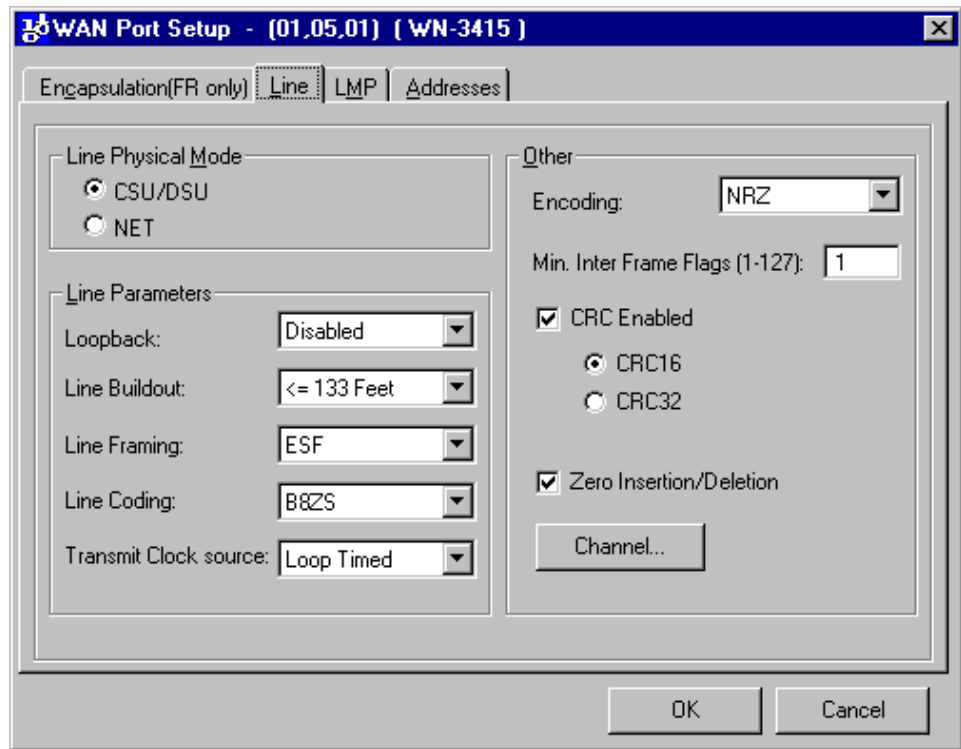


Table 5-17 WAN Card Attribute tab fields.

Field	Description
<b>Line Rate</b>	This field is the same as the <b>Line Rate (kbps)</b> field on the WAN Port Setup window Line tab. If you change the value at the WAN Port Setup window, the new value will be displayed here. Select a line rate from 19.2 to 8192 Kbps. This value applies only to the V.35 interface of the WN-3405 SmartCard. The value in this field sets the internal clock rate.
<b>Encapsulation Type</b>	Select an encapsulation type to be used for the Frame Relay payload. This field is the same as the Encapsulation Type field on the WAN Port Setup window Address tab. If you change the value at the WAN Port Setup window, the new value will be displayed here <ul style="list-style-type: none"><li>• <b>None</b> - No encapsulation is used to send traffic. Select when source and destination ports both use Frame Relay.</li><li>• <b>Bridged</b> - Select if the device you are testing is a bridge.</li><li>• <b>Routed</b> - Select if the device you are testing is a router.</li></ul>
<b>DLCI</b>	The Data Link Connection Identifier for this PVC.

## Defining WAN Port Parameters

You must define the line rate to use to transmit frames. The WAN Port Setup window allows you to define this and other physical characteristics of the SmartCard port. This screen illustrates the **Line** tab for the WN-3415 SmartCard.



The WAN Port Setup window contains these tabs:

- **Line** – Use to configure the physical characteristics of the port.
- **LMP** – Use to select a Link Management Protocol signaling procedure.
- **EIA Leads** (WN-3405 Frame Relay SmartCard only) – Use to select or deselect control signals on the V.35 line interface.
- **Address** – Use to configure protocol addresses.

### WAN Port Setup Line Tab (WN-3405)

Use this tab to configure the physical characteristics of your WN-3405 Frame Relay WAN SmartCard port. After you specify the line mode (DTE or DCE), you must specify the line encoding. If you use WAN SmartCards to both send and receive data, use the Line Clock options to synchronize the sending SmartCard's data with the receiving SmartCard's clock.

**Note:** In a SmartCard test pair, you must configure one card as a DCE and one as a DTE.

### Line Physical Mode options

Select how you want to define the equipment mode (according to the V.35 specification) within the Frame Relay User/Network interface. Normally you configure the SmartCard as a DTE.

- **DTE** – User side (also referred to as CPE or Customer Premise Equipment).
- **DCE** – Network side

### Line Clock options

Select these radio buttons to synchronize data with the clock. These are the line clock options for the WN-3405 SmartCard:

- **Tx Clock Src**  
Select the transmit clock source for the SmartCard. SmartWindow automatically selects the **External** (default) radio button for Clock if you select **DTE** or the **Internal** radio button if you select **DCE**.
- **Rx Clock Src**  
Select the type of clock source for the receiving SmartCard. If you select **DTE** SmartWindow automatically selects the **External** radio button for the Line Clock. If you select **DCE** you must select which source you want for the clock.
  - **Internal** – The SmartCard provides the clock internally for the receiving SmartCard.
  - **External (SCTE - 113)** – Circuit 113 by default, a function (signal) on a V.35 connector pin, provides the clock for the receiving SmartCard.
- **Tx Clock Polarity**  
Select how you want the source port to transmit data in relation to clock timing. Since the HDLC controller transmits data on rising edges only, when you change the clock polarity to Falling Edge, the clock phase shifts 180 degrees with respect to the data.
  - **Rising Edge** – Rising edge of the transmit clock coincides with the boundary of a bit cell.
  - **Falling Edge** – Rising edge of the transmit clock coincides with the middle (center) of a bit cell. Select this option only if you use an external or isolated (buffered) copy of the transmit clock.
- **Rx Clock Polarity**  
Select the edge of the receive clock on which to sample received data.
  - **Rising Edge** – samples received data on the rising edge of the receive clock.
  - **Falling Edge** – samples received data on the falling edge of the receive clock.
- **Line Rate (kbps)**  
Select a line rate from 19.2 to 8192 Kbps. This value applies to the V.35 interface. The value in this field sets the internal clock rate.

### Other

Use these fields to specify other parameters such as line encoding and CRC. These are other line parameters for the WN-3405 SmartCard:

- **Encoding**

Select the encoding type for the V.35 interface. Possible values:

- **NRZ** – Non-return to zero.
- **NRZI** – Non-return to zero inverted.

- **Min. Flags Between Frames**

Select the number of flags (7E hexadecimal pattern) to be inserted between transmitted frames. The maximum value is 127.

- **CRC Enabled**

Check this box to enable HDLC frame CRC generation. This field applies to transmitting traffic only. When receiving traffic, the SmartCard always checks for CRC characters.

- **Checked** – Enables the CRC (cyclic redundancy check). If checked, you can select either 16-bit or 32-bit CRC generation.
- **Unchecked** – Disables CRC generation. The SmartCard's receive path still looks for CRCs at the selected (but greyed out) size.

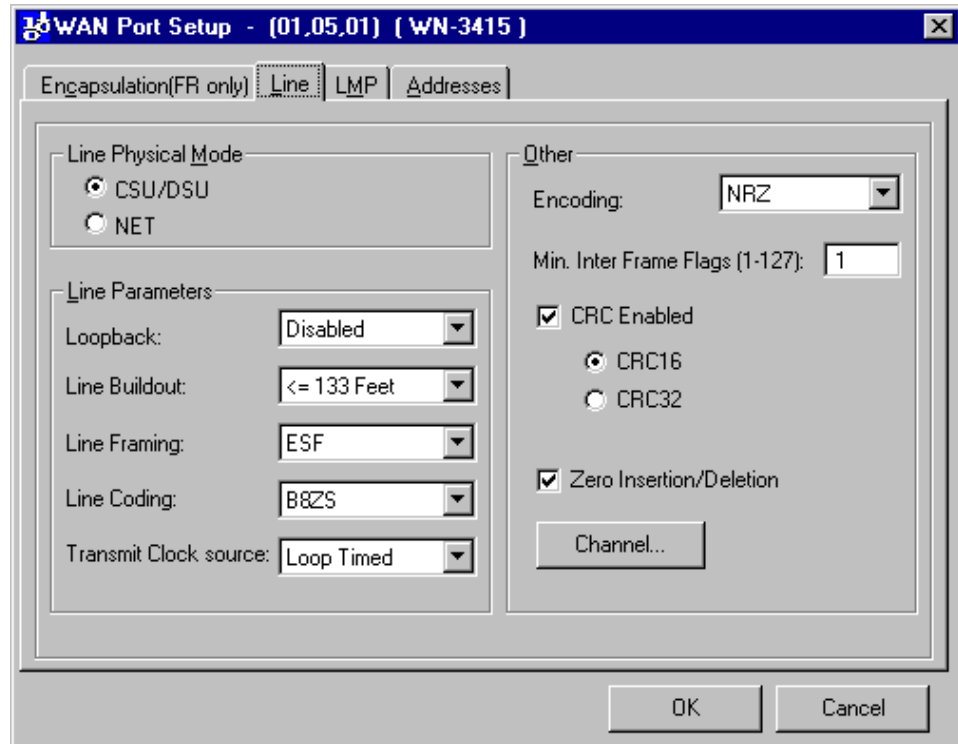
- **Zero Insertion/Deletion**

Check this box to enable HDLC bit stuffing. This field applies to transmitting traffic only. When receiving traffic, the SmartCard always performs bit unstuffing.

- **Checked** – Enables HDLC zero-bit stuffing for transmitting data and zero-bit unstuffing for receiving data, to help distinguish a byte of data from a flag byte.
- **Unchecked** – Disables zero-bit stuffing and transmits raw (unencoded) data. The SmartCard's receive path still performs bit unstuffing.

## WAN Port Setup Line Tab (WN-3415/WN-3420)

Click the **Line** tab to configure the physical characteristics of your WN-3415 Frame Relay WAN SmartCard port:



In a SmartCard point-to-point test pair, you must configure one card as a CSU/DSU and one as a NET. After you specify the line mode (CSU/DSU or NET), specify the line encoding.

### Line Physical Mode

Select how you want to define the equipment mode within the Frame Relay User/Network interface. Normally you configure the SmartCard as a CSU/DSU.

