SCRAMNet® Network

Monitor & Analyzer (SCRAMalyzer) User Manual

Document No. D-T-MU-SCALYZER-A-0-A1

FOREWORD

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FCC

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1. INTRODUCTION

1.1 How to Use This Manual

1.1.1 Purpose

This manual describes the operating features of the SCRAMNet Network Monitor and Analyzer (SCRAMalyzer). The SCRAMalyzer is a tool for measuring and diagnosing SCRAMNet network performance.

1.1.2 Scope

This document is intended for SCRAMNet network system managers and/or engineers. You can use the SCRAMalyzer to understand and improve your SCRAMNet network operations. To use this manual effectively you need an understanding of the SCRAMNet network; its hardware and software components, and Windows NT.

1.1.3 Style Conventions

The following conventions are used in this document:

- The (CTRL)(C) symbol indicates that you must press the (CTRL) key while you simultaneously press another key (in this case, (C)).
- Names of files, parameters and commands are in bold type; for example, **sysconfigtab** file.
- Names of called routines are followed by open and closed parentheses and are printed in italics; for example, *dma_read()*.
- Directory path names are in italics; for example, *mkdir /usr/*SCRAMNet.
- In a prompt, square brackets indicate that the enclosed item is the default response. For example, [y] means the default response is Yes.
- Menu items are in single quotation marks; for example, 'File', 'Start', etc.
- Button names are bolded, such as **OK**.

1.2 Related Information

- *SCRAMNet Network Media User's Guide*
  (Document No. D-T-MU-MEDIA)
- The appropriate SCRAMNet hardware reference manual corresponding to the specific SCRAMNet boards in your network
- *FieldGo PCATX-N9 Series Portable Workstation User's Guide*
  (Broadax Systems, Inc.)
- Broadax Systems, Inc. web site: www.bsicomputer.com

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- Improve the quality of our operations to meet the needs of our customers, suppliers, and other stakeholders.
- Provide our employees with the tools and overall work environment to fulfill, maintain, and improve product and service quality.
- Ensure our customer and other stakeholders that only the highest quality product or service will be delivered.

The British Standards Institution (BSI), the world's largest and most respected standardization authority, assessed Systran's Quality System. BSI's Quality Assurance division certified we meet or exceed all applicable international standards, and issued Certificate of Registration, number FM 31468, on May 16, 1995. The scope of Systran's registration is: "Design, manufacture and service of high technology hardware and software computer communications products." The registration is maintained under BSI QA's bi-annual quality audit program.

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Technical documentation is provided with all of our products. This documentation describes the technology, its performance characteristics, and includes some typical applications. It also includes comprehensive support information, designed to answer any technical questions that might arise concerning the use of this product. We also publish and distribute technical briefs and application notes that cover a wide assortment of topics. Although we try to tailor the applications to real scenarios, not all possible circumstances are covered.

Although we have attempted to make this document comprehensive, you may have specific problems or issues this document does not satisfactorily cover. Our goal is to offer a combination of products and services that provide complete, easy-to-use solutions for your application.

If you have any technical or non-technical questions or comments (including software), contact us. Hours of operation are from 8:00 a.m. to 5:00 p.m. Eastern Standard/Daylight Time.

- Phone: **(937) 252-5601** or **(800) 252-5601**
- E-mail: **support@systran.com**
- Fax: **(937) 252-1349**

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To learn more about Systran products or to place an order, please use the following contact information. Hours of operation are from 8:00 a.m. to 5:00 p.m. Eastern Standard/Daylight Time.

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2. PRODUCT OVERVIEW

2.1 Overview

This chapter describes the SCRAMalyzer and lists its features. SCRAMalyzer measures your network's performance and reports the results in real-time. This information can help you identify network performance issues and aid you in improving your network design. A photo of a SCRAMalyzer unit is shown in Figure 2-1.

Figure 2-1 SCRAMalyzer

2.2 Description

The SCRAMalyzer is a portable system used to non-obtrusively monitor, record, and analyze SCRAMNet network performance. The SCRAMalyzer displays and collects real-time data traffic including network throughput and latency.

Physically, SCRAMalyzer is a portable industrial computer running Windows NT with a graphic user interface (GUI) and all associated utility software. The software provides "post-test" throughput versus time data plotting and statistical analysis data. Latency measurement graphs provide easy throughput and latency comparisons. You can also generate text-based data reports for post-test analysis.

:

2.3 Features

The SCRAMalyzer system has the following specific features:

- Real-time network data throughput sampling (up to 1 ms rate).
- Real-time network latency sampling.
- Data statistics analysis package.
- Time versus throughput display.
- Throughput probability mass function.
- Throughput probability density function.
- Continuous real-time (scrolling) display.
- Pre-installed software.
- On-line documentation.

3. INSTALLATION

3.1 Overview

This chapter contains the information you need to properly install SCRAMalyzer.

Refer to the *FieldGo PCATX-N9 Series Portable Workstation User's Guid*e for information on unpacking and starting your system.

3.2 Connections

Add the SCRAMalyzer into the SCRAMNet ring like you would another node by connecting the fiber-optic cables from a downstream node to the SCRAMalyzer, and from the SCRAMalyzer to an upstream node.

Turn on the power, and wait for the computer to boot.

FIBER-OPTIC CABLE PRECAUTIONS

Fiber-optic cables are made of glass and may break if crushed or bent in a loop with less than a 2-inch radius.

Perform a visual check of the cable ends before inserting into the Media Card interface. If debris is inserted into the transmitter/receiver connector, it may not be possible to clean it out and it could result in damage to the transmitter or receiver lens. Hair, dirt, and dust can interfere with the light signal transmission.

Use an alcohol-base wipe to clean the cable ends.

CAUTION: No other applications should be running while using SCRAMalyzer. If other applications are running the performance will be degraded.

3.2.1 Fiber-optic Configuration (SCRAMNet SC78)

The basic SCRAMNet SC78 Series Network communication architecture consists of SCRAMNet SC78 boards connected together by fiber-optic cable in a ring configuration. The maximum recommended distance between each node of the network using this configuration is approximately 300 meters. The recommended fiber-optic cable is 62.5/125 micron core multi-mode fiber cable with ST connectors.

