

Determining Validity of Ethernet Sampling Program

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1 Introduction

In order to examine the behaviour of traffic on Ethernet segments a program was required accurately record all packets transmitted on that segment. This was done using an IBM Personal Computer (PC) or compatible and a program written in C to time stamp and save the first n octets of each packet. The captured headers then had to be written out to permanent storage.

Having written this program a series of controlled experiments were performed to check the validity and usefulness of the program. Below are some of the requirements of interest.

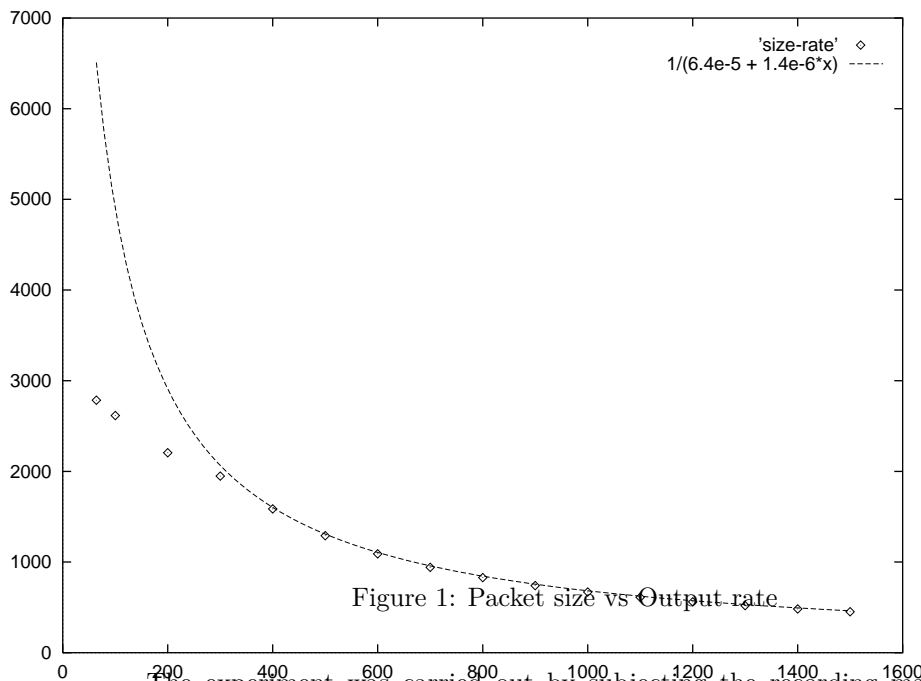
- A what rate of packet arrival does packet loss occur.
- Does the size of the arriving packets effect packet loss.
- In what form does packet loss happen.
- How packet loss is effected by writing to permanent storage.

2 The experiment

2.1 Design

This experiment was performed using two machines connected via an isolated segment of Ethernet. On one machine a packet generator executes while the other records all packets seen on the segment and writes then out to permanent storage.

One important note is the relative processing power of each machine. While boths machines have compatible architectures one is at least twice as fast as the other. This asymmetry enables the recording program to be “tested to destruction” while the packet generating remains stable.



The experiment was carried out by subjecting the recording machine to various traffic loads (as specified by the generator's input parameters) and examining the resulting output file.

2.2 The packet generator

The packet generator generates c packets of fixed size s octets. Between each packet is a delay d . The delay is just a count for a loop which performs a simple calculation. This means the delay depends of the machine it is executing on. Provided the delay is linear then this is of no real concern. These three parameters can be specified on the command line.

To examine the behaviour of the packet generator a series of packet generations was carried out from the slower to the faster machine. The experiment looked at the maximum rate (in packets per second) the generator could produce given a specific packet size. The result can be seen in Figure 1.

The results suggest that beyond packet sizes of 400 octets the generator's output is bound by the I/O (Input / Output) of the machine, at about 710,000 octets/second or 693 K per second. Packet sizes smaller than this are bound by the processing time needed to send each packet.