- **CSU/DSU**  
Channel Service Unit/Data Service Unit. Also known as Customer Premise Equipment. Defines the SmartCard port as residing on the customer (subscriber) side of the T1/E1 connection.
- **NET**  
Network side. Defines the SmartCard port as residing on the network side of the T1/E1 connection.

## Line Parameters

- **Loopback**

Specifies the type of loopback to be used.

- Disabled – No loopback is used. This is the normal operating mode of the device.
- **Local** – Loops the SmartCard's output back to the SmartCard's input.
- Remote – Loops the SmartCard's input back to the SmartCard's output.

- **Buildout**

Select to change the electrical output of the SmartCard to either 1) accommodate the length of the cable with which you are testing or 2) specify the amount of attenuation to apply to the signal.

For the WN-3420 only: Select the type of cable with which you are testing:

**Coax Normal, Cat-5 Normal, Coax High Loss, Cat-5 High Loss.**

Possible Buildout Cable Length Values:

- <=133 Feet Pulse shaping for cable lengths up to 133 feet.
- >133, <=266 Feet Pulse shaping for cable lengths more than 133 ft. and up to 266 ft.
- >266, <=399 Feet Pulse shaping for cable lengths more than 266 ft. and up to 399 ft.
- >399, <=533 Feet Pulse shaping for cable lengths more than 399 ft. and up to 533 ft.
- >533, <=655 Feet Pulse shaping for cable lengths more than 533 ft. and up to 655 ft.

Possible Buildout Attenuation Values:

- 7.5 dB Pulse shaping to generate -7.5 dB of attenuation.
- 15.0 dB Pulse shaping to generate -15.0 dB of attenuation.
- 22.5 dB Pulse shaping to generate -22.5 dB of attenuation.

- **Line Framing**

Select the framing mode for the physical layer. Possible values:

- **D4** – Uses D4 (Super Frame) line framing.
- **ESF** – Uses Extended Super Frame line framing.

- **Line Encoding**

Select the type of encoding to be used for the line. Possible values:

- **AMI** – Uses AMI (Alternate Mark Inversion) line encoding.
- **B8ZS** – Uses B8ZS line encoding. (WN-3415 only)
- **HDB3** – E-1 mode using HDB3 line encoding. (WN-3420 only)

- **Transmit Clock source**

Specifies the clock against which you want to run the tests.

- **Internal** – Uses the SmartCard's internally generated clock as the transmit clock.
- Loop Timed – Uses the received clock as the transmit clock.

## Other

Use these fields to specify other parameters such as line encoding and CRC.

- **Encoding**

Select the type of encoding to be used for the line. Possible values:

- **NRZ** – Non-return to zero.
- **NRZI** – Non-return to zero inverted.

- **Min. Flags Between Frames**

Select the number of flags (7E hexadecimal pattern) to be inserted between transmitted frames. The maximum value is 127.

- **CRC Enabled**

Check this box to enable HDLC frame CRC generation. This field applies to transmitting traffic only. When receiving traffic, the SmartCard always checks for CRC characters.

- **Checked** – Enables the CRC (cyclic redundancy check). If checked, you can select either 16-bit or 32-bit CRC generation.
- **Unchecked** – Disables CRC generation. The SmartCard's receive path still looks for CRCs at the selected (but greyed out) size.

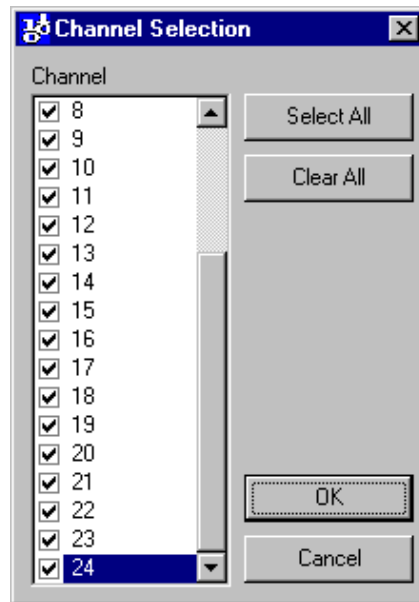
- **Zero Insertion/Deletion**

Check this box to enable HDLC bit stuffing. This field applies to transmitting traffic only. When receiving traffic, the SmartCard always performs bit unstuffing.

- **Checked** – Enables HDLC zero-bit stuffing for transmitting data and zero-bit unstuffing for receiving data, to help distinguish a byte of data from a flag byte.
- **Unchecked** – Disables zero-bit stuffing and transmits raw (unencoded) data. The SmartCard's receive path still performs bit unstuffing.

## Channel Selection

Use the Channel Selection dialog box for Fractional T-1 and E-1. Select up to 24 channels per SmartCard pair, which is the maximum number of 64 kbps circuits allowed on the T-1 line to transmit and receive frames. If you select all of the channels, the entire bandwidth of the DS-1 line is used.



### To select all channels

Click the **Select All** button.

### To clear all channel selections

Click the **Clear All** button.

### To select a range of channels

- Hold down the left mouse button and drag the mouse.
- Right click within the highlighted area. A popup menu appears from which you can choose to check or uncheck the items in your selection.



## Synchronizing WAN SmartCard Clocks

In order to transmit data, you must synchronize both of the clocks in a SmartCard send/receive test pair. Lack of synchronization can cause aborted frames and/or CRC errors when transmitting flags because the receiving SmartCard can mistake the flags for a frame or abort sequence.

These conditions can cause prevent or disrupt clock synchronization:

- Two SmartCards in a test pair not set to the same clock polarity
- Delays from mismatched cables
- Induced noise
- Internal delays
- Long cables (over 10 feet)

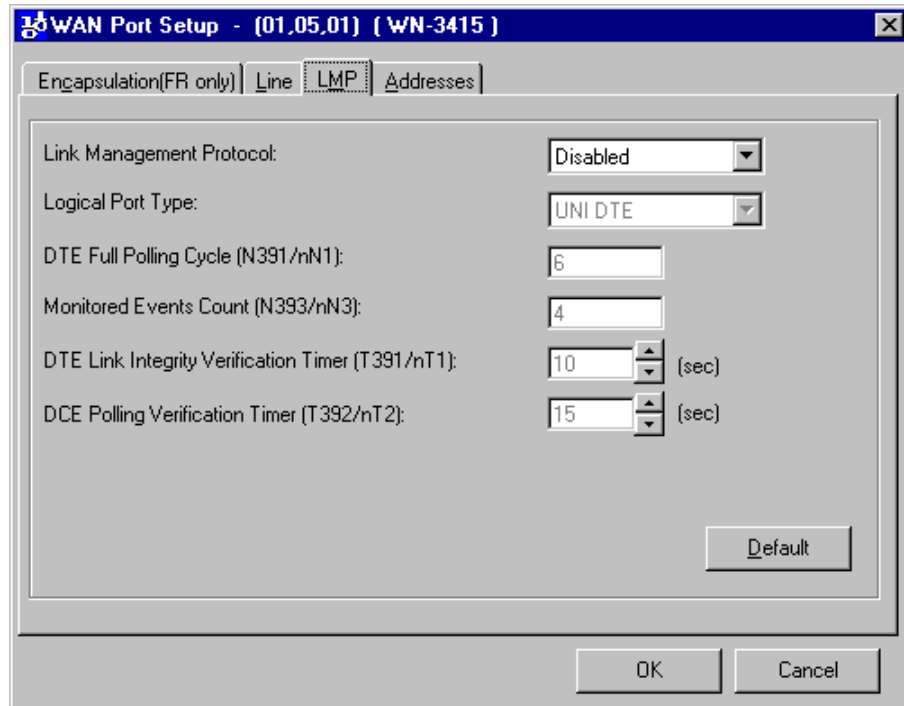


**Note:** Bit cell width shrinks as frequency rises. Since cable and internal delays are a function of the cable length, they are constant.

In DTE mode, some routers may try to recover their transmit clocks based on incoming data. If this occurs, the falling edges of the transmit clock (which is derived from the receive clock) may have excessive jitter. To avoid this, select a Falling Edge for the receive clock so that the sampling edge coincides with the middle of the bit cell period.

## WAN Port Setup LMP Tab

Click the **LMP** tab to display the following window:



The values that appear in these fields are industry-standard defaults. If you modify these values, you can reset them back to the defaults with the **Defaults** button.

This table lists and describes the WAN Port setup **LMP** tab fields:

*Table 5-18 WAN Port Setup LMP tab fields*

Field	Description
<b>Link Management Protocol</b>	Select an LMP signaling method. The signaling method must match the equipment to which you are connecting.
<b>Logical Port Type</b>	Select the UNI DTE (User Side) or the UNI DCE (Network Side). When connecting to a Frame Relay Switch, this would normally be set to UNI DTE. If LMP is enabled and you configure the card as CSU/DSU, set this field to UNI DTE. If you configure the card as NET, set this field to UNI DCE.
<b>DTE Full Polling Cycle</b>	Used to set the number of polling cycles to complete before a Full Polling Status Inquiry Message is sent by the DTE.

Table 5-18 WAN Port Setup LMP tab fields

Field	Description
<b>Monitored Events Count</b>	Used to set the number of Reliability Error events or In-Channel Signaling Protocol Error events that can occur before a link is considered inactive.
<b>DTE Link Integrity Verification Timer</b>	Used to set the frequency in seconds that Status Inquiry Messages are sent when configured as a DTE.
<b>DCE Polling Verification Timer</b>	Used to set the time that the interface waits for a Status Inquiry Message before counting an error when configured as a DCE.

### WAN Port Setup EIA Leads Tab (WN-3405)

These radio buttons correspond to the physical pins on the connector. This table lists and describes the WAN Port Setup **EIA Leads** tab fields:

Table 5-19 WAN Port Setup EIA Leads tab fields.

Field	Description
<b>DCE</b>	Use these radio buttons to turn on or off Data Set Ready (DSR), Clear to Send (CTS), Data Carrier Detect (DCD). These signals are only applicable when the Physical Line Mode is set to DCE.
<b>DTE</b>	Use these radio buttons to turn on or off Data Terminal Ready (DTR), Request to Send (RTS). These signals are only applicable when the Physical Line Mode is set to DTE.  <b>Note:</b> Test Mode (TM), Remote Loopback (RL), and Local Loopback (LL) are currently not supported.