NOTE: On a freshly powered system, a message from any node on the ring may be necessary to establish the carrier signal.

FIBER-OPTIC CONNECTORS

The fiber-optic cables are shipped in a separate carton. The fiber-optic cables are to be attached to the connectors on the SCRAMNet SC78 board or the Cabinet Kit, as appropriate. Remove the rubber boots on the fiber-optic transmitters and receivers as well as the ones on the fiber-optic cables. These rubber boots should be replaced when cables are not in use or in the event the node must be returned to the factory.

There are two types of “bayonet” fiber-optic connector used on ST fiber-optic cables. The newer type is made by 3M and is smaller than the AT&T ST connector. Install the connector by pushing it onto the board connection and twisting the connector to the right (clockwise) to engage the blade. Remove it by pressing the metal sleeve toward the board and twisting to the left (counter-clockwise) to disengage the blade.

The primary difference between the connector types is that the AT&T connector provides a “locking” mechanism. Before it can engage or disengage the blade on the board connection, the plastic boot must be unscrewed at least 1/4" inch and then re-tightened.

3.2.2 Fiber-optic Configuration (SCRAMNet SC150)

The SCRAMNet SC150 Series Network communication architecture consists of SCRAMNet SC150 boards tied together by paired sets of fiber-optic cable in a ring configuration. The maximum recommended distance between each node of the network using this configuration is approximately 300 meters. The recommended fiber-optic cable is 62.5/125 micron core multi-mode fiber cable with ST connectors.

NOTE: On a freshly powered system, a message from any node on the ring may be necessary to establish the carrier signal.

FIBER-OPTIC CONNECTORS

The fiber-optic cables are shipped in a separate carton. The fiber-optic cables are to be attached to the connectors on the SCRAMNet SC78 board or the Cabinet Kit, as appropriate. Remove the rubber boots on the fiber-optic transmitters and receivers as well as the ones on the fiber-optic cables. These rubber boots should be replaced when cables are not in use or in the event the node must be returned to the factory. Figure 3-1 is a representation of an ST fiber-optic connector.

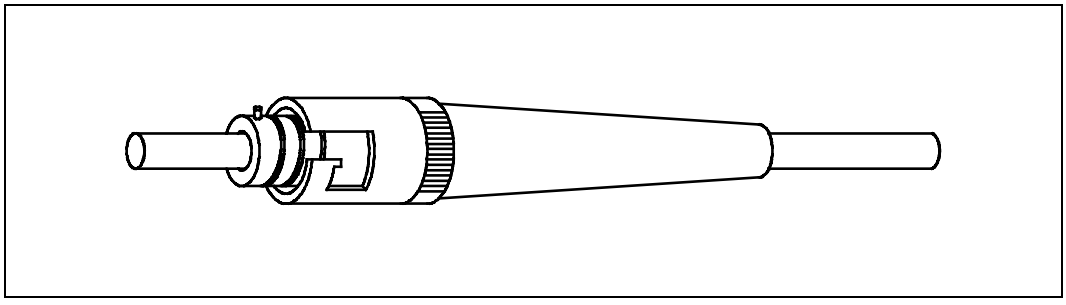

Figure 3-1 Fiber-optic ST Connector

3.2.3 Fiber-optic Connection

SCRAMNet SC78 SERIES PRODUCTS

Connect the fiber-optic cable to the receive (R) and transmit (T) connectors on the SCRAMNet SC78 board as shown in Figure 3-2.

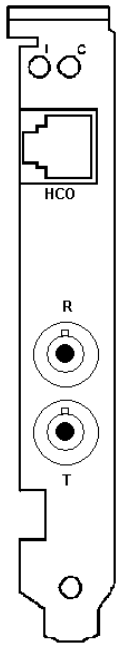

Figure 3-2 SC78 PCI Faceplate

The fiber-optic cable transmitter of the up-stream node is connected to the receiver of the down-stream node. Data flows from the transmitter of one node to the receiver of the next node as shown in Figure 3-3.

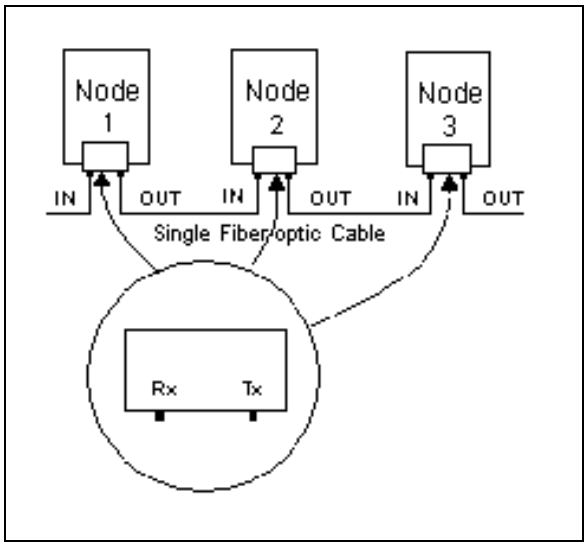

Figure 3-3 SC78 Fiber-Optic Connections

SCRAMNet SC150 SERIES PRODUCTS

Connect the fiber-optic cable to the receive (R_1, R_2) and transmit (T_1, T_2) connectors on the SCRAMNet SC150 board as shown in Figure 3-4.

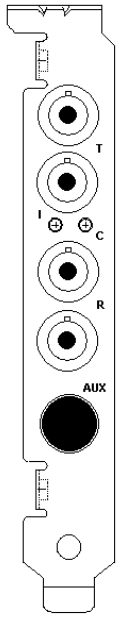

Figure 3-4 SC150 PCI Faceplate

The fiber-optic cable transmitter pairs of the up-stream node are connected to the receiver pair of the down-stream node. Data flows from the transmitter pair of one node to the receiver pair of the next node as shown in Figure 3-5.

