>>> Solution for HW #4 for Capacity Planning (Fall 2001) <<<

For assignment #4 you are to "crunch" a network packet trace to determine if the arrival of ARP packets is Poisson. You are given a trace file taken from the CSEE domain. Using your knowledge of distributions and their properties, make observations and conclusions on the distribution of ARP packet arrivals.

Summary statistics for interarrival times for the ARP trace are shown in Table 1. A histogram is shown is Figure1 and the autocorrelation in Figure 2. For Poisson arrivals the interarrival distribution is exponential. For an exponential distribution the CoV = 1 and autocorrelation for all lags is 0.0. Figure 1 shows the histogram of both the arp_trace.txt date and artificially generated exponentially distributed data (of same mean as arp_trace.txt data). The large spike for the arp_trace.txt histogram at 1 second is due to the implementation of ARP… namely, that ARP packets are sent in one-second intervals if no response is received (see [1]). It is thus not surprising that the large majority of interarrival times are less than one second. The histogram show a good fit up to one second, but a poor fit for times greater than one second. The autocorrelation plot in Figure 2 shows a relatively high autocorrelation for lag up to about 6 and then a virtually zero autocorrelation for greater lags. The conclusion from these measures is that ARP traffic is not Poisson. An empirical distribution could mimic the histogram, but CoV would be 0.0.

Table 1 - Summary statistics for arp_trace.txt

Statistic	Value
# of values	106583
Mean	0.74 sec
Std Dev	0.94 sec
CoV	1.27
1% value	0.00 sec
5% value	0.00 sec
95% value	2.51 sec
99% value	4.81 sec

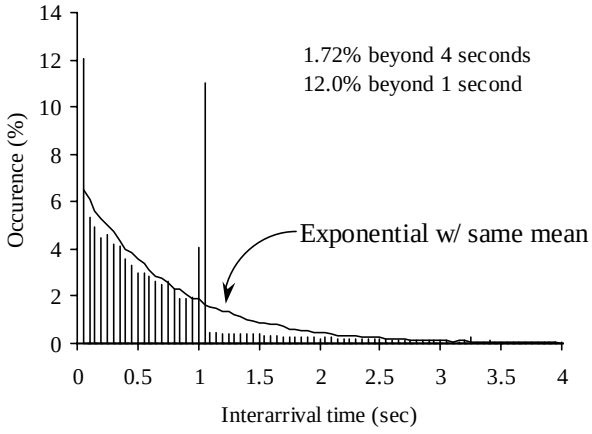

Figure 1 - Histogram for arp_trace.txt

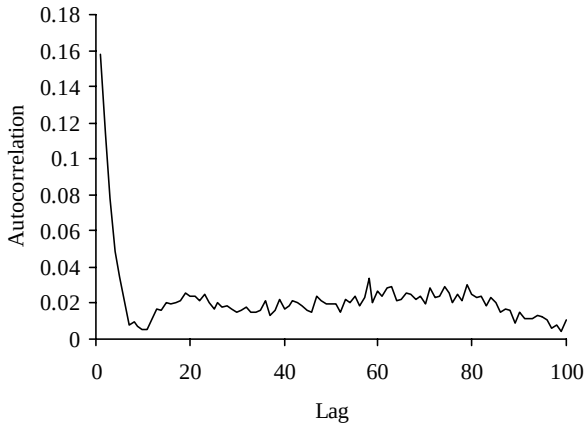

Figure 2 - Autocorrelation for arp_trace.txt

References:

[1] D. Comers, "TCP/IP Illustrated, Volume 2: The Implementation," Addison-Wesley, 1995.