## WAN Port Setup Address Tab

Click the **Addresses** tab to display the following window:

This table lists and describes the **WAN Port Setup Address** tab fields:

*Table 5-20 WAN Port Setup Address tab fields.*

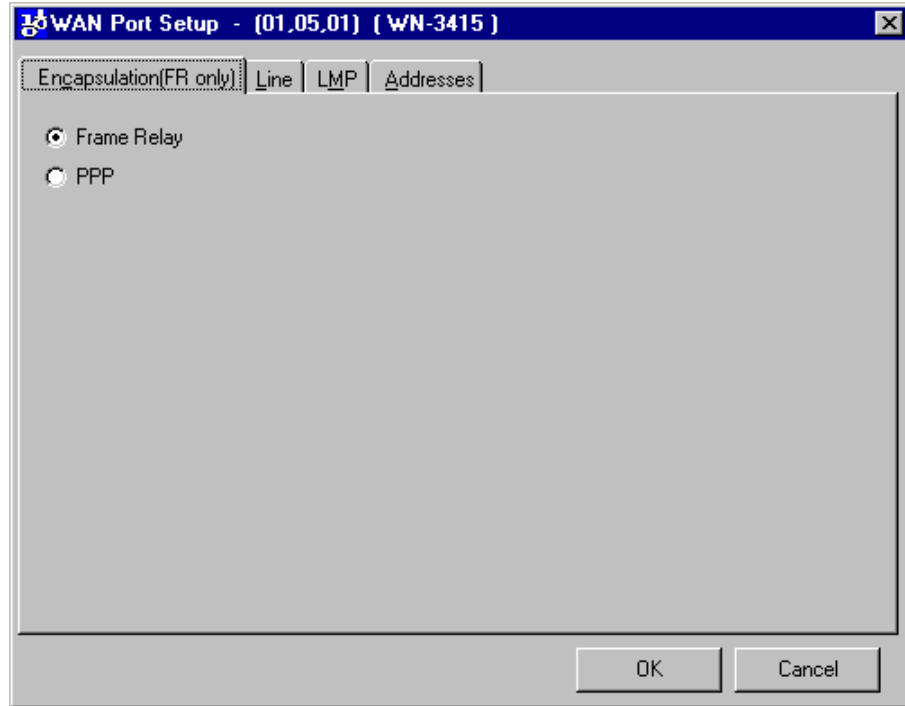
Field	Description
<b>MAC Address</b>	Enter a source MAC address for sending Ethernet protocol frames if you selected Bridged (Ethernet) for the encapsulation type.
<b>IP Address</b>	Enter an IP address for sending IP protocol frames.
<b>Netmask</b>	Enter a subnet mask.
<b>Gateway</b>	Enter the next hop IP address for the network.
<b>Ping Target</b>	Enter the target IP address for the Ping packets.
<b>Send Ping packet</b>	When checked, Ping packets will be sent to the Ping Target at the rate in seconds that you enter in the a <b>Ping Freq</b> field.

*Table 5-20 WAN Port Setup Address tab fields.*

<b>Field</b>	<b>Description</b>
<b>Send SNMP packet</b>	When checked, SNMP Management packets will be sent to the Gateway at the rate (in seconds) that you enter in the <b>SNMP Freq</b> field.
<b>Send RIP packet</b>	When checked, RIP broadcast packets will be sent to out on all PVCs on the above subnet at the rate (in seconds) that you enter in the <b>RIP Freq</b> field.
<b>Reply to all ARP requests</b>	When checked, ARP replies will be sent in response to all ARP requests not destined for configured streams on the specified IP address or the IP address configured for the card.

## WAN Port Setup Encapsulation (FR only) Tab

Click the **Encapsulation (FR only)** tab to display the following window:



This table lists and describes the **WAN Port Setup Address** tab:

Table 5-21 WAN Port Setup Encapsulation (FR only) tab fields

Field	Description
Frame Relay	Click to select Frame Relay.
PPP	Click to select Point-to-Point Protocol (PPP).

## Router Testing

Testing routers with Smart Applications is very similar to how you test other devices, however there are a few differences outlined here:

### Switch testing

You select the test ports in the card attribute tab of the main window. Normally you can use the default protocol settings. This is not true for router devices.

### Router testing

SmartApplications needs more information since the DUT is routing the IP/IPX packets routed to the destination port. To test routers successfully, you must manually edit the IP/IPX headers by using the Network IPs window. There is an additional test you can perform on routers called the Next Hop test.

### Preliminary Setup for Router Testing

Before you test a router, you must do the following:

- Check the **Router Test** checkbox on the **Preferences** tab in the Test Setup window.
- If you also want to do a Next Hop test:
  - 1Check the **Next Hop Test** box in the on the **Preferences** tab.
  - 2Click the **Network IPs** button on the card attributes tab to access the Network IPs window where you enter next hop IP addresses.
- Obtain the MAC and IP addresses of the involved router ports and enter them on the card attribute tab on the main window.

### Router Test Configuration Fields

The Router Test Configuration fields on the card attributes tab of the main window are specifically for testing routers.

This table lists and describes the Router Test Configuration fields:

*Table 5-22 Router Test configuration fields*

<b>Field</b>	<b>Description</b>
<b>Protocol</b>	The protocol to use for the port. If you selected <b>IP</b> for the <b>Protocol</b> field, the <b>SmartCard's IP</b> field appears. If you selected <b>IP</b> or <b>UDP</b> , the <b>Router's IP</b> fields appears. If you selected <b>IPX</b> , the <b>Source Net</b> and <b>Destination Net</b> fields appear. <b>Note:</b> For router testing, select use either <b>IP</b> , <b>UDP</b> , or <b>IPX</b> .
<b>Smart Card's IP</b>	This field appears when you select <b>IP</b> or <b>UDP</b> for the <b>Protocol</b> field. The IP addresses are entered in this field using dotted decimal notation. The SmartCard IP address must have the same network address with a different host address as the router port to which the SmartCard is connected. For example, a SmartCard IP is 192.168.100.2 for the transmitter and 146.72.1.2 for the receiver.
<b>Router's IP</b>	This field appears when you select <b>IP</b> or <b>UDP</b> for the <b>Protocol</b> field. The DUT IP address must be the IP address of the router port connected to the card. For example, the DUT IP address for the transmitter matches the router port IP, which is 192.168.100.1. Also, the DUT IP for the receiver matches the IP of the connected router port, which in this example is 146.72.1.1.
<b>Source Net</b>	The 4-byte network address of the transmitting card.
<b>Destination Net</b>	The 4-byte network address of the router port (for router testing) or receiving card.
<b>Destination MAC</b>	The SmartCard's MAC destination address must be set to be the MAC address of the router port to which the card is connected.

At the beginning of each repetition of the test being run, every port involved in the test sends out a packet to its test pair partner (using the test pair's MAC address). This should cause the router under test to initiate an ARP exchange on the receiving ports to determine their MAC addresses. All involved ports are set to recognize this ARP request when it comes in (by using SmartCard triggers), and to respond with an appropriate ARP Reply (by using the SmartCard Echo transmission mode). From that point, the router tables should be updated and the test can continue.

The transmitting port routes IP, UDP or IPX packets to the receiving port via the router to the MAC and IP addresses specified on the card attributes tab on the main window.



## How the Next Hop Test Works

The Next Hop test tests a router's ability to recognize the next hop address and update its routing table with this address. In Next Hop tests, all receiving ports act as virtual router ports whose IP addresses you define in the Network IPs window.

### How Next Hop Test Works

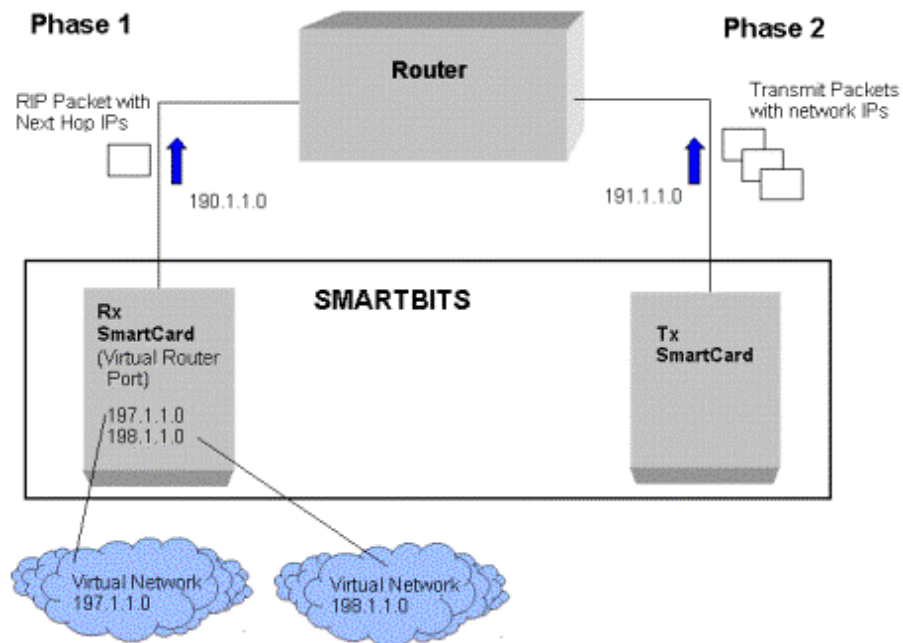


Figure 5-2. Diagram of Next Hop topology

At the start of each Next Hop test the receiving port sends to the router a RIP packet containing the virtual router port (host) addresses that you defined on the Network IPs window. These are the addresses of the networks you want the card to advertise. The router then updates its routing table with these IP addresses (known as the “Learning Phase”).

Once the router's routing table is updated, the transmitting SmartCard sends packets containing the host addresses from the Network IPs window to the router.

## Setting Up Next Hop Tests

In order to use Next Hop tests, you must enter the network IPs of the virtual routers involved by following these steps:

- 1 Check the **Next Hop Test** box in the Test Setup window.
- 2 At the SmartApplications main window, select **IP** or **UDP** for the **Protocol** field.

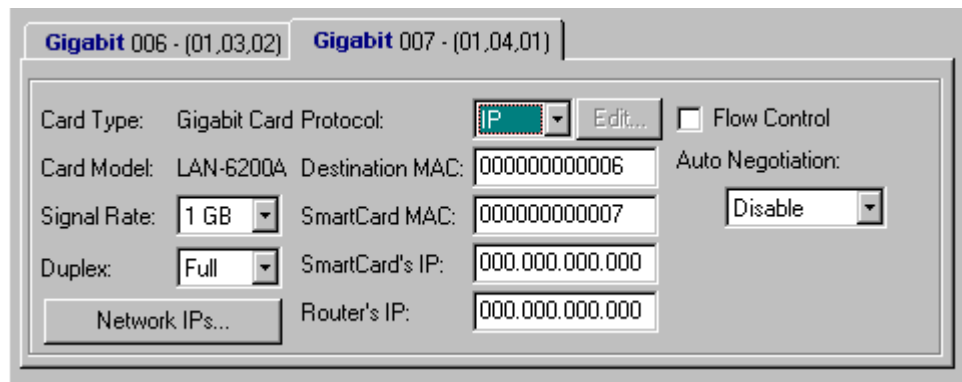
- 3 Click the **Network IPs** button from the card attribute tab. The Network IPs window is displayed.
- 4 Enter up to 15 valid network IPs. The network IP is formatted as a RIP packet. The first three bytes represent a network address for a Class C IP address. The last byte represents the host address and is not modifiable.