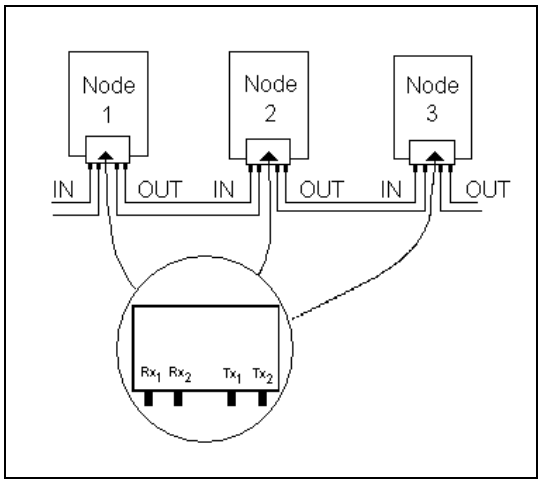

Figure 3-5 SCRAMNet SC150x Fiber-optic Connections

NOTE: It does not matter if Tx_1 or Tx_2 is connected to the next node's Rx_1 or Rx_2 as long as both Tx cables are connected to both of the next node's Rx connectors.

3.3 Fiber-Optic Cable Maintenance

It is important that the ends of the fiber-optic cable be kept clean. If there is an exceptional amount of light-power loss experienced, the cable ends should be inspected for cleanliness. Alcohol-based fiber-optic cleaning pads are available to remove minor contaminants such as dust and dirt.

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4. OPERATION

4.1 Overview

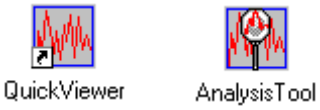
This chapter contains the information you need to properly operate SCRAMalyzer and use its capabilities.

SCRAMalyzer has two operational modes:

- **SCRAMalyzer Quick Viewer** - Provides a scrolling real-time graph displaying a coarse view (10 ms rate) of the SCRAMNet network throughput and latency. A snapshot of this data can be stored to disk for post-test analysis. The snapshots can be taken either manually or automatically.
- **SCRAMalyzer Analysis Tool** - Passively collects data faster in real-time (1 ms rate). When data collection is halted, the application provides various statistical data reports regarding network throughput and latency.

4.2 Getting Started

To begin using SCRAMalyzer, select one of the SCRAMalyzer operational modes from the 'Start' | 'Programs' menu or click on the icon:



CAUTION: Node ID must be unique for each node in the network.

4.3 SCRAMalyzer Quick Viewer

The Quick Viewer Application starts examining the network immediately after clicking on the Quick Viewer icon. The Quick Viewer window is shown in Figure 4-1.

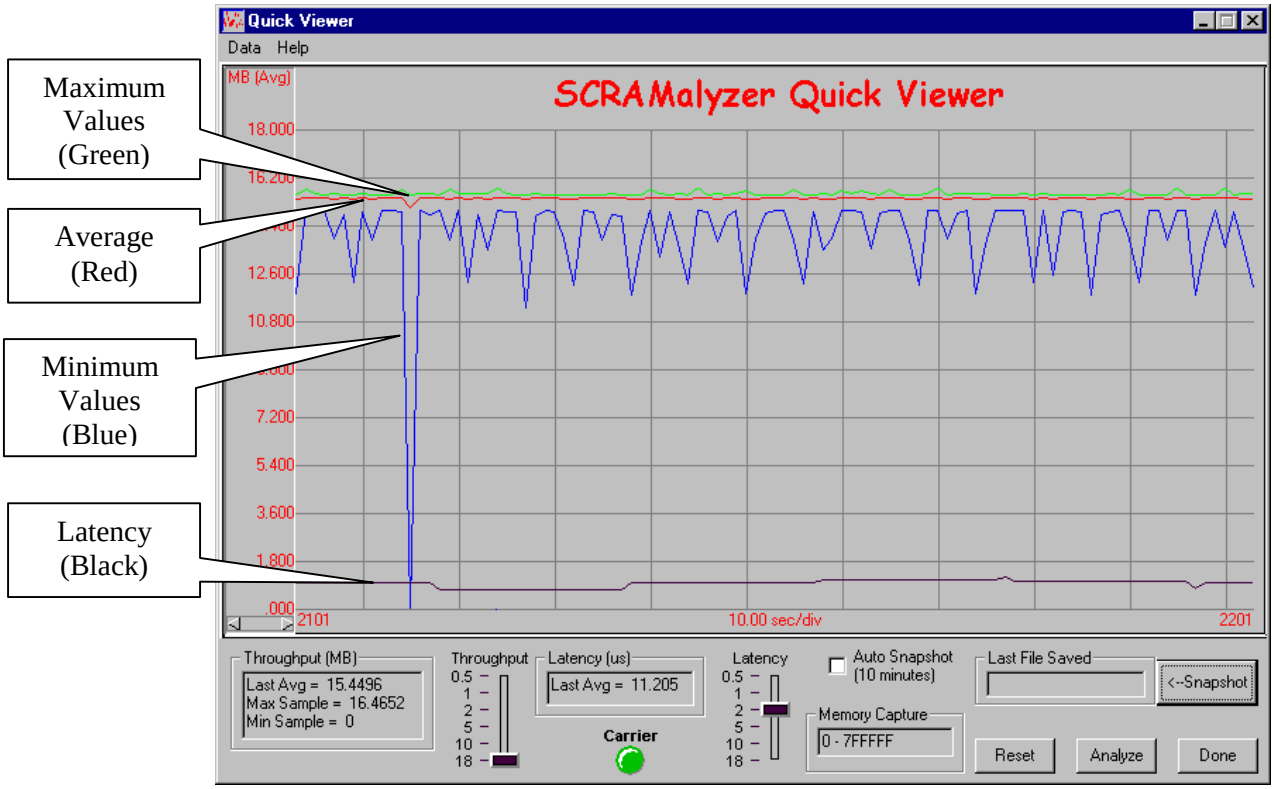


Figure 4-1 SCRAMalyzer Quick Viewer Dialog

The Quick Viewer provides:

- Both graphic and text representations of the SCRAMNet throughput. The graphic lines are based on one-second sample averages.
  - The red line represents the average.
  - The green line displays the maximum values.
  - The blue line displays the minimum values.
- Both graphic and text representations of the SCRAMNet latency. This graphic line is based on a 1 second average. The black line represents the latency.
- A network Carrier Detect indicator.
- Slider controls to adjust the vertical scale of latency and throughput.
- A **Reset** button to reinitialize the running maximum and minimum values displayed and restarts scrolling.
- The current Trigger window settings.
- Snapshot buffer information and control.
- An **Analyze** button to run the SCRAMalyzer analysis tool.

