

The Snarfer User's Guide

for Macintosh computers
Final Draft 3/31/92

 Apple Computer, Inc.

The Apple logo is a registered trademark of Apple Computer, Inc. Use of the “keyboard” Apple logo (Option-Shift-k) for commercial purposes without the prior written consent of Apple may constitute trademark infringement and unfair competition in violation of federal and state laws.

©Apple Computer, Inc. 1991,92
20525 Mariani Avenue
Cupertino, CA 95014-1010

Apple, the Apple logo, AppleTalk, EtherTalk, LocalTalk, Macintosh, TokenTalk are trademarks of Apple Computer, Inc., registered in the United States and other countries.

Contacts:

Craig Mortensen (408) 974-8497, AppleLink: MORTAY
Logan Roots (408) 974-1499, AppleLink: LOGANR

Contents

- **Introduction** 3
 - Description 3
 - Audience Requirements 3
- **The Snarfer Document Window** 4
- **Distribution** 5
- **Criteria** 6-7
- **Specifying A Condition Element** 7
- **Specifying An Action Element** 8
 - Altering A Packet's Size 8
 - Altering A Packet String 8-9
 - Altering A Packet Parameter 9
 - Delaying A Packet 10
 - Reverbing A Packet 11
- **Appendix A**
 - A Sample Complex Document 12
- **Appendix B**
 - Snarfer Data Format 13-14
- **Appendix C**
 - Miscellaneous Notes 15

Introduction

Description

The Snarfer was written to test the abilities of different layers of the AppleTalk stack to recover from various degrees of disruption. Such disruption includes having packets of data distorted, truncated, delayed, or never delivered at all.

The Snarfer is an application that directs whatever machine it is running on to examine each packet it is about to write to the net and, if it meets operator-defined criteria, alter the packet in a variety of ways. Packets can have their size changed, data altered, protocol parameters changed, or their transmission delayed or repeated. The user-defined criteria currently includes matching such traits as source and destination node, source and destination network, packet length, various traits specific to the ASP, ATP, ADSP, DDP, LLAP, NBP, and PAP protocols. The Snarfer might be used, for example, to test whether ADSP can continue to function in an environment where 50% of its packets are lost; another use might be to see how ATP responds when packets have their transaction ID's, user bytes, bitmap sequences, or control information altered.

The Snarfer has been implemented in a modular fashion, so that if additional criteria is desired, it can be easily added. The Snarfer functions across all hardware links (including LocalTalk, EtherTalk, and TokenTalk). It can be running on a router between nets, or on one or more machines on the same or different nets.

Audience Requirements

Since the users of this application are at the *advanced* level of Macintosh computing, certain knowledge is therefore assumed. The user should already be familiar with the way files are manipulated on the Macintosh. This includes commands that manipulate documents: New, Open, Close, Save As, and Revert To Saved.

You should already be familiar with networking concepts of the Macintosh. *Inside AppleTalk 2nd Edition* is useful information when using The Snarfer.