## Setting Up IP/UDP/IPX Protocols

When you select a Layer 3 protocol of **IP**, **UDP**, or **IPX** from the **Protocol** fields on a card attribute tab, you must also specify IP addresses for additional fields that appear.

- If you select **IP** or **UDP** protocols these fields appear:
  - SmartCards's IP
  - Router's IP
- If you select **IPX** protocol these fields appear:
  - Source Net
  - Destination Net

The following SmartApplications main window illustrates some of the fields involved with using IP, UDP, or IPX.



### To set up a Layer 3 protocol address

- 1 **For routers:**

Determine the MAC and IP addresses for each router port you are using in the test. Enter them into the **Destination MAC** and **Router IP** fields respectively. The MAC addresses are in hexadecimal.

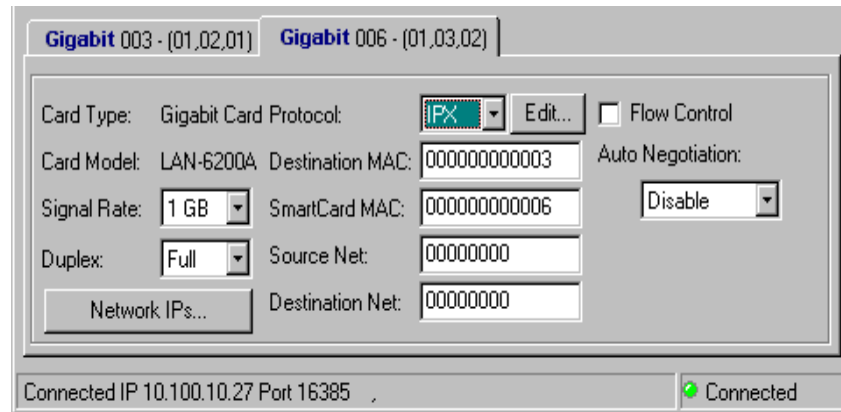
**For switches:**  
You can use the default values.

**Note:** You must use the same type of protocol within a port pair. For example, you cannot configure the transmitting card with IP and the receiving card with UDP.

- 2 Enter the SmartCard IP. Use the same network address as the attached router port but with a different host address.

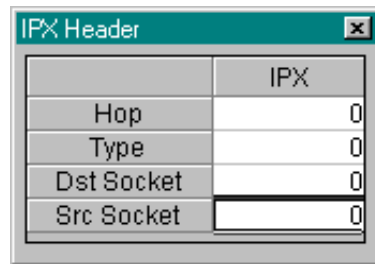
## Editing the IPX Frame Format

You can customize IPX frame formats to define distant MAC addresses with distant IPX network addresses from the Card Attributes portion of the main window:



Follow these steps:

- 1 Select **IPX** from the protocol pull-down menu.
- 2 Click the **Edit** button. The IPX Header window displays:



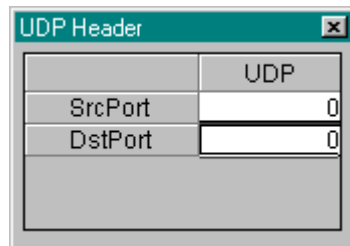
- 3 Enter the appropriate hop type and socket values.
- 4 Close the IPX Header window by clicking the **X** button.

IPX requires that you provide a full address, including the distant network and the distant MAC.

## Editing the UDP Format

To customize the UDP format, follow these steps:

- 1 Select **UDP** from the protocol drop-down menu.
- 2 Click the **Edit** button. The UDP Header window displays:



The screenshot shows a window titled "UDP Header" with a close button (X) in the top right corner. The window contains a table with two rows and two columns. The first row has a header "UDP" in the right column. The second row has "SrcPort" in the left column and a text input field containing "0" in the right column. The third row has "DstPort" in the left column and a text input field containing "0" in the right column. Below the table is a large empty rectangular area.

	UDP
SrcPort	0
DstPort	0

- 3 Type the source (Src) and destination (Dst) port numbers in the corresponding **UDP** fields.
- 4 Close the UDP Header window by clicking the **X** button.

## Example of Assigning Addresses for Protocols

Let us say you want to connect two SX-7410 SmartCards in Ports 1 and 2 to two ports of a router. This example demonstrates how you might assign addresses for the protocols on the card attribute tab.

- 1 Obtain the following addresses for the **router's Port 1**:  
MAC address:00 00 A5 E3 91 00  
IP address: 146.72.1.1
- 2 Enter the router's IP and MAC Destination on the appropriate port attribute tab.
- 3 Attach the SmartCard in Port 1 to the router's Port 1.
- 4 Assign the **SmartCard's Port 1** IP address with the same network address but with a different host address as the router's Port 1. SmartApplications automatically assigns the SmartCard's MAC address.  
SmartCard Port 1: 146.72.1.2  
Smart Card MAC address:00 00 00 00 00 01
- 5 You obtain the following addresses for the **router's Port 2**:  
MAC address: 00 00 A5 E2 91 00  
IP address: 192.168.100.1
- 6 Enter the router's IP and MAC Destination on the appropriate port attribute tab.
- 7 Assign the **SmartCard's Port 2** these addresses (for consistency):  
SmartCard Port 2: 192.168.100.2  
Smart Card MAC address:00 00 00 00 00 02

SmartApplications automatically issues the ARP exchanges to set up the router's ARP table.

The SmartCard attribute tab for Port 1 would look like this:

Card Type:	Fast Card	Protocol:	IP	<input type="checkbox"/> Flow Control
Card Model:	SX-7410	Destination MAC:	000000000004	Auto Negotiation:
Signal Rate:	10M	SmartCard MAC:	00000010401	Disable
Duplex:	Half	SmartCard's IP:	000.000.000.000	
<input type="button" value="Network IPs..."/>		Router's IP:	000.000.000.000	



# 6

## Run Tests



This chapter contains the following sections:

***Section 1: Test Phases***

***Section 2: Viewing Test Results***

***Section 3: Viewing and Printing ASCII Text Report Files***

***Section 4: Viewing Log Contents***



## Test Phases

When you start to run a test, the test goes through several phases.

### Device Under Test Initialization

When the test starts, SmartApplications first sends out learning packets so that the switch or bridge can learn which addresses are local and which addresses need to be forwarded. After the learning sequence, the actual load testing begins.

### Learning Phase

Some DUTs fail to update forwarding tables with the default number of packets (3) sent from receiver to transmitter, transmitter to receiver. If the DUT does not update the forwarding table correctly using the defaults, increase the number of learning packets to send. To do this, select **Test > Setup** to access the **Test Configuration** tab. Increase the number for the **Learning Retries** field. This field determines how many retries will be used with a 1 second delay between retries before determining if a single packet can be forwarded correctly. The default value is 3.

When you test routers, SmartApplications initiates an ARP exchange to up date the router's ARP table before the learning phase.

### Load Generation

The test now runs on the DUT (all selected ports run concurrently) starting with the first packet size selected. The test is run according to the test methodology.



## Viewing Test Results

You can view test results on the Results window by:

- **Individual test tab**  
View results by test as the test runs.
- **Reports tab**  
View a report of the test once it finishes.
- **Log tab**  
View a running record of all repetitions of each trial of all tests.

Once a test starts running, the Results window with the tab for that test is displayed. You can also access the Results window by selecting **File > View Results File** from the main window. See example below of the Results window for the Packet Loss test with a chart created based on the results.

Frame Size	Rate Tested(%)	(01,01,01) to (01,02,01) (%)	(01,06,01) to (01,07,01) (%)	Average
64	100.00	100.000	100.000	100.000
128	100.00	100.000	100.000	100.000
256	100.00			
512	100.00			
1024	100.00			
1280	100.00			
1518	100.00			

The Results window test tabs display test results as the test runs, until it finishes. The test settings are displayed in the upper part of the window. The test results are displayed in the status bar at the bottom of the window. To access the results of another test, click one of tabs across the bottom of the window.










**Note:** For latency test results, SmartApps always measures and yields results for both store and forward devices or for bit-forwarding (cut-through) devices regardless of the DUT. When viewing results, use the result that is appropriate for your type of device.

When the testing is complete, the word *Ready* is displayed in the lower left hand corner and the final results are displayed in the lower right hand portion.

## Results Window Menu Options and Buttons

At the Results window you can perform the following actions through menu bar options or the buttons at the top of the window:

*Table 6-1 Results window menu bar options.*

Action	Menu bar option	Button
Opens a previously saved Results file.	Open Results File	
Saves the information in the Results window to a file.	Save Results File	
Copies the information in the Results window to the clipboard. You can then paste the information to a third party software application such as MS Notepad™ or MS Excel™.	Copy Result	
Prints the contents of the active tab on the Results window.	Print Result	
Stops the test from running.	Stop Test	
Begins running the test.	Start Test	
Opens the Chart Wizard window once you select some data to chart.	Create Chart	



## Results Window Status Bar fields

This table lists and describes the Results Window Status Bar fields:

Table 6-2 Results window status bar fields.

Field	Description
Frame size	The size of the current frame being sent.
Trial	The number of the current trial.
Rep	The number of repetition for the current trial.
Passed	The percentage of traffic that passed the test without any packet loss.
Current	The rate at which the current trial/repetition is being run.
Failed	The last rate at which packet loss occurred.

**Note:** Passed and Failed statuses are not used in the Latency or Packet Loss test.

## Viewing Results of Previous Configurations

You can view and print the test results that you saved from other configurations while still in the current configuration. Follow these steps:

- 1 From the main window, select **File > View Results File**. The Results window is displayed.
- 2 From the menu bar, select **File > Open**. Select the .vts file containing the test results you want to view and click the **Open** button.
- 3 Click on a test tab to view test results, or one of the other tabs at the bottom of the Results window.

## Viewing and Printing Test Reports

SmartApplications provides two reports for each type of test that you run in one SmartApplications session: a detail report and a summary report. Both types of reports append results by packet size with each test trial. You can produce individual reports for just one packet size.