4.3.1 Viewing Options

To view the *y*-axis of each plotted line, click on the small triangles at the bottom-left of the plot. The color of the *y*-axis text changes to correspond to the color of the line it represents. Also, the label (shown at the top of the *y*-axis) changes to describe each line. Scroll through the *y*-axes in the following order:

- Red - MB (Average throughput)
- Green - MB (Maximum throughput)
- Blue - MB (Minimum throughput)
- Black - μs (Latency)

These items are rotated through both forward and backwards depending on which triangle you click on.

4.3.2 The Carrier LED

The Carrier LED on the Quick Viewer window detects the presence of the carrier signal on the SCRAMNet ring. If the carrier is lost due to a broken or disconnected cable or for some other reason, the light will be red. If the carrier is present the light will glow green. If you cannot resolve the problem, contact Technical Support.

4.3.3 Measuring Throughput

The Quick Viewer performs the following functions:

- Captures and saves SCRAMNet throughput data to disk for future examination.
- Displays statistical data.
- Provides custom setup of various parameters.

THE THROUGHPUT TEXT BOX

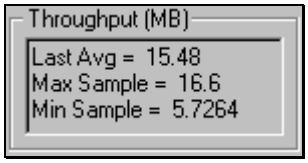


Figure 4-2 Quick Viewer Throughput Text box

The Quick Viewer Throughput Text box, shown in Figure 4-2, displays the maximum, minimum, and last average sample of the SCRAMNet network throughput. All values displayed and plotted are calculated by averaging all throughput samples taken at 10 millisecond intervals (100 per second) and averaged for one second (100 samples). An average, maximum, and minimum of this one-second collection of data are plotted in the graph of Figure 4-1. The average value is displayed numerically in the Throughput Text box as *Last Avg.* The absolute maximum and minimum averages seen since the application was started or reset is displayed in the Throughput text box as "Max Sample" and "Min Sample." Pressing the **Reset** button conveniently clears these maximum and minimum values.

THROUGHPUT SCALING

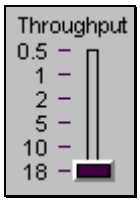


Figure 4-3 Throughput Vertical Scale Slider

The Quick Viewer Throughput Scaling slider, shown in Figure 4-3,allows you to control the scaling of the SCRAMNet network throughput plot. You can change the scale by either dragging the “thumbtack” or by clicking in the guide area above or below the “thumbtack.” The SCRAMalyzer retains the value of the slider position and resets it to that position when the application is reopened.

SETTING THE SNAPSHOT BUFFER SIZE

Select ‘Data’ | ‘Set Snapshot Buffer Size’ within the Quick Viewer application to open the ‘Snapshot Buffer Size Editor’ dialog box.

Figure 4-4 Quick Viewer Snapshot Buffer Size Editor

The Quick Viewer application collects throughput data in a buffer. This data represents a snapshot of throughput information of a desired length of time. The Quick Viewer retains the snapshot buffer size and resets it to that value when the application is reopened.

The application calculates the buffer size to accommodate the desired timeframe selected in the ‘Snapshot Buffer Size Editor’ dialog box shown in Figure 4-4. You can press the **Size** button to display the size of buffer you are creating.

SETTING MEMORY CAPTURE RANGE

Select ‘Data’ | ‘Set Memory Capture Range’ within the Quick Viewer application to open the ‘Set Memory Capture Range’ dialog box.

The SCRAMalyzer displays throughput measurements based on activity of specific areas of SCRAMNet memory. By default, SCRAMalyzer evaluates all SCRAMNet memory areas. To examine a specific memory area, define the area in the ‘Memory Capture Range’ dialog box shown in Figure 4-5.

NOTE: This feature is not available on SCRAMNet SC78 systems.

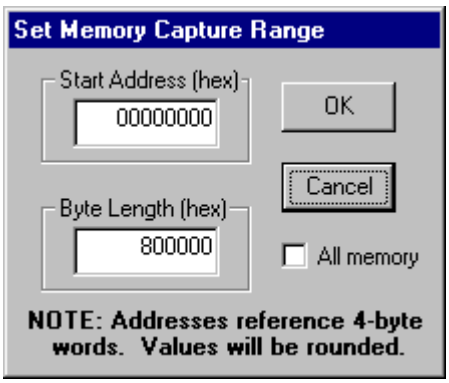


Figure 4-5 Quick Viewer Set Memory Capture Range Dialog

NOTE: The smallest memory area allowed is one longword (4 byte words). If a length is entered that does not evenly divide by four then the length is rounded up to the next full 4-byte word. For example, if you enter a starting address of 0 and a length of 1, SCRAMalyzer detects activity on byte addresses 0 through 3.

Since the dialog box asks for a starting address and length, it is possible to enter values that exceed the size of their SCRAMNet card. If this occurs, the size value is automatically set to the correct value after clicking on the **OK** button.

There is also an 'All memory' checkbox that selects the entire address range of SCRAMNet memory as the Memory Capture Range. The Memory Capture Range function retains the starting address and length values and resets it to those values when the application is reopened.

4.3.4 Saving Throughput Measurements

The throughput plot displayed on the Quick Viewer can be saved to a file for future analysis. The size of the file is defined by the size (time period) of the Snapshot buffer (see **SETTING THE SNAPSHOT BUFFER SIZE** above).

THE SNAPSHOT BUTTON

The **Snapshot** Button copies the content of the Snapshot buffer into a file. The filename of the saved buffer is named for the time and date in which it was stored. The format is of the form *DATE_TIME*.szr. For example:

17NOV99_162736.szr

The file above represents a buffer saved on November 17, 1999 at 4:27:36 P.M. This file can be read into the Analysis Tool for further study at a later time.