The Snarfer Document Window

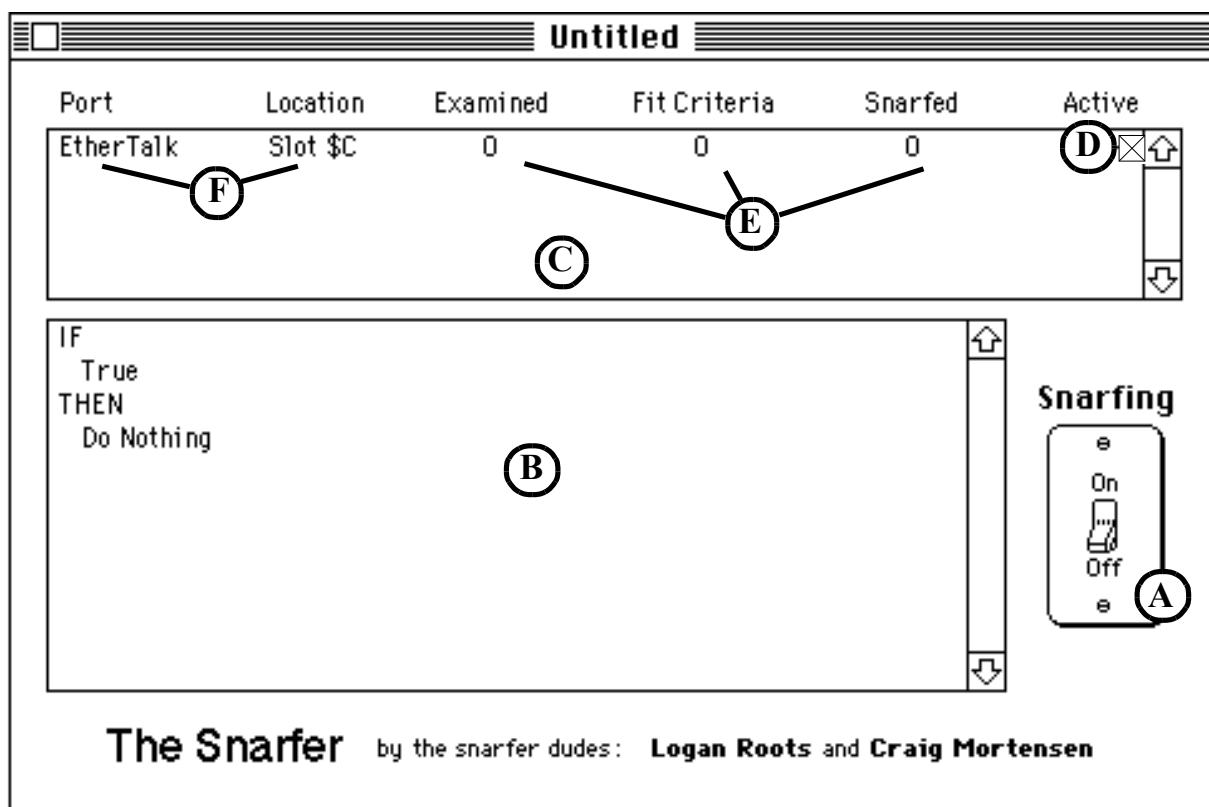


Figure 1: A Sample Document Window

- (A) This Snarfing Switch will turn The Snarfer on and off. The menu item “Snarf” will do the same.
- (B) The Criteria List Box displays the current conditions and actions for Snarfing. Double-click on this box to bring up the Criteria Dialog. More information about the criteria is mentioned on page 4.
- (C) The Port List Box shows the current status for each network connection (or port).
- (D) This Port Switch can turn individual ports on and off when Snarfing. Each network connection will have their own port switch. When a port is turned off, a “-” character appears instead of the “√” character. For internet routers, all ports are initially turned off. It is up to the user to enable the appropriate ports.
- (E) The Snarfing Statistics will show how many packets have been *examined*, the number of packets that have *fit the criteria* for snarfing, and the number of those packets that have actually been *snarfed*. The menu item “Clear Statistics” will set all three values for all ports to 0.
- (F) The Port Name and Location shows which type of network connection it is (i.e. LocalTalk,

EtherTalk, TokenTalk) and which slot it currently occupies. Connections that are built-in such as LocalTalk and on-board EtherTalk are marked as “Built-In.”

The Snarfer handles only one document at a time. There are two menu items under the Commands menu that lets the user manipulate a document window. “Snap Window” will position the window so that the top of it appears on the bottom of the screen, making the first port visible. This command is used to get the document window out of the way while still letting the user watch the statistics change. “Hide/Show Window” will make the window invisible or visible.

When saving this window, the user can specify the type of document it will be. These types are: Snarfer ‘SNFD’, MPW ‘MPS’, and standard ‘TEXT’. The data for the document is stored in the data fork. If the file is saved as TEXT or MPW format, the user can modify the document data (see Appendix B).

Distribution

To display this dialog, select “Distribution...” from the Commands menu. The distribution affects all ports that are active. The simplest way to explain the distribution is to read the dialog in two sentences. In figure 2 below, we have the default setting: Wait for 0 matches then snarf 0 matches. Thereafter, snarf 1 out of 1 randomly. The first two settings are used to control initial snarfing. This example shows that the Snarfer will not do anything initially. The last two values are used for snarfing a certain number of packets in a given range. The Random check box forces a random snarfing of packets in that range otherwise it snarfs the 1st n matches. In this example, 1 out of 1 means *snarf all packets*.