### Detail Reports

The detail report contains ALL results for each trial of each type of test that was run that was run during the SmartApplications session. For every packet size tested, SmartApplications appends the results of each trial to a report table that you can view

online or print. If you run all tests at once, the detail report contains results for all four tests. One report table can hold up to 16384 rows (equivalent to many reports). Detail reports display, by packet size, test progress including current trial number, operation in process (transmitting, receiving, retrieving data), current rate and passed rate. It also displays approximate percent of completion.

Detail reports are available in two formats:

- **Tabular (default)**  
Displays results in columns by frame size.
- **Non-tabular**  
To change to the non-tabular report format, uncheck the **Create Tabular Report** box on the **Preference** tab of the Test Setup window.

#### To view a detail report online

- Click the **Reports** tab of the Results window.

#### To print a detail report

- Select **File > Print** from the menu bar.

**Note: For tabular reports only:** You can only print data that is visible on your screen. If the visible data on your screen exceeds physical page parameters, go to **File > Page Setup** from the menu bar and adjust your margins.



## Summary Reports

SmartApplications also generates a summarized report for each type of test that you run in a SmartApplications session. These reports summarize the results for each packet size run for the test, similar to the Scott Bradner result format. For each test setup, at the end of a trial SmartApplications appends the results by packet size to the summary report.



**Note:** You must use an editor such as MS Notepad™ in order to view or print summary reports.

### To create a separate report for each packet size

- Rename the file on the **Preferences** tab in the Test Setup box.



## Viewing and Printing ASCII Text Report Files

You can print a detail report that contains the results of only one test at a particular packet size. SmartApplications assigns the following default filenames to individual report files:

THROUGHHP . nnn for Throughput.

LATENCY . nnn for Latency

PACKETLO . nnn for Packet Loss (Ethernet only)

BAKTOBAK . nnn for Back-to-Back (Ethernet only)

. nnn is the hexadecimal number representing the test frame size. For example, if you run a Packet Loss test with a packet size of 64 bytes, the filename will be `PACKETLO.040` where 040 is the hexadecimal for 64. You can change these default names (excluding the file extension) on the **Preferences** tab in the Test Setup box.



**Note:**

- 1) Summary reports use the file extension `.ndt`.
- 2) If you run the same test again at the same packet size, SmartApps overwrites the first detail report. To avoid this, rename the report filename before running the test again.

### To print an individual test report (including a summary report)

- 1 Open an editor such as MS Notepad™.
- 2 Select the file you want to print using **File > Open**.
- 3 Select **File > Print**.

## Sample Throughput Report

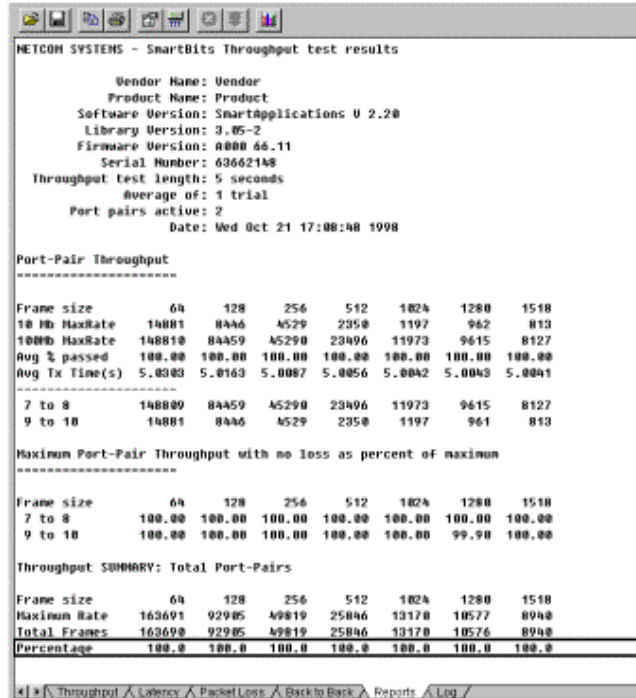


Figure 6-1. Detail Report – Tabular Format

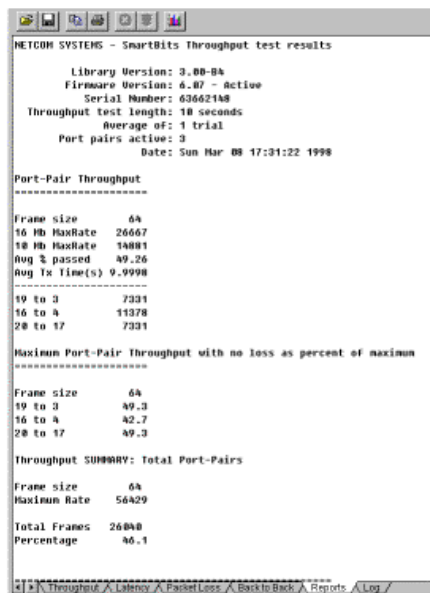


Figure 6-2. Detail Report - Non-tabular Format

## Chapter 6: Run Tests

### Viewing and Printing ASCII Text Report Files

```
===== THROUGHPUT PERFORMANCE MEASUREMENTS (5 seconds)

Vendor Name: ABC
Product Name: XXX Series
Software Version: SmartApplications V 2.04
Test Configuration: C:\Program Files\SmartApplications\A.sig
Protocol:
Date Tested: Fri Jun 12 16:25:52 1998

Library Version: 3.01-8
Firmware Version: ADOE 96.09
Serial Number: 63662148

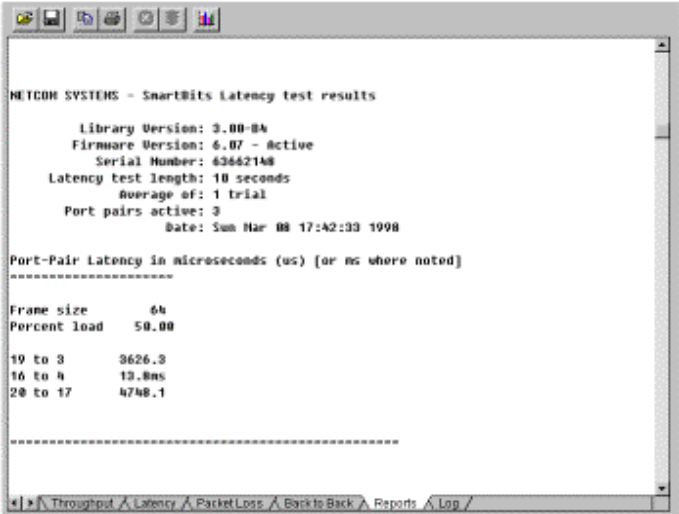
      64  byte frames
          intended send: 74074
          intended rate: 14880 (pps)
          total: 74074
          duration: 5 (sec)
          total rate: 14814 (pps)

     128  byte frames
          intended send: 42229
          intended rate: 8445 (pps)
          total: 42229
          duration: 5 (sec)
          total rate: 8445 (pps)

     256  byte frames
          intended send: 22644
          intended rate: 4528 (pps)
          total: 22644
          duration: 5 (sec)
          total rate: 4528 (pps)
```

Figure 6-3. Summary Report

## Sample Latency Report



```
METCOR SYSTEMS - SmartBits Latency test results

Library Version: 3.00-04
Firmware Version: 6.07 - Active
Serial Number: 63662148
Latency test length: 10 seconds
Average of: 1 trial
Port pairs active: 3
Date: Sun Mar 08 17:42:33 1998

Port-Pair Latency in microseconds (us) [or ns where noted]
=====
Frame size      64
Percent load    50.00

19 to 3         3626.3
16 to 4         13.8ms
20 to 17        4748.1

=====

<|> Throughput / Latency / Packet Loss / Back to Back / Reports / Log /
```