THE AUTO SNAPSHOT FEATURE

If the *Auto Snapshot* check box is checked, SCRAMalyzer will automatically create a file (of the above format) and copy all Snapshot data into the file at the rate defined by the Snapshot buffer size. By enabling this feature, **all throughput data** is stored into files on the SCRAMalyzer's hard drive for future review. The number of files and size of the files are, again, defined by the size of the Snapshot buffer and the system hard drive. This can be very convenient for storing all of the SCRAMNet activity overnight or for long periods of time.

4.3.5 Measuring Latency

Latency is the amount of time it takes for a packet to go completely around the SCRAMNet ring. SCRAMalyzer determines this time by putting a single packet on the ring and measuring how long it takes to complete the trip.

THE LATENCY TEXT BOX

Figure 4-6 shows the Quick Viewer text box displaying the last average sample of the SCRAMNet network latency.

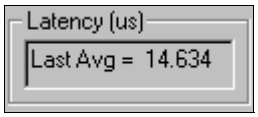


Figure 4-6 Quick Viewer Latency Text box

All values displayed are calculated by averaging all latency samples taken and averaged for one second. The average value is displayed numerically in the ‘Latency’ text box as *Last Avg*.

LATENCY SCALING

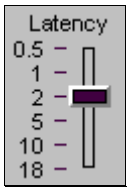


Figure 4-7 Latency Vertical Scale Slider

The Quick Viewer Latency Scale slider, shown in Figure 4-7, controls the scaling of the SCRAMNet network latency plot. The scaling can be changed by either dragging the “thumbtack” slider control or by clicking in the guide area above or below the “thumbtack.” SCRAMalyzer retains the value of the slider position and resets it to that position when the application is reopened.

SETTING LATENCY TEST ADDRESS

Select ‘Data’| ‘Setup Latency Testing’ within the Quick Viewer application to open the ‘Latency Test Address Editor’ dialog box.

You can set the SCRAMNet memory location for latency testing by using the Latency Test Address dialog box shown in Figure 4-8. To set the location, select an unused location in SCRAMNet memory and type the number in the dialog box.

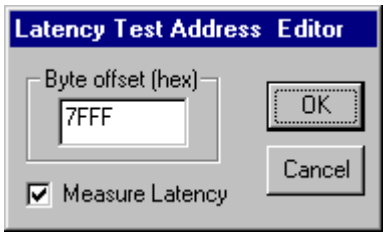


Figure 4-8 Latency Test Address Editor

NOTE: When the SCRAMalyzer is measuring latency, it is minimally contributing to the network traffic. Checking the *Measure Latency* checkbox can turn on or off the latency measurement feature.

SCRAMalyzer retains both the offset and state of the Measure Latency checkbox and resets it to those values when the application is reopened.

4.3.6 The Reset Button

Pressing the **Reset** button on the Quick Viewer window resets all cumulative maximum and minimums displayed in the 'Throughput' Text box. In addition, the graphic display is cleared and reset to the initialized state.

4.3.7 The Analyze Button

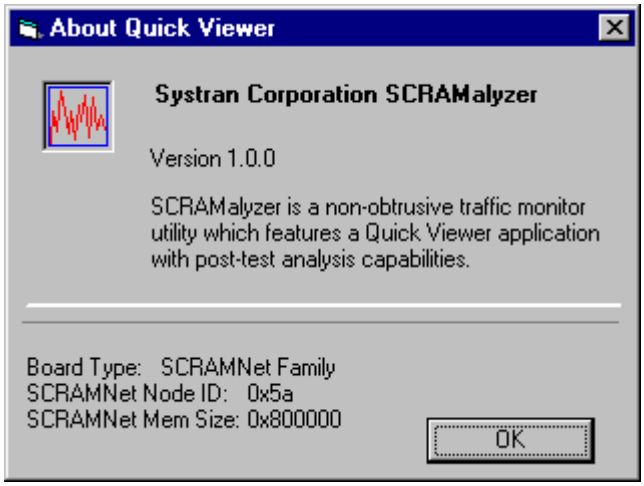
Pressing the **Analyze** button brings up the SCRAMalyzer Analysis tool. If a Snapshot file is present in the Snapshot file text box when the button is pressed then the Analysis Tool will automatically load that file when it displayed. If no Snapshot file is present then the Analysis Tool will create a default file **untitled.szr**.

4.4 Help

4.4.1 About SCRAMalyzer

Select 'Help' | 'About' within the Quick Viewer application to access the 'About SCRAMalyzer' window which contains the following information:

- Board type
- SCRAMNet Node ID
- SCRAMNet memory size



4.4.2 On-line Help

Select 'Help' | 'Help Topics' within the Quick Viewer application to access the On-line Help program.

4.5 SCRAMalyzer Analysis Tool

4.5.1 Overview

The SCRAMalyzer Analysis Tool is another means to collect network throughput information. It differs from the Quick Viewer in the following ways:

- The Analysis Tool provides post-test plots of the data with some statistical capabilities.
- The Analysis Tool provides 1-millisecond sampling of throughput as opposed to 10-millisecond sampling of the Quick Viewer.
- The Analysis Tool provides no graphics or indicators other than an elapsed time during data collection
- The Analysis Tool uses **all remaining CPU cycles** to run during data collection.
- The Analysis Tool **does not** examine latency.

NOTE: It is recommended that all other applications be closed before starting data collection to achieve peak efficiency.

Start the application by clicking on the 'Analysis Tool' icon.

4.5.2 Measuring Throughput

You can start throughput data collection by pressing the **Sample** button in the Analyzer window. The SCRAMalyzer Analysis Tool dialog box shown in Figure 4-9 displays Status, Elapsed Time, Node ID, and Memory Size. The SCRAMalyzer logs network traffic throughput information in one-millisecond increments until the **Stop** button is pressed. The size of the buffer created during data collection is 4 MB. The percentage that this 4 MB buffer is filled with data is also displayed in this window. If the buffer overflows, the Status line will indicate this. The buffer will hold the most recent 17.5 minutes of data.