Distribution Settings:

Wait for match(es),
then snarf match(es).
Thereafter snarf match(es)
out of (Randomly).

Figure 2: Distribution Dialog

Criteria

The criteria is divided into two parts: the *If Clause* and *Then Clause*.

An If Clause is limited to 20 elements and are separated by either an “AND” or “OR.” The Then Clause is also limited to 20 elements and are all separated only by an “AND.”

Implied Elements

Some elements in the If clause are called “implied elements.” These exist for the ASP and PAP protocols only. Implied elements are used for aiding the user while constructing their criteria. For example, an ASP OpenSession WSS packet parameter automatically implies that the ASP function is 4. The user can decide if the 2nd (implied element) is desired for the criteria. Implied elements can be removed, but not altered. Having 2 condition elements will increase the chances of snarfing the desired packet.

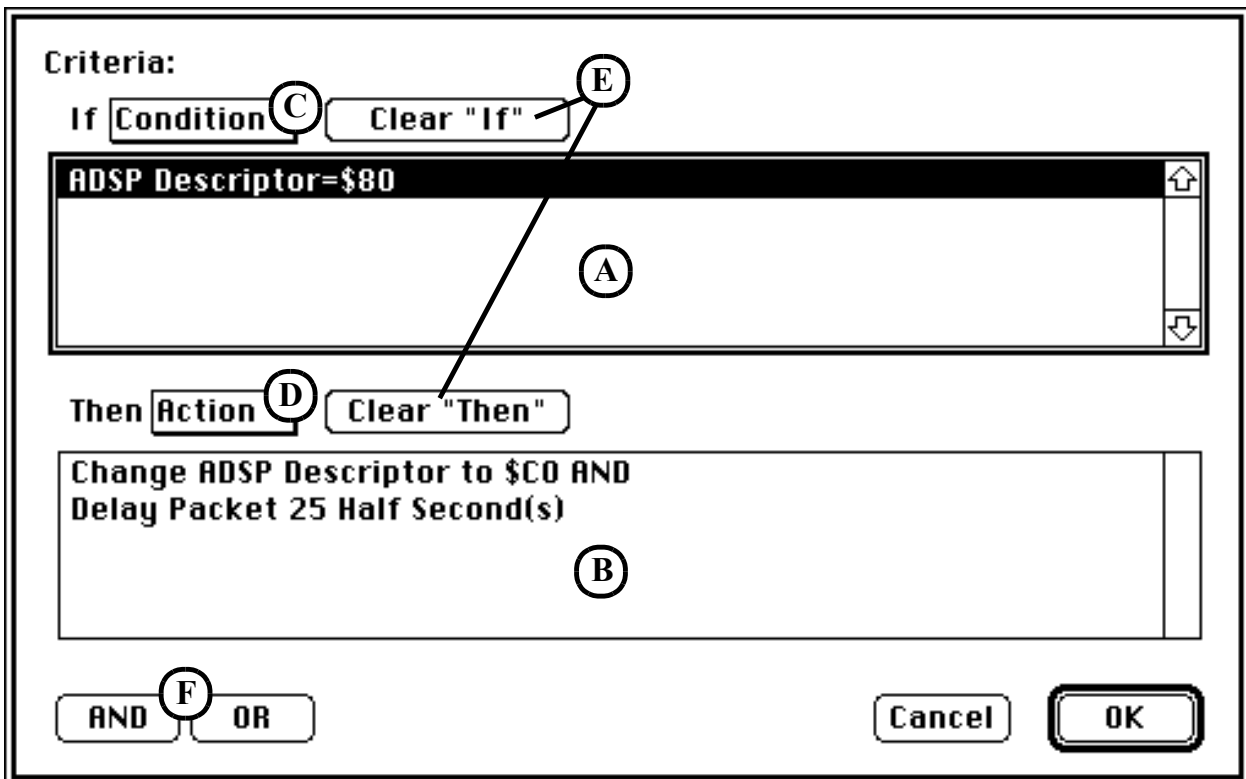


Figure 3: Criteria Dialog

(A) The If Clause List Box shows a scrollable list of If Clause elements. These are double-

clickable for altering the element, or can be removed with the delete key. Elements such as “True” or implied parameters are not modifiable, but can be deleted.