Figure 6-4. Detail Report - Tabular Format



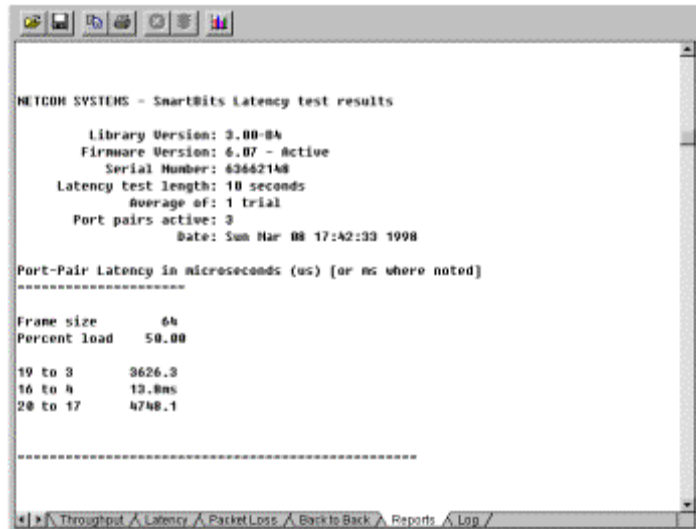


Figure 6-5. Detail Report - Non-tabular Format

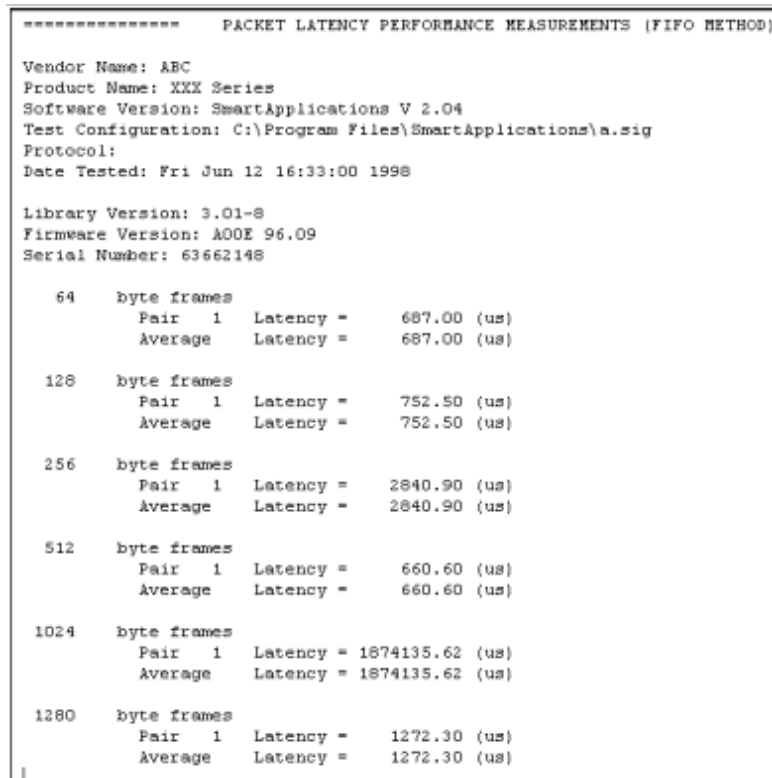


Figure 6-6. Summary Report

## Sample Packet Loss Report

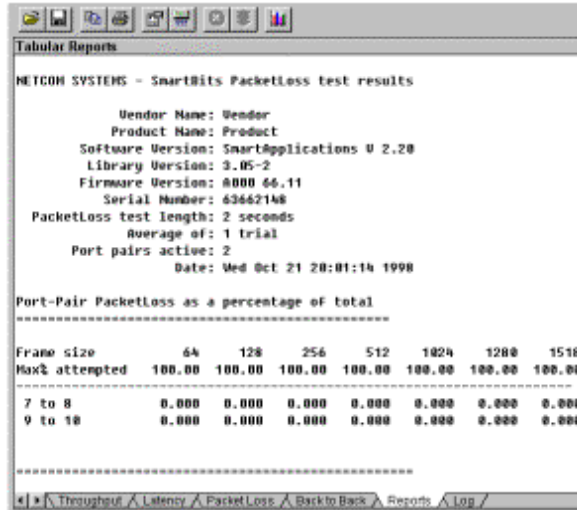


Figure 6-7. Detail Report - Tabular Format

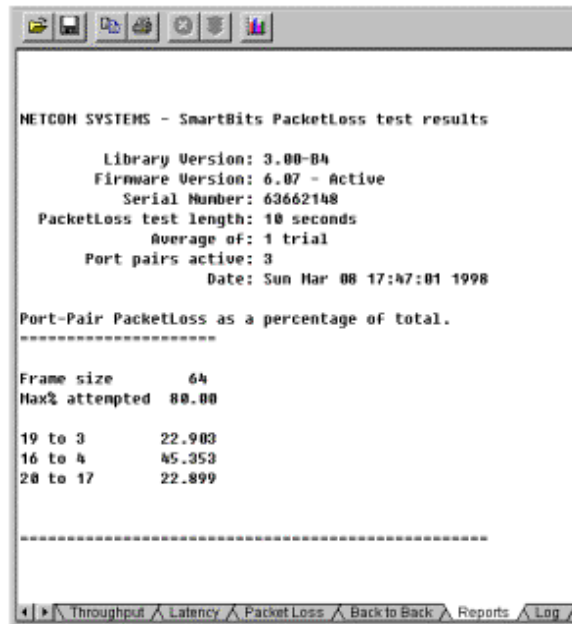


Figure 6-8. Detail Report - Non-tabular Format

```

*****  PACKET LOSS RATE MEASUREMENTS (5 seconds)  *****
Vendor Name: ABC
Product Name: XXX Series
Software Version: SmartApplications V 2.04
Test Configuration: C:\Program Files\SmartApplications\a.sig
Protocol:
Date Tested: Fri Jun 12 16:37:04 1998
|
Library Version: 3.01-8
Firmware Version: A00E 96.09
Serial Number: 63662148

      pkt_size  intended_rate  intended_sent  rx_packets  rx_rate      lost  pct_lost
-----
      64         14880         74404         74404      14880         0      0.00
     128         8445         42229         42229      8445          0      0.00
     256         4528         22644         22644      4528          0      0.00
     512         2349         11745         11745      2349          0      0.00
    1024         1197         5985          5985      1197          0      0.00
    1280          960         4804          4804       960          0      0.00
    1514          814         4070          4070       814          0      0.00
  
```

Figure 6-9. Summary Report

## Sample Back-to-Back Report

NETCON SYSTEMS - SmartBits BacktoBack test results

Vendor Name: Vendor  
Product Name: Product  
Software Version: SmartApplications V 2.20  
Library Version: 3.05-2  
Firmware Version: A000 66.11  
Serial Number: 63662148  
BacktoBack test length: 2 seconds  
Average of: 1 trial  
Port pairs active: 2  
Date: Wed Oct 21 20:05:32 1998

Port-Pair BacktoBack

Frame size	64	128	256	512	1024	1280	1518
10 Mb offered	29762	16892	9058	4700	2394	1924	1626
100Mb offered	297620	168918	90580	46992	23946	19230	16254
Burst Seconds	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Offered %	100.00	100.00	100.00	100.00	100.00	100.00	100.00
-----							
7 to 8	297620	168918	90580	46992	23946	19230	16254
9 to 10	29762	16892	9058	4700	2394	1924	1626
-----							
BacktoBack SUMMARY: Total Port-Pairs							
-----							
Frame size	64	128	256	512	1024	1280	1518
Frames Rcv'd	327382	185810	99638	51692	26240	21154	17880

Throughput / Latency / PacketLoss / BacktoBack / Reports / Log

Figure 6-10. Detail Report - Tabular Format

## Chapter 6: Run Tests

### Viewing and Printing ASCII Text Report Files

```
NETCOM SYSTEMS - SmartBits BacktoBack test results

      Library Version: 3.00-B4
      Firmware Version: 6.07 - Active
      Serial Number: 63662148
      BacktoBack test length: 10 seconds
      Average of: 1 trial
      Port pairs active: 3
      Date: Sun Mar 08 18:17:26 1998

Port-Pair BacktoBack
-----

Frame size      256
10 Mb Max Req  36232
Burst Seconds  9.9945
Max test prcnt 80.00
-----
19 to 3        36230
16 to 4        59920
20 to 17       36230

BacktoBack SUMMARY: Total Port-Pairs
-----

Frame size      256
Max Possible    163570

| > | Throughput | Latency | PacketLoss | BacktoBack | Reports | Log |
```

Figure 6-11. Detail Report - Non-tabular Format

```
----- BACK TO BACK MEASUREMENTS (5 seconds) -----

Vendor Name: ABC
Product Name: XXX Series
Software Version: SmartApplications V 2.04
Test Configuration: C:\Program Files\SmartApplications\a.sig
Protocol:
Date Tested: Fri Jun 12 16:40:37 1998

Library Version: 3.01-8
Firmware Version: A00E 96.09
Serial Number: 63662148

      FrameSize      FrameReceived(in one burst)|
           64          74400
          128          42225
          256          22640
          512          11745
         1024           5985
         1280           4800
         1514           4070
```

Figure 6-12. Summary Report

## Viewing Log Contents

Each test that is run is displayed in a log that you can view from the **Log** tab of the Results window. The log displays the detailed results of every repetition of every trial run. It is a detailed running record of what happened during the test.



**Note:** Always check the test log to make sure that the test ran properly.

The following is an example of a Log:

	PkSize	Hub	Slot	Port	Gap	Rate	Burst	RcvPkt	XmtPkt	Collision	RcvTrig	Rc
1	Throughput :: 1 to 1 test											
2	Trial: 1 Repetition: 1 Frame Size: 64 Percent Rate:50.03 Duration: 10 sec.											
3	Throughput :: 1 to 1 test											
4	Trial: 1 Repetition: 1 Frame Size: 64 Percent Rate:100.00 Duration: 10 sec.											
5	64	1	1	1	96	148810	1488095	0	1488095	0	0	100
6	64	1	2	1	96	148810	14881	1488095	0	0	1488095	952
7	Throughput :: 1 to 1 test											
8	Trial: 1 Repetition: 1 Frame Size: 128 Percent Rate:100.00 Duration: 10 sec.											
9	128	1	1	1	96	84459	844594	0	844594	1	0	100
10	128	1	2	1	96	84459	14681	750421	0	0	750422	960
11	Trial: 1 Repetition: 2 Frame Size: 128 Percent Rate:50.02 Duration: 10 sec.											
12	Throughput :: 1 to 1 test											
13	Trial: 1 Repetition: 1 Frame Size: 64 Percent Rate:100.00 Duration: 10 sec.											
14	64	1	1	1	96	148810	1488095	0	1488095	2	0	100
15	64	1	2	1	96	148810	14881	1310411	0	0	1310412	838
16	Trial: 1 Repetition: 2 Frame Size: 64 Percent Rate:50.03 Duration: 10 sec.											
17	64	1	1	1	767	74460	744601	0	744601	1	0	997
18	64	1	2	1	96	148810	14881	672545	0	0	672545	430
19	Trial: 1 Repetition: 3 Frame Size: 64 Percent Rate:50.03 Duration: 10 sec.											
20	64	1	1	1	767	74460	744601	0	744601	1	0	997



# 7

## Test Scenario



### What's in this Chapter

This chapter contains the following sections:

***Section 1: About the Scenarios***

***Section 2: Throughput Test Scenario***

***Section 3: Latency Test Scenario***

***Section 4: Packet Loss Test Scenario***

***Section 5: Back-to-Back Test Scenario***



## About the Scenarios

The scenarios described provide successful sample test configurations for DUTs (routers or switches). Although these examples may not match your test environment exactly, they help demonstrate how you might run a test and what the results would look like. Naturally, you would configure test configurations to your own needs.



**Note:** All of the scenarios described apply to either a router or switch. However, if the device under test is a router, the **Router Test** box must be checked on the **Preferences** tab of the Test Setup window.

## Throughput Test Scenario

The Throughput test measures the fastest rate at which a device can forward frames without error. If a single frame is dropped the test fails and the test is repeated at a lower throughput rate.

## Sample Test Configuration

In this example we selected Port 1 and Port 2 for testing as shown here:

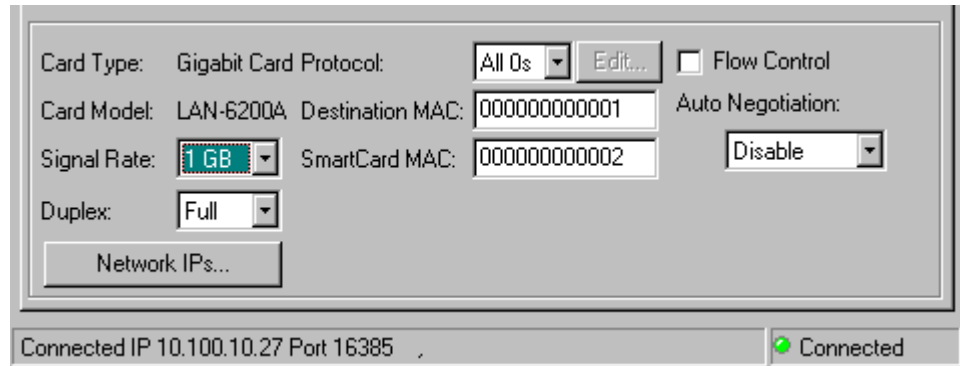
The screenshot shows a configuration window titled "1 to 1". It contains three main sections: "Source ( Hub,Slot,Port )", "Destination ( Hub,Slot,Port )", and "Test Pairs ( Hub,Slot,Port ) --> ( Hub,Slot,Port )".