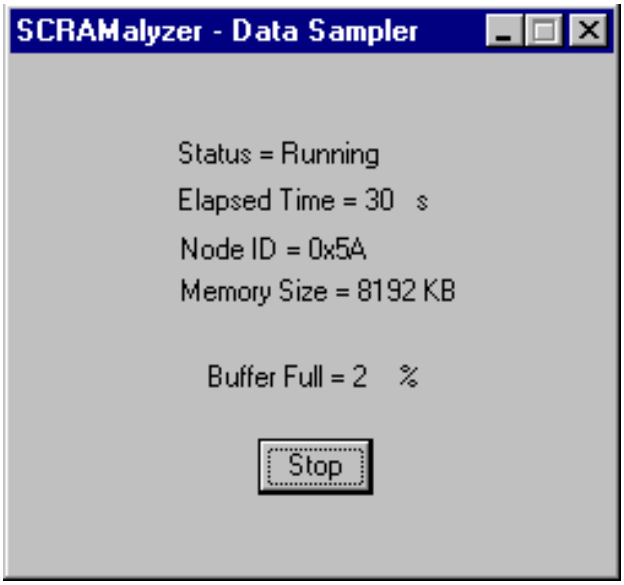


Figure 4-9 Analysis Tool Main Dialog

When you press the **Stop** button, the Analysis Tool window will generate a plot with statistical analysis for the given run. In addition, a statistical summary of the run is written to a standard text file of the same name as the **.szr** file but with a **.txt** extension.

To save the data to a file simply press the **Save** button or select 'File' | 'Save As' from the SCRAMalyzer menu.

Click on the **Exit** button to halt the SCRAMalyzer Analysis Tool.

4.5.3 Loading Stored Throughput files

To load previously stored throughput data files, select 'File' | 'Open' from the Analyzer menu and enter a filename to analyze. Files created using both the Analysis Tool and the Quick Viewer can be loaded.

4.5.4 Statistical Display

Once network data has been generated in the **.szr** file format statistical analysis for the given run is produced. In the lower left corner of the dialog, an edit box displays various data statistics. These values are also written to the stats **.txt** data file as a permanent record.

THE MAIN STATISTICS WINDOW

The Analysis Tool's Throughput Statistics in Figure 4-10 displays the throughput data as a function of time in milliseconds. You can view this data by pressing the throughput tab located in the upper left hand corner. The main display is a graphic plot of the average network traffic in red. The data is sampled in approximate one-millisecond intervals.

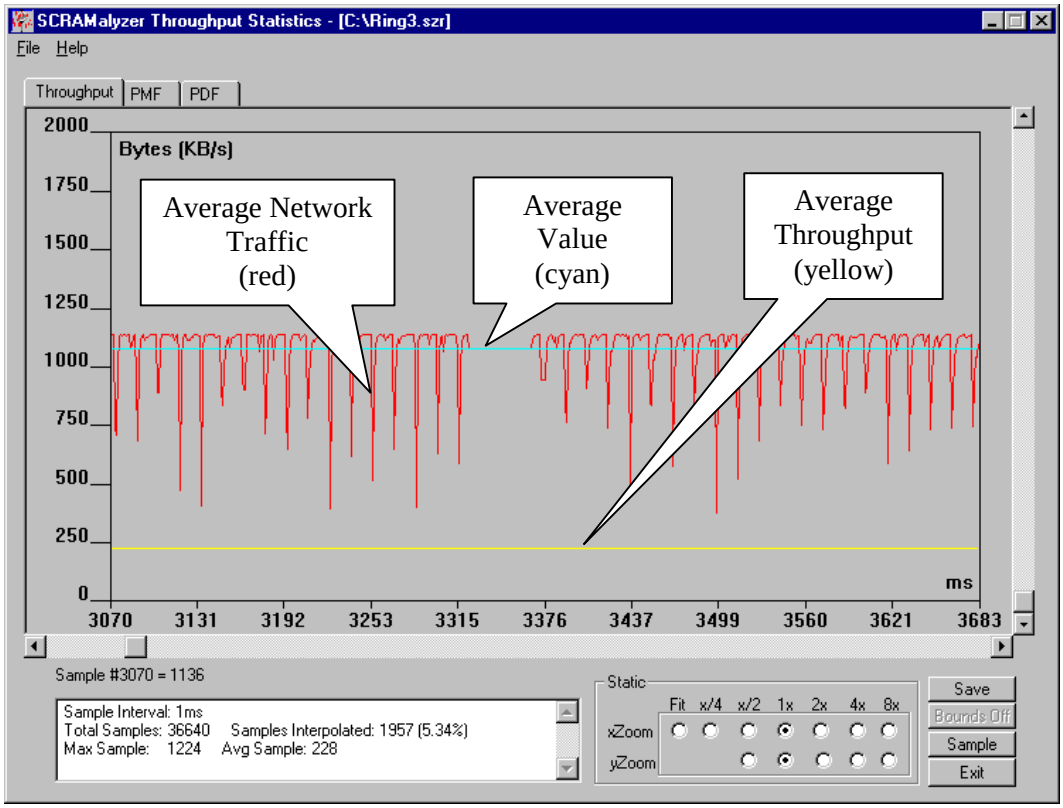


Figure 4-10 Throughput versus Time Display

The data displayed has been interpolated so the data points are plotted in exact millisecond intervals. The y-axis is the number of bytes received within the given sample interval and translates roughly into KB/s of throughput. The horizontal yellow line represents the average throughput value for the entire logged data. Similarly, the horizontal cyan line represents the average value of the data currently displayed on the screen. The scale buttons in the lower right of the dialog along with the display scrollbars allow zooming and panning of the data to permit more detailed view resolution.

DATA FIT DISPLAY

Clicking on the **Fit** button under the 'x Zoom' options displays an overview of the entire data log.