B The Then Clause List Box shows a scrollable list of Then Clause elements. These are also double-clickable and can be deleted. “Do Nothing” cannot be altered but can be deleted.

C The Condition Popup Menu lets the user specify an element in the If Clause. These elements (or packet parameters) are a list of conditions used for snarfing.

D The Action Popup Menu lets the user specify an element in the Then Clause. These elements are a list of actions to perform on a packet. These actions are delaying, truncating, and reverbing a packet; altering a string; and replacing a packet parameter.

E These “clear” buttons will delete all elements of the If and Then Clauses.

F The Conjoint Buttons allow the user to specify or change a “conjoint” for elements in the If and Then Clause. If the user wishes to change an AND to an OR, simply click the cell and press the OR button. The Snarfer prohibits the user from using an AND in the Then Clause.

Specifying a Condition Element

Each element in the If Clause directly corresponds to a packet parameter for a certain AppleTalk protocol. An exception to this would be the default “True” condition that is set up when creating a new document. The dialog in figure 5 below will appear after selecting an item from the Conditions Popup Menu. It shows the packet parameter size and name. An operator can be chosen (=, ≠, >, <) as well as a format type (Hex, Decimal, Binary.) Some parameters are bit-oriented. The ATPControl Information and ADSP Descriptor are examples of such parameters. The user can click on these bits to turn them on and off; The Snarfer updates the value in the text box accordingly.

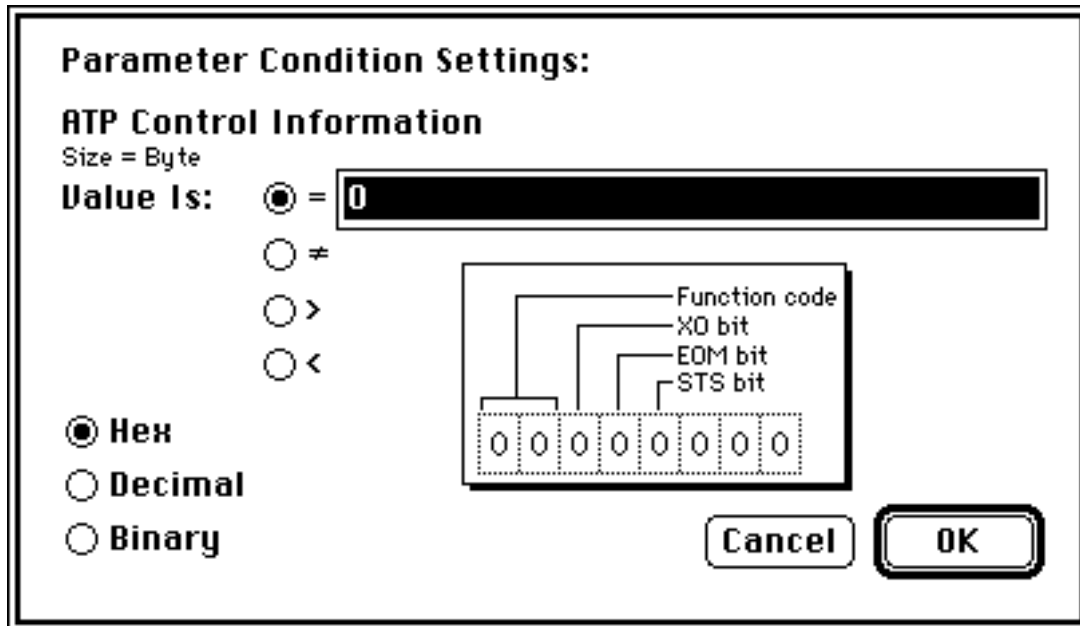


Figure 4: Parameter Dialog

Specifying An Action Element

When The Snarfer has determined that a packet has fit the criteria for snarfing, one or more actions need to be specified. These actions appear under the Action Popup Menu. When creating a new snarfer document, the "Do Nothing" action is the default. The list of actions are: altering a packet's size, changing a string of data, and modifying a parameter in that packet. Additionally, the user can delay or reverb a packet.

Altering a Packet's Size

When changing a packet's size, it can be set, increased, or reduced to a certain value. The change in size can be indicated in the actual *physical* length, data length (datagram length in the DDP header), or both. Setting the packet size to 0 will prevent the packet from being sent out on the network. Figure 5 below shows the default settings when the dialog appears.

