Addendum for:

IEEE 1394 and Isochronous Traffic:

An ns2 implementation and simulation of effective bandwidth usage.

Spring 2002

FINAL PROJECT ADDENDUM

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This document augments the original Final Project Paper and provides some graphs of the packet delivery times with a higher resolution sample period (0.000001 secs). For comparison, the other timing events of interest are:

Isochronous Cycle Timer: 0.000125 secs.
Isochronous Subaction Gap: 0.000005 secs.
Asynchronous Subaction Gap: 0.00001 secs.
Asynchronous Fairness Gap: 0.00002 secs.

The testing runs for these graphs were done from 0.0 to 0.03 seconds, and a third of that time appears in the graphs below.

The most interesting result come from the Isochronous transfers. It is possible to see the packets receipts (they appear as the spikes) along with the lengthy gaps that indicate the nodes are waiting form the Cycle Timer packet. The following graphs shows Isochronous transfers with 2, 3, 5, 7, and 9 nodes, sending 200 byte packets. The graphs indicate the half the nodes are receiving during each interval. Each graph is shown from 0.001 to 0.002 seconds. With 9 nodes (half receiving during each interval) the cycle is completely used up.
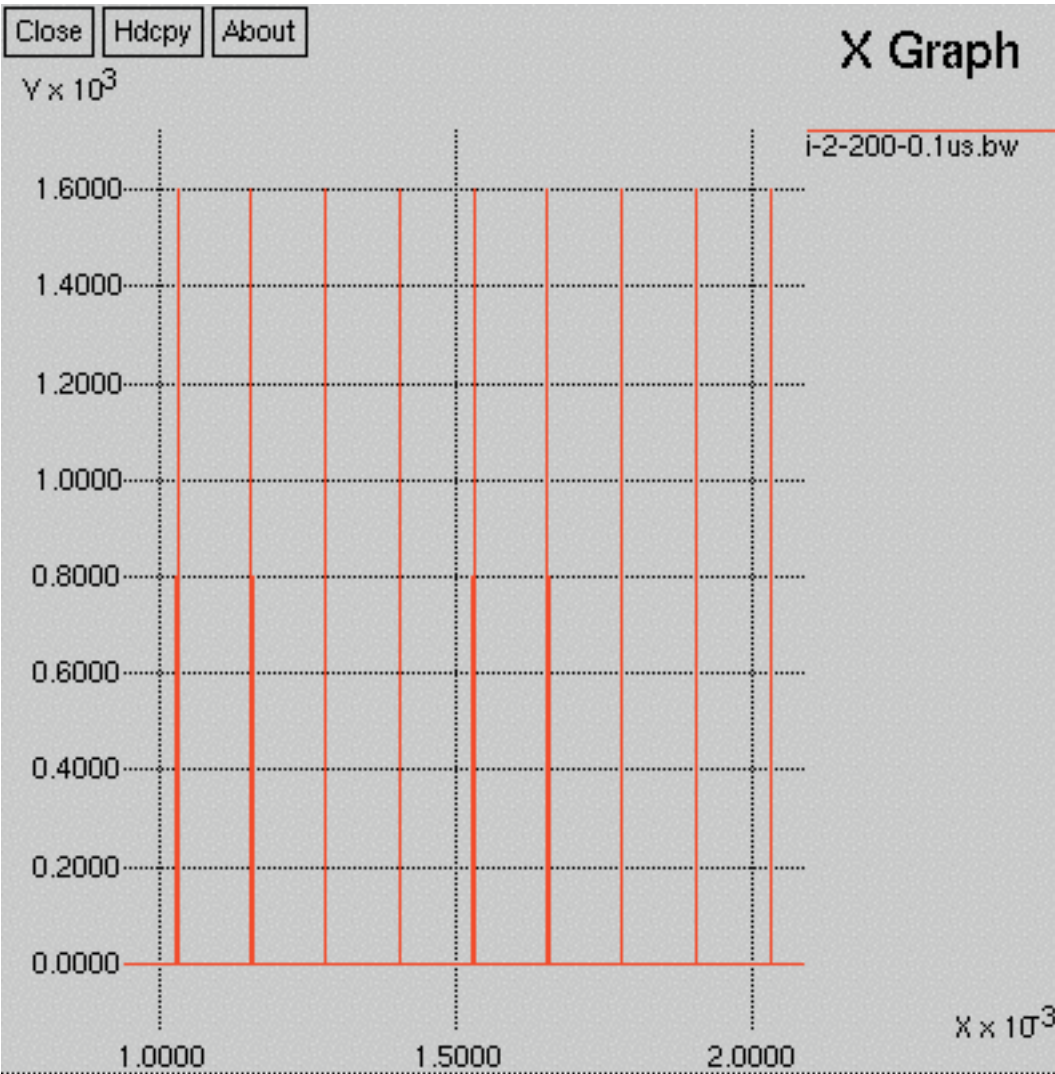
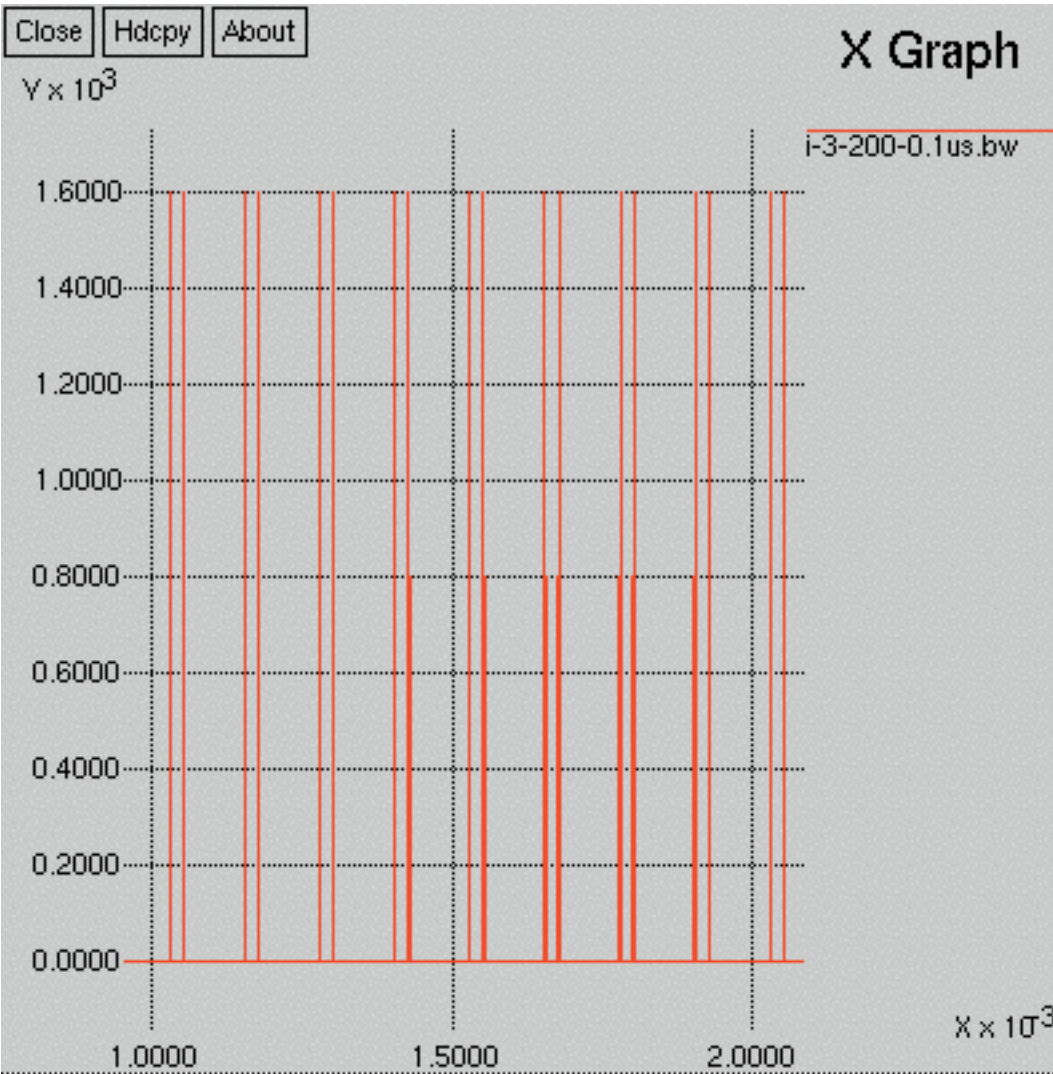Figure 1 - Isochronous, 2 node bus, 200 byte packets, 0.001 to 0.002 interval.