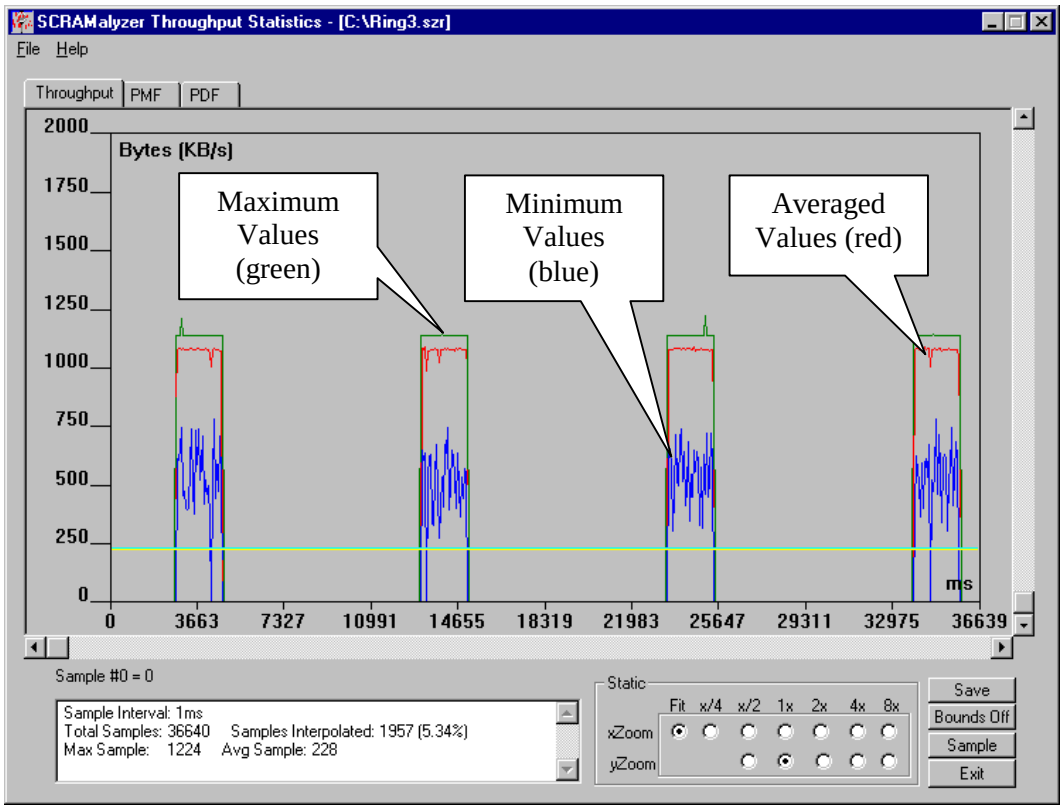


Figure 4-11 Data Fit Display

Since there are typically more sample points than display pixels, the data points must be averaged before displayed. Although the picture in Figure 4-11 is in black and white in this manual, you can distinguish the various data types by their color on the screen display. The average values are in red. The maximum values for the averaged intervals are in green, and the minimums are in blue. This feature proves useful for quickly identifying network traffic peaks in a given network configuration. The **Bounds On/Off** button provides a means to view or turn off the maximum and minimum plots in this window.

NOTE: This feature is only enabled when the 'xZoom' selection is Fit, x/4, or x/2.

PROBABILITY MASS FUNCTION

The SCRAMalyzer Throughput Statistics box includes a Probability Mass Function (PMF) tab in the upper left corner next to the Throughput tab. If you want to view the probability mass function for the logged data, press the PMF tab.

The PMF is a normalized histogram of a statistical data set. For the SCRAMalyzer, the data set is distributed into 167 bins, each representing throughput ranges of 100 KB/s wide. Each of the bin values represents the percentage of data samples falling within that throughput range. Figure 4-12 shows a PDF example screen.

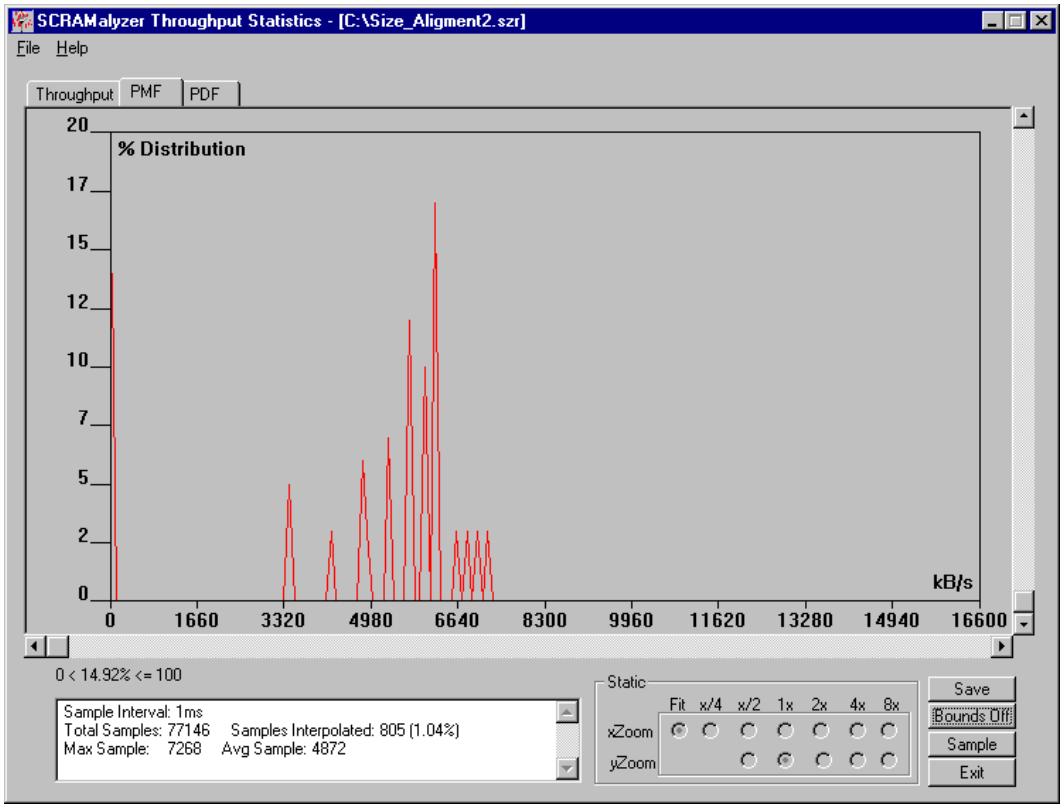


Figure 4-12 Probability Mass Function

PROBABILITY DENSITY FUNCTION

In addition to the PMF, you can press the Probability Density Function (**PDF)** tab to show a probability density function for the logged data. The PDF defines the running summation or integration of the PMF. Each of the bin values represents the percentage of data samples less than the specified throughput range.