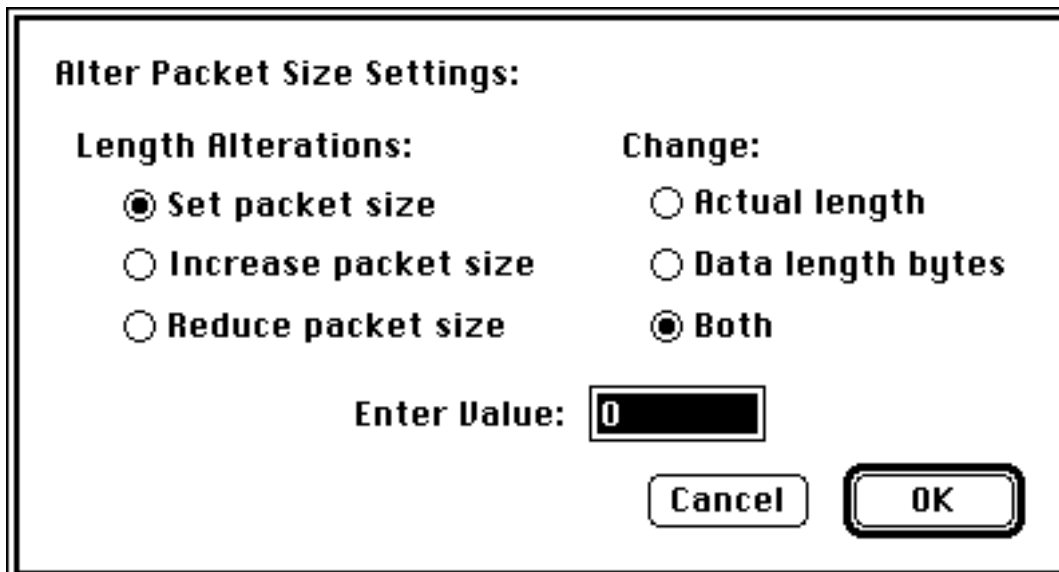


Figure 5: Alter Packet Size Dialog

Altering a Packet String

A user can alter a sequence of data (or string) that can appear anywhere within a packet. Usually, this is performed in the data area of the packet. This data has a maximum of 32 characters. Figure 6 below shows a dialog that corresponds to changing packet strings. The user can indicate case sensitivity or that the strings are Pascal format (which means the 0th byte of the string is the length byte). An example of this would be the strings that exist in an NBP tuple: name, type, and zone. The “munge” option will reduce or increase the original string’s size in the packet if the destination string is not equal in length to the source string. A more detailed description of “munge” is explained in *Inside Macintosh Vol I*, for the Munger Toolbox Utility routine.