Source ( Hub,Slot,Port )	Destination ( Hub,Slot,Port )	Test Pairs ( Hub,Slot,Port ) --> ( Hub,Slot,Port )
(01,02,01)	(01,02,01)	(01,01,01) --> (01,01,02)
(01,02,02)	(01,02,02)	
(01,03,01)	(01,03,01)	
(01,03,02)	(01,03,02)	
(01,04,01)	(01,04,01)	
(01,04,02)	(01,04,02)	

Below the lists are three buttons: a right arrow (>), a left arrow (<), and a double left arrow (<<). At the bottom, there are two checkboxes: "Bi-directional" (unchecked) and "Reverse Tx & Rx port" (unchecked). On the right, there are two radio buttons: "1 to 1" (selected) and "1 to M" (unselected).

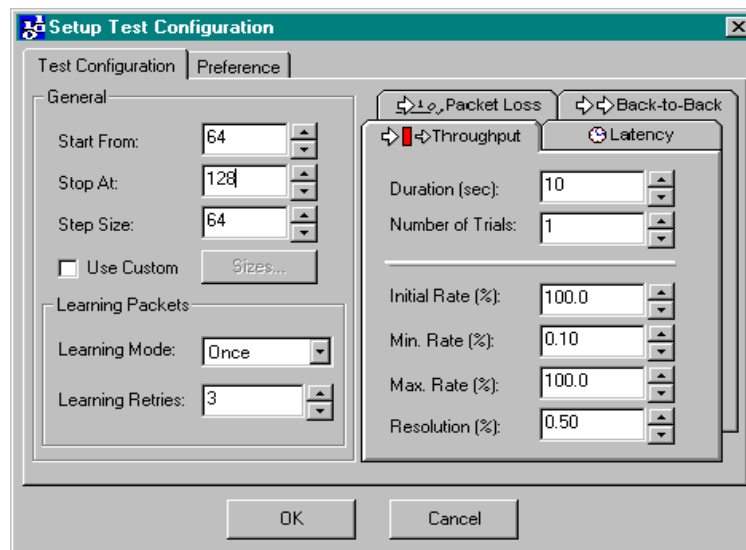


In the card attributes tabs for the ports, the **Destination MAC** and **SmartCard MAC** correspond to the sending and receiving port numbers, as shown here:



In this example the DUT is a switch. If we tested a router the **Protocol** field would have to contain a Layer 3 protocol instead.

The following window displays the test configuration used for this test:



For this example, the test is set to start (Initial Rate) at 100%, the maximum rate to 100%, the minimum rate to 50%, and the resolution to 1%. To save time the test is set for a minimum of 64 bytes and a maximum of 128 bytes with a step size of 64. This will cause two tests to run: one at 64 packets and a second at 128 packets.

The test will start running at 100% and fall back down from there if any packets are lost. The minimum rate is 50%.



**Note:** The rates in this example were selected to minimize the number of tests run. RFC 1242 actually recommends frame sizes for Ethernet of 64, 128, 256, 512, 1024, 1280 and 1518 (the default sizes when the Use Custom box is checked).

## Sample Test Results

The Results window for that test appears as soon as the test is started. The following is a sample of the Results window for the Throughput Test:

- This trial failed.
- The rate at which the test failed.
- The current rate to which the test dropped.

Frame Size	Initial Rate(%)	1 to 2 (pkts/sec)	Total
64	100%	74625	74625
128	100%		

The current rate to which the test dropped.

The rate at which the test failed.

Since we selected packet sizes of 64 and 128 bytes, only two tests are shown. The test failed at an initial rate of 100%, dropped down to 80% for the next trial. For subsequent trials normally a binary search rate that is between the successful and failed rates. In this case that would be 40%, however since the Min. Rate for this test is set to 50% the rate will not drop below that. The screen capture was taken when it dropped down to 50%.

## Sample Test Log

- Shows packets received
- Shows packets transmitted
- The following screen illustrates the log for the scenario we have been using.

	PkSize	Hub	Slot	Port	Gap	Rate	Burst	RcvPkt	XmtPkt	Collision	RcvTrig	Rcv
1	Throughput :: 1 to 1 test											
2	Trial: 1 Repetition: 1 Frame Size: 64 Percent Rate:50.03 Duration: 10 sec.											
3	Throughput :: 1 to 1 test											
4	Trial: 1 Repetition: 1 Frame Size: 64 Percent Rate:100.00 Duration: 10 sec.											
5	64	1	1	1	96	148610	1486095	0	1486095	0	0	100
6	64	1	2	1	96	148610	14861	1486095	0	0	1486095	952
7	Throughput :: 1 to 1 test											
8	Trial: 1 Repetition: 1 Frame Size: 128 Percent Rate:100.00 Duration: 10 sec.											
9	128	1	1	1	96	84459	844594	0	844594	1	0	100
10	128	1	2	1	96	84459	14861	750421	844594	0	750422	960
11	Trial: 1 Repetition: 2 Frame Size: 128 Percent Rate:50.02 Duration: 10 sec.											
12	Throughput :: 1 to 1 test											
13	Trial: 1 Repetition: 1 Frame Size: 64 Percent Rate:100.00 Duration: 10 sec.											
14	64	1	1	1	96	148610	1486095	0	1486095	2	0	100
15	64	1	2	1	96	148610	14861	1310411	0	0	1310412	836
16	Trial: 1 Repetition: 2 Frame Size: 64 Percent Rate:50.03 Duration: 10 sec.											
17	64	1	1	1	767	74460	744601	0	744601	1	0	997
18	64	1	2	1	96	148610	14861	672545	0	0	672545	430
19	Trial: 1 Repetition: 3 Frame Size: 64 Percent Rate:50.03 Duration: 10 sec.											
20	64	1	1	1	767	74460	744601	0	744601	0	0	997

The difference in the number of packets transmitted and received indicates packet loss.

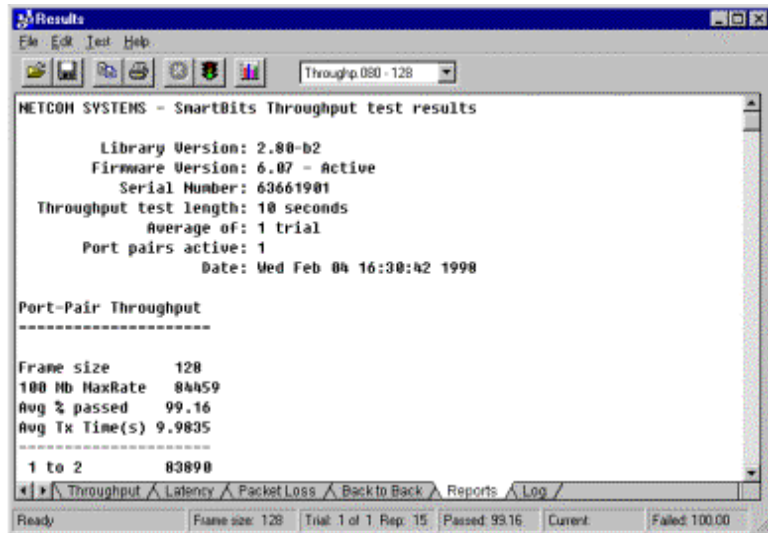


**Note:**

- 1) Lines 1 through 6 represent one trial and one repetition.
- 2) The field that caused the iteration to fail (error) is indicated in red.

## Sample Test Report

The report summarizes the test.

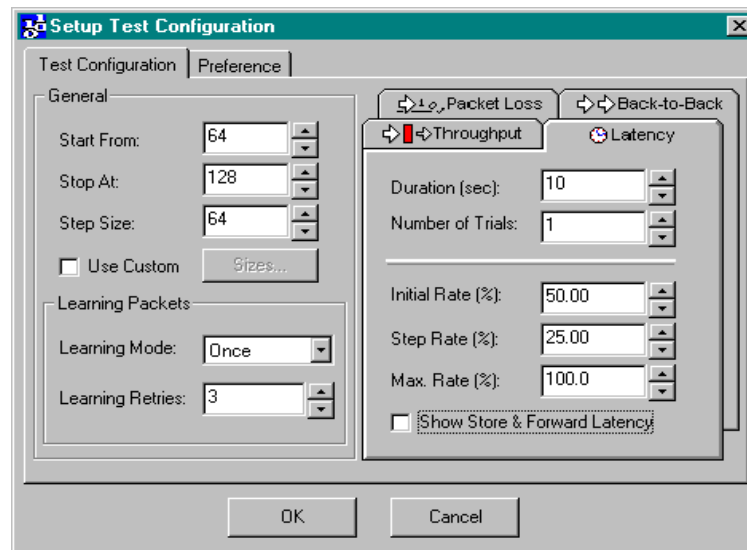


## Latency Test Scenario

The **Min. Rate** field does not apply to Latency testing.

### Sample Test Configuration

The following **Test Configuration** tab of the Test Setup window shows the settings used in this scenario:



We will test with 64-byte packets and 128-byte packets. Each trial will last 10 seconds. Learning Packets will be sent once before each test.

These settings show an Initial Rate of 50% a Step Rate of 25% and a Max Rate of 100%. These settings will cause six tests to run. The tests will run with 64-byte packets at 50%, 75% and 100%, then with 128-byte packets at 50%, 75% and 100%.

The Latency test does not step down in percentage of transmission. For example, if we set Initial Rate to 100%, Minimum Rate to 50% and Step Rate to 25%, the test will only run at 100%.



**Note:** Rates in this example were selected to minimize the number of tests run. RFC 1242 actually requires a minimum of 20 repetitions (Number of Trials) with a recommended stream duration of at least 120 seconds. The recommended frame sizes for Ethernet are 64, 128, 256, 512, 1024, 1280 and 1518 (the default sizes when the Use Custom box is checked).

## Sample Test Results Window for Latency

The sample Results window below shows the Latency test in progress. Test results are displayed for both Cut Through and Store and Forward devices. Use the measurement that is appropriate for your type of device.

Frame Size	Initial Rate(%)	1 to 2 (us)	Average						
64	50%	1.20	1.200						
64	75%	1.20	1.200						
64	100%	1.20	1.200						
128	50%	1.00	1.000						
128	75%								
128	100%								

The 64-byte tests are complete at 50%, 75% and 100%. The latency time is 1.2 microseconds for all rates. The 50% test with 128-byte packets is also complete with a latency of 1 microsecond.