Similar to the PMF, the data is summed over 167 bins, each representing throughput ranges of 100 KB/s wide. The *y*-axis displays the percentage of data points less than the given *x* value. Figure 4-13 shows a PDF example screen.

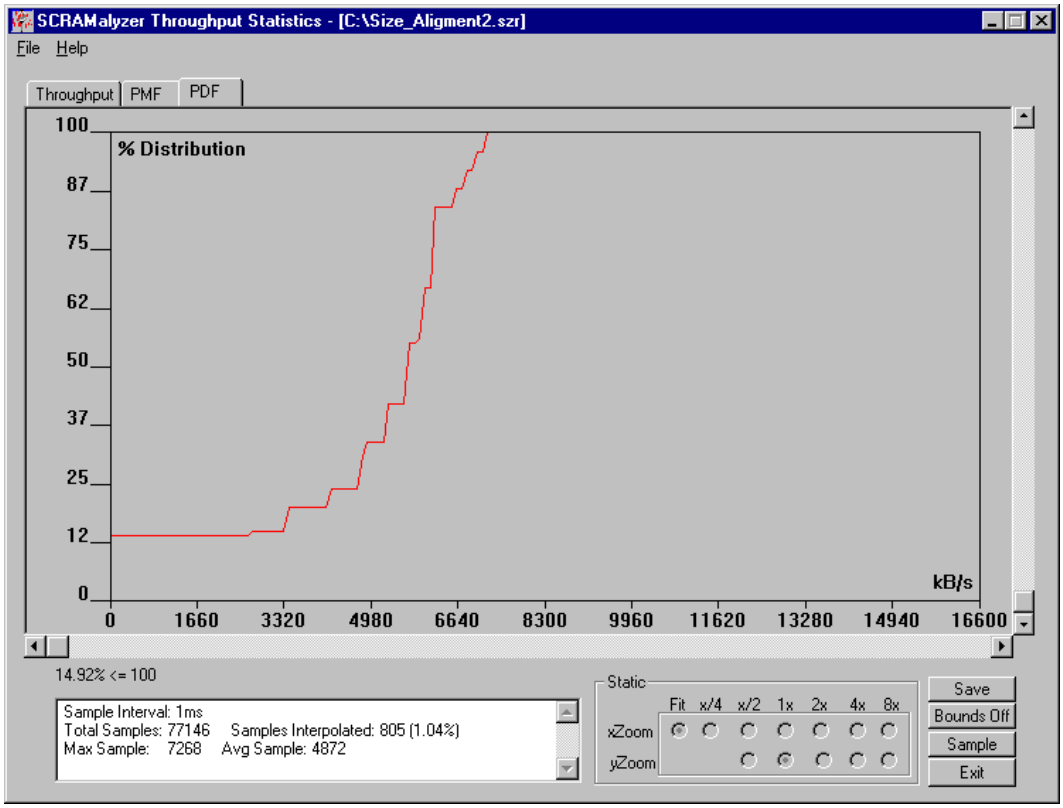


Figure 4-13 Probability Density Function

4.6 Troubleshooting

Problem	Solution
Carrier light stays red on the Quick Viewer.	Check your cable connections to the SCRAMNet card.
No throughput plots being displayed on Quick Viewer.	If the Carrier light is not green, verify your SCRAMNet cable connections. If the Carrier light is green, verify that your Memory Capture Range is set to an area where activity is occurring or check the “All Memory” checkbox. OR Bring up the 'Help' | 'About' window and verify you have not selected the same SCRAMNet Node ID as another network node. If you have, use the 'SCRAMNet Installation' program to change it to a unique ID.
Latency slider will not move on the Quick Viewer.	Latency measurement is turned off. Select 'Data' | 'Setup Latency Testing' and click the ‘Measure Latency’ checkbox.
There are no maximum or minimum plots on the Analysis Tool graph.	If your ‘xZoom’ selection is Fit, x/4, or x/2, press the **Bounds On** button. Maximum and minimum plots are not available at any other ‘xZoom’ selections.
The plots within the Analysis Tool have unexplained spikes.	You probably have collected data with the Quick Viewer running and performing latency measurements. Open the Quick Viewer application, turn off latency measurement, and try sampling the data again.

GLOSSARY

carrier---------- Short for carrier signal. A light signal in a communications channel modulated to carry digital signal information

deterministic ---------- Completely predictable packet transit time from application to application.

fiber optic cable ---------- A bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves.

latency ---------- The amount of time it takes for a packet to go completely around the SCRAMNet ring.

latency, pass-through ---------- The time required to retransmit an upstream node's packet.

latency, receive ---------- The measure of time necessary to update shared memory when an incoming packet arrives.

latency, transmit ---------- The time required to send a packet onto the network after a shared memory write access is performed.

LED---------- Light Emitting Diode. They are used to indicates a state or activity.

longword ---------- Four bytes (32 bits) of data.

packet ---------- A message that travels on the network.

probability density function -- The running summation or integration of the Probability Mass Function. For the SCRAMAlyzer, the data is summed over 167 bins, each representing throughput ranges of 100 KB/s wide. Each of the bin values represents the percentage of data samples less than the specified throughput range.

probability mass function ----- The normalized histogram of a statistical data set. For the SCRAMAlyzer, the data set is distributed into 167 bins, each representing throughput ranges of 100 KB/s wide. Each of the bin values represents the percentage of data samples falling within that throughput range.

SCRAMalyzer Quick Viewer- Provides a scrolling real-time graph displaying a coarse view (10 ms rate) of the SCRAMNet network throughput and latency.

SCRAMalyzer Analysis Tool - A tool for measuring and diagnosing SCRAMNet network performance. It collects data traffic in real-time and reports the network throughput and latency.

shortword---------- 16 bits. Also referred to as halfword.

snapshot ---------- The statistical state of the system or network at a given instant.

thumbtack ---------- The control button on the sliding vernier.

upstream packet ---------- A packet that is in (passing through) a node other than the one of origin.

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