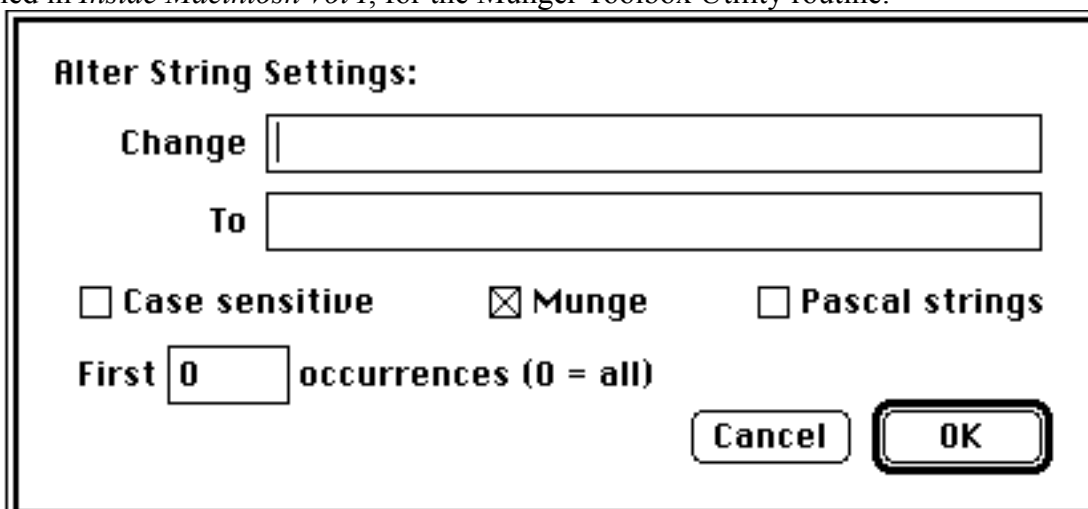


Figure 6: Alter String Dialog

Altering a Packet Parameter

Altering a parameter is similar to setting up a condition element. Figure 7 shows a dialog which aids the user in changing a parameter for a specific protocol. When specifying the parameter to change, the user selects the popup menu that shows the list of possible parameters. This popup is exactly the same as the Conditions Popup Menu in the Parameter Dialog.

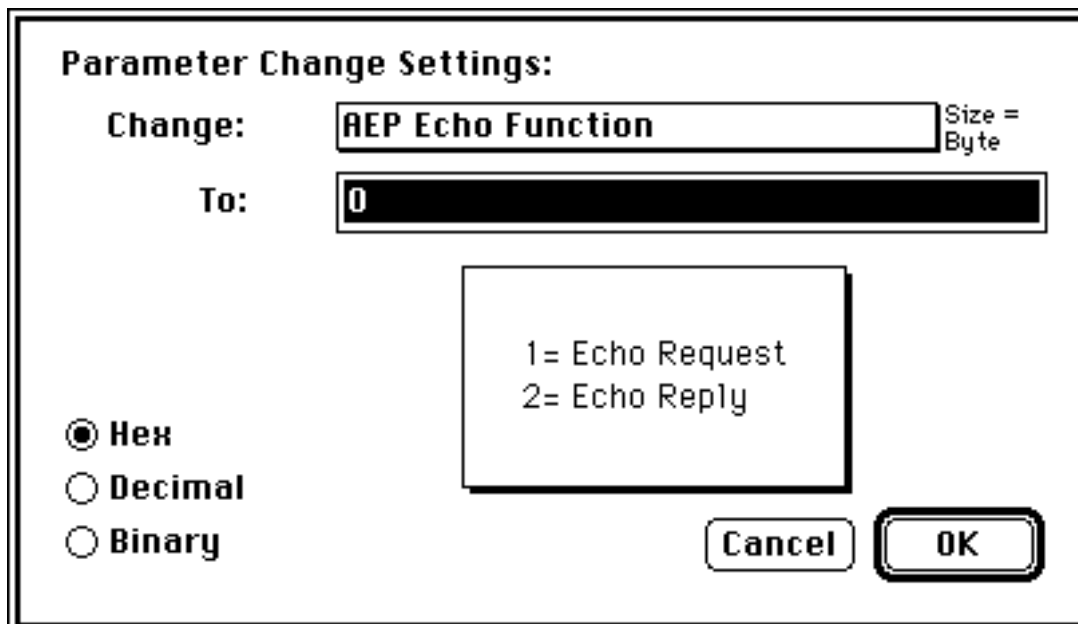


Figure 7: Change Parameter Dialog

Delaying a Packet

A useful feature of The Snarfer is the ability to delay packets from being written to the network. The dialog in figure 8, shows how the user can specify the number of “half-seconds” to delay or indicate a range of half-seconds. The Snarfer chooses a value in that range. Delaying packets is useful for simulating slow routers, wide area networks, or networks that experience heavy traffic. The Snarfer has a limited buffer space to withhold packets from the network. In the dialog, the user can see how many packets that can be delayed before the buffer is full. If the user wishes to increase this buffer size, The Snarfer’s memory size can be changed in it’s Finder “Get Info” window. Note, however that since packets are flushed from the buffer once they have been delayed, this will free up more room in the buffer to delay packets.