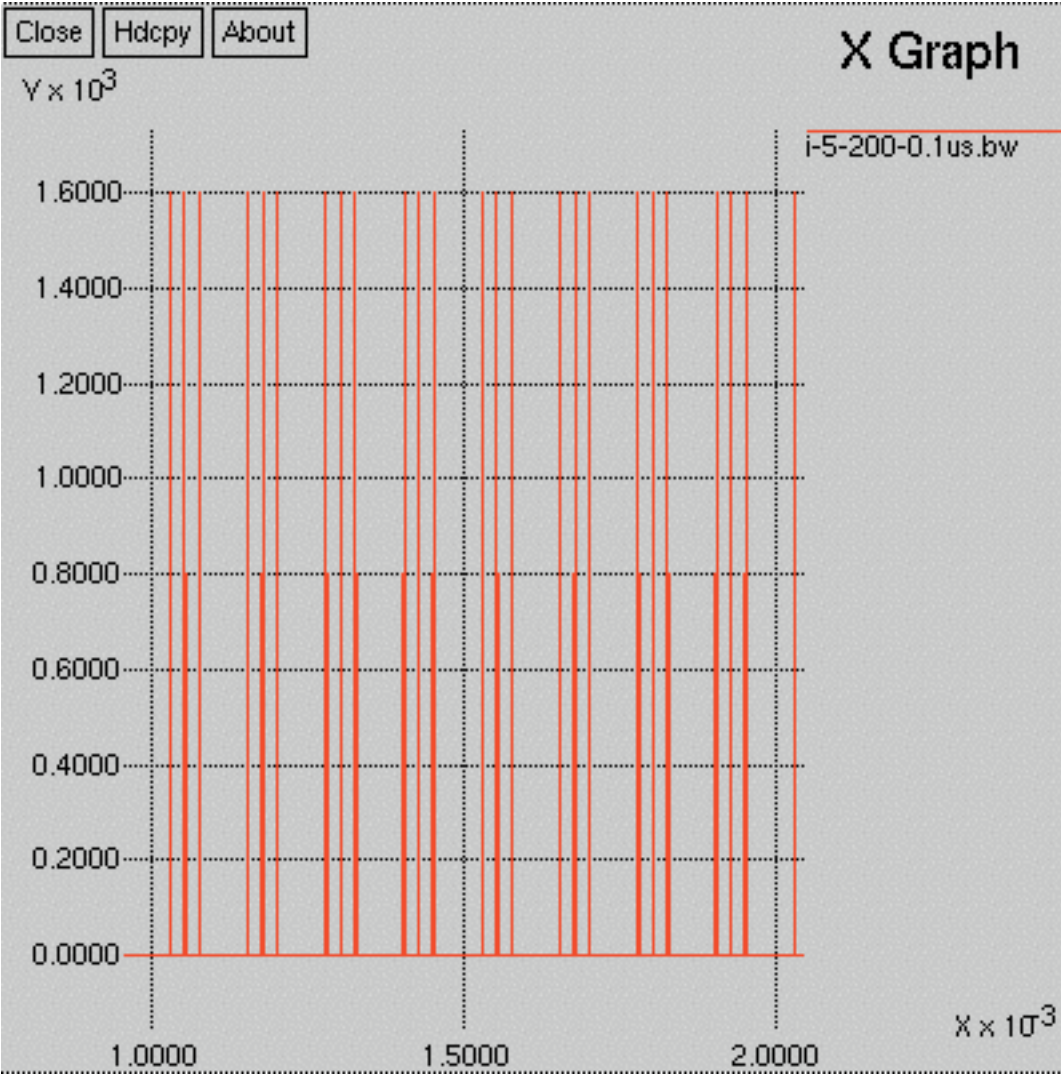Figure 2 - Isochronous, 3 node bus, 200 byte packets, 0.001 to 0.002 interval.