In the status bar at the bottom of the window displays current activity:

- Transmitting 4 of 10 seconds
- Frame size being transmitted (128 bytes)
- Current trial count (1 of 1)
- Current rate (74.99%)



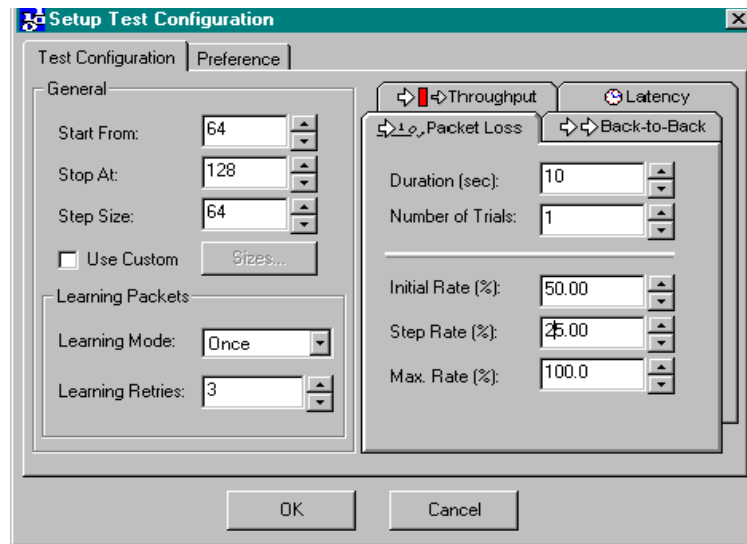
**Note:** Passed and Failed statuses are not used in the Latency test.

## Packet Loss Test Scenario

This test measures the percentage of frames lost by the DUT that should have been forwarded.

### Sample Test Configuration

In this example, the Packet Loss test ran with the following settings:



We have left the Packet Size to Test set to start with 64 byte packets, increase by 64 bytes after each test, and stop when the packet size is equal to or greater than 128. This results in six trials: 64-byte packets sent at 50%, 75% and 100%, and 128-byte packets sent at 50%, 75% and 100%.



**Note:** Rates in this example were selected to minimize the number of tests run. The recommended frame sizes for Ethernet are 64, 128, 256, 512, 1024, 1280 and 1518 (the default sizes when the Use Custom box is checked).

## Sample Results Window

Based on the settings in this scenario, the following Results window was displayed:

Frame Size	Initial Rate(%)	1 to 2 (%)	Average
		10M-10M	
64	50%	0.000	0.000
64	75%	11.555	11.555
64	100%	16.239	16.239
128	50%		
128	75%		
128	100%		

In this example the first test ran at 50% with 64-byte packets and no packet loss. The loss rate (shown in the 1 to 1 column) shows 0% lost.

The second test ran at 75% with 64-byte packets, and 11.555% of the packets transmitted were lost. In the third test, 16.239% of the packets transmitted were lost.

## Results Window for a Router

We also ran this test on two 10 Mbps routers joined by a 56 kbps link. Therefore, the packet loss was very high, as shown below:

Frame Size	Initial Rate(%)	1 to 2 (%)	Average
		10M-10M	
64	50%	90.243	90.243
64	75%	95.352	95.352
64	100%	98.368	98.368
128	50%	77.984	77.984
128	75%	86.964	86.964
128	100%	91.517	91.517

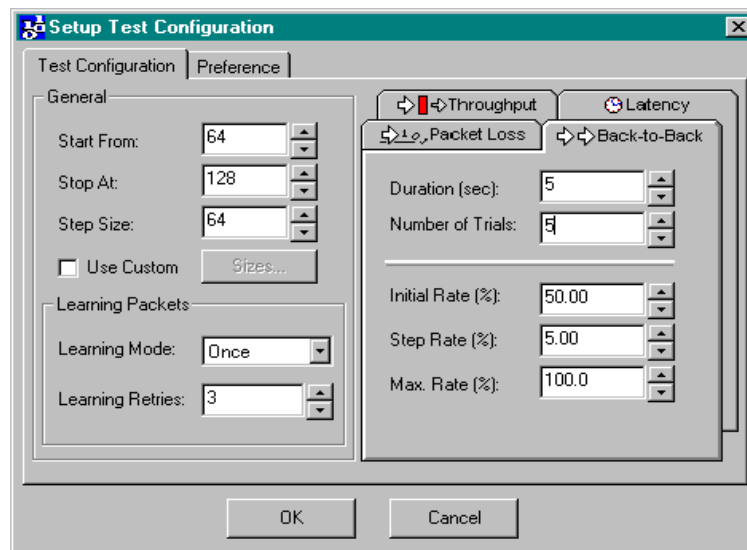


## Back-to-Back Test Scenario

Back-to-Back tests the buffering capability of the device under test.

### Sample Test Configuration

In this example, the back-to-back test ran with the following settings:



The test is set to run five, 5-second trials per test. The testing will start at the 50% rate and increase in 25% steps to a maximum of 100%. It starts with 64-byte packets and increases by 64 bytes in each test to a maximum of 128-byte packets.



**Note:** Rates in this example were selected to minimize the number of tests run. RFC 1242 actually recommends at least 50 trials with a required minimum duration of 2 seconds with frame sizes for Ethernet of 64, 128, 256, 512, 1024, 1280 and 1518 (the default sizes when the Use Custom box is checked).

## Sample Results Window

Based on the settings shown above, this test produced the following Results window:

Frame Size	Initial Rate(%)	1 to 2 (frames)	Total						
64	50%	37200	37200						
64	75%	55800	55800						
64	100%	74405	74405						
128	50%	21115	21115						
128	75%	31670	31670						
128	100%	42230	42230						

This Results window shows the number of frames in the longest burst that the DUT handled without dropping a packet. In this scenario we used a jumper wire to connect the two SmartCards under test. Therefore the results shown here only represent the maximum number of frames of that size that can be transmitted at the test rate.



# Glossary

This glossary describes the terminology, abbreviations, and acronyms introduced in this guide, as well as terms based on networking technology and standards.

## Acronyms and Abbreviations

Acronym / Abbreviation	Definition
<i>AMI</i>	Alternate Mark Inversion.
<i>ATM</i>	Asynchronous Transfer Mode. Transfer mode in which information is organized into cells.
<i>CPE</i>	Customer Premise Equipment.
<i>CRC</i>	Cyclic Redundancy Check.
<i>CSU</i>	Channel Service Unit.
<i>CTS</i>	Clear to Send.
<i>DCD</i>	Data Carrier Detect.
<i>DLCI</i>	Data Link Connection Identifier.
<i>DSR</i>	Data Set Ready.
<i>DSU</i>	Data Service Unit.
<i>DTR</i>	Data Terminal Ready.
<i>DUT</i>	Device Under Test.
<i>ELAN</i>	Emulated Local Area Network. A group of ATM and legacy devices registered with the LES that constitute a logical network.
<i>ESI</i>	End System Identifier.

## Glossary

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Acronym / Abbreviation	Definition
<i>FIFO</i>	First in-first out.
<i>GPS</i>	Global Positioning System.
<i>ILMI</i>	Interim Local Management Interface. Discovers and registers ATM addresses of attached hosts.
<i>IP</i>	Internet Protocol. Works in conjunction with TCP and is usually identified as TCP/IP.
<i>IPX</i>	Internetwork Packet Exchange.
<i>LAN</i>	Local Area Network. Designed to move data between stations within a campus.
<i>LEC</i>	Lan Emulation Client. A device such as a server, switch, or workstation that performs ATM signaling and control functions while communicating with other devices in an ELAN. Every LEC Client has an ATM address and a MAC address.
<i>LECS</i>	LAN Emulation Configuration Server. Provides mapping information about ELANs on the ATM network that a LEC may join.
<i>LES</i>	LAN Emulation Server. Registers the MAC addresses of each LEC on the non-ATM LAN and resolves the MAC address to an ATM address.
<i>LIFO</i>	Last in-first out.
<i>LMP</i>	Link Management Protocol.
<i>NRZ</i>	Non-return to zero
<i>NRZI</i>	Non-return to zero inverted.
<i>PCB</i>	Printed Circuit Board.
<i>PPP</i>	Point-to-Point Protocol.
<i>PVC</i>	Permanent Virtual Circuit. A dedicated channel between endpoints through an ATM network used for long-term data transfer.
<i>RFC</i>	Request For Comments. Document series used as the primary means for communicating information about the Internet.

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Acronym / Abbreviation	Definition
<i>RIP</i>	Routing Information Protocol.
<i>RTS</i>	Request to Send.
<i>SMB</i>	SmartBits.
<i>SNAP</i>	Subnetwork Access Protocol.
<i>SRA</i>	Source Route Addressing.
<i>SVC</i>	Switched Virtual Circuits. Switched Virtual Circuit: A connection established through signaling with user-defined endpoints when the call is initiated.
<i>UDP</i>	User Datagram Protocol. Connectionless transport layer protocol in the TCP/IP protocol stack.
<i>VCI/VPI</i>	Virtual Channel Identifier/Virtual Path Identifier. A connection in the form of a channel which has been successfully initialized and on which data is ready to be transmitted and received. Provides mapping information for routing cells from a source to destination.
<i>WAN</i>	Wide Area Network

### Terminology

***Back-to-Back test***

Tests the buffering capability of the device under test (DUT).

***bi-directional***

Port pairs transmitting simultaneously in both directions, as in full duplex operation.

***card***

In this manual, refers to any SmartCard or printed circuit board (PCB) that resides within a SmartModule or MiniModule.

***frame***

A data pattern that a stream transmits.

***hub***

The SmartBits chassis that contains a SmartCard or module.

***iteration***

An iteration is when SmartApplications, while maintaining the frame size, varies the transmission rate based on the last failed rate. The resolution and number of repetitions determines the accuracy of results.

***latency***

Delay between the time a device receives a frame and the time that frame is forwarded out the destination port.

***MAC address***

A 6-byte IEEE identifier for hardware devices, sometimes called a hardware address.

***Next Hop test***

Tests a router's ability to recognize the next hop address and update its routing table with this address.

***Packet Loss test***

Measures the percentage of frames lost by the device under test (DUT) that should have been forwarded.

***port***

On a SmartBits chassis, the port on a SmartCard or module.

***slot***

On a SmartBits chassis, a slot is where the SmartCard or module is inserted.

***stream***

An engine which defines where and how to transmit a frame repeatedly.

***test***

Refers to the test (such as Throughput or Latency) run for a particular frame size.

***Throughput test***

Tests the fastest rate at which a device can forward frames without error.

***trial***

One set of iterations for a specific frame size and varying transmission rates. Tests use trials to determine the optimal rate of traffic for that frame size.



**Glossary**

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