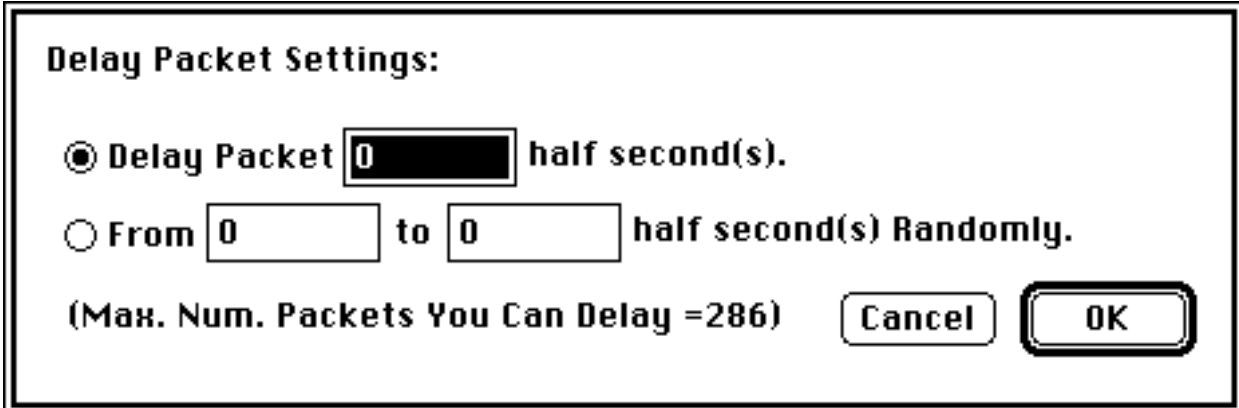


Figure 8: Delay Dialog

Reverbing a Packet

The reverb action is a complex one. First, the user can specify whether the packet is sent immediately (via the Send Original Check Box). They can also chose an initial delay time, the number of reverbs (or copies to repeatedly send), and the time interval between these copies. Like the delay action, reverbing will indicate the buffer space that is available.

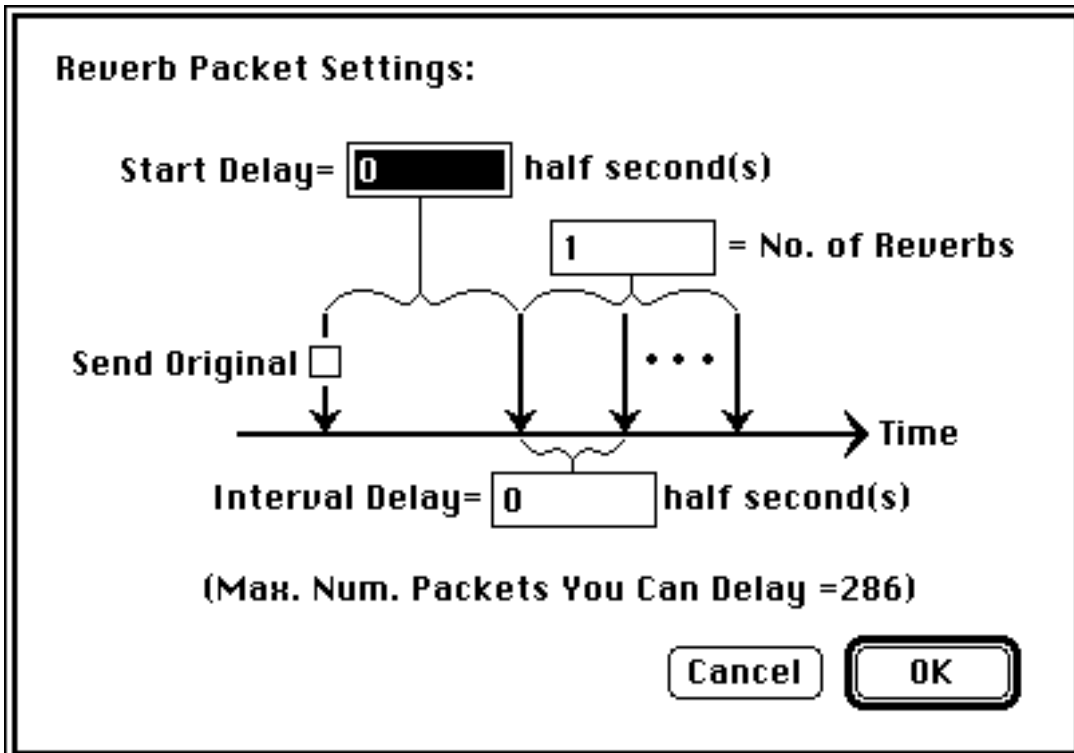


Figure 9: Reverb Dialog

Appendix A:

A Sample Complex Document

The document “ATP Stress” below is an example of how detailed a user be. This particular setup involved a Macintosh running an internet router software package routing ports for 2 Ethernet cards, 1 Token Ring card, and the printer port. In this case, the LocalTalk port was turned off. The other ports have displayed their statistics since the user last turned Snarfing “on” or after the statistics have been cleared.