Figure 3 - Isochronous, 5 node bus, 200 byte packets, 0.001 to 0.002 interval.
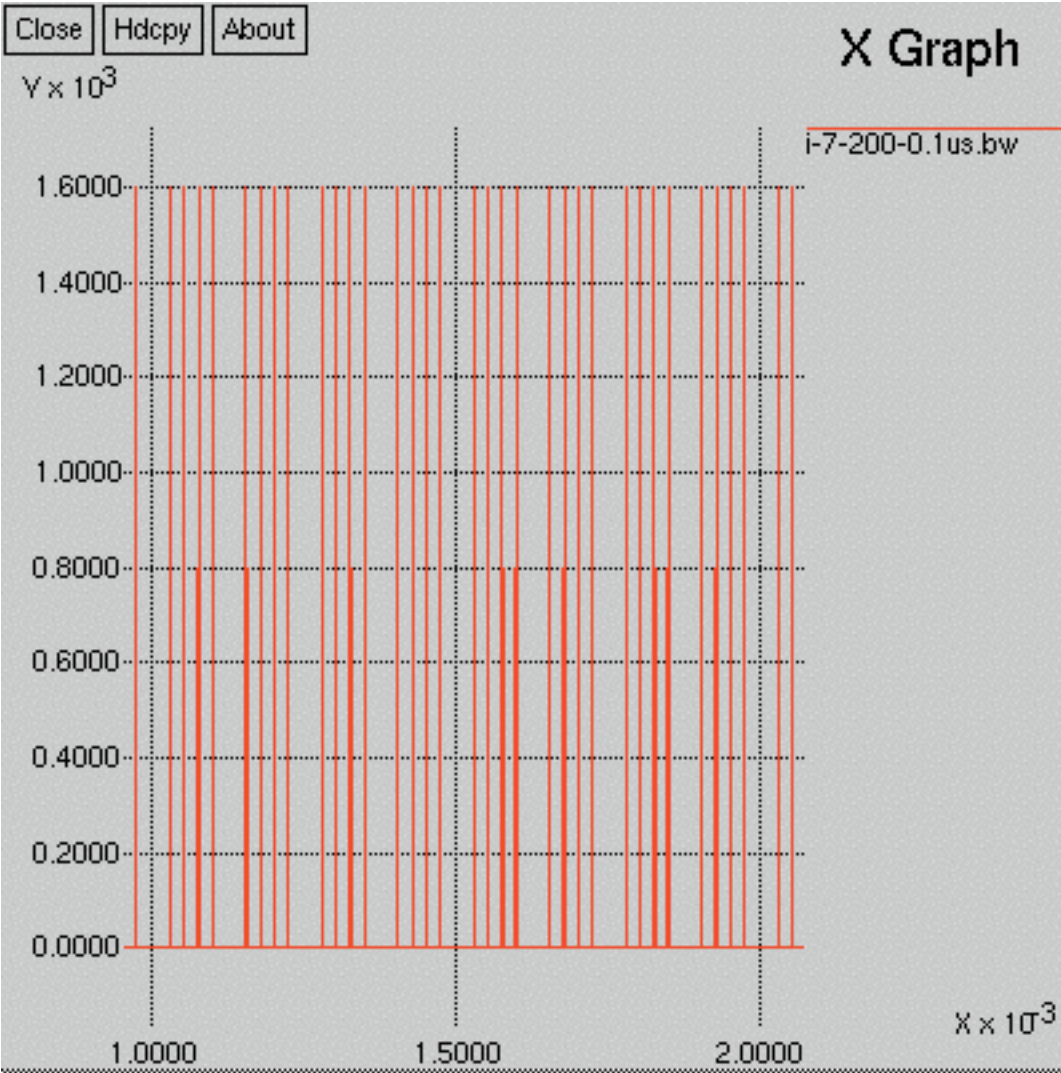