This Criteria involved ATP packets with their control information, user bytes, transaction ID, and bitmap sequence number. When these packeted were snarfed, they were truncated to 60 bytes in length (this value was also reflected in the datagram length field of the DDP header.) If the packet had any data in it that matched “Craig”, it is changed to “Keith” (indicating that it is a Pascal string). Finally, the packet is *reverbed* by sending the original one, waiting 4 half-seconds, and sending 5 extra copies of this packet on the network with a time interval of 1 half-second between each one.

The screenshot shows a window titled "ATP Stress" with a table of port statistics, a list of criteria, and a "Snarfing" control panel.

Port	Location	Examined	Fit Criteria	Snarfed	Active
EtherTalk	Slot \$A	245	45	20	<input checked="" type="checkbox"/>
EtherTalk	Slot \$B	4	4	1	<input checked="" type="checkbox"/>
LocalTalk	Built-In	0	0	0	<input type="checkbox"/>
TokenTalk	Slot \$C	1991	1966	25	<input checked="" type="checkbox"/>

IF
ATP Control Information = \$50 AND
ATP Userbytes=\$F4E1 AND
ATP Transaction ID=\$5 OR
ATP Bitmap Sequence Number=\$6
THEN
Set Packet Size to 60 (Physical Packet Length & Datagram Length) AND
Change 'Craig' to 'Keith' (Munge, x=X,Psci,0) AND
Reverb Packet (Send Orig., Start Delay=4, Interval=1, No. Reverbs=5)

Snarfing

On
 Off

The Snarfer by the snarfer dudes: **Logan Roots** and **Craig Mortensen**

Figure 10: A Complex Document

Appendix B:

Snarfer Data Format

When editing a Snarfer document in a text editor such as MPW or TeachText, the user can change the document's criteria and distribution.

Each line that begins and ends with a ‘•’ character are internal key phrases to tag certain data. The distribution values are a one-to-one correspondence to the Distribution Dialog's edit text boxes. Each element for the If Clause contains a string to identify the routine, nine values (long words) to describe the element, a string to represent it, and an element separator string (AND/OR). For each element in the Then Clause there is a string to identify the routine and eight values (long words) to describe the element. The ‘#’ character indicates the end of The Snarfer data.

For adding personal comments to the file, each line that begins with “/*” denotes a comment. Comments cannot be placed on the same line as data. They must be a line by themselves.

Data Format

```
•distribution•
distribution value1 (long)
distribution value2 (long)
distribution value3 (long)
distribution value4 (long)
•if queue•
<routine name string>
9 parameters (long)
<condition string>
<conjunction>
...
•then queue•
<routine name string>
8 parameters (long)
...
#
```

Example Data

The criteria for the data below was: If DDP Hop Count=3, Delay Packet 9 half-seconds. Note that a few comments were added by the user.

```
•distribution•
0
0
1
1
•if queue•
Check Condition
61
3
3
-3
195
0
0
0
9240577
DDP Hop Count=$3
•then queue•
Delay Packet
/* change 9 half-seconds to 10 when bug is fixed: cpm 11/31/91
9
/* add random settings if above bug is fixed.
0
0
0
0
0
0
0
0
Delay Packet 9 Half Second(s)
#
```

Appendix C:

Miscellaneous Notes

The Snarfer will not intercept control packets that are sent at the link layer. Viewing the number of packets sent on the wire using a protocol analyzer will be inconsistent with the number of packets The Snarfer has claimed it has examined.

Do not change networks using the Network Cdev while The Snarfer is running or unpredictable things will happen. This must be done before launching the application.

The Apple Publishing System

The Snarfer User's Guide was written, edited, and composed on a desktop publishing system using Apple Macintosh computers, an AppleTalk network system, MacWrite II, Mac Paint, and MacDraw II.

Text and display type are Apple Times font. Some elements, such as listings, are set in Apple Monaco, a fixed-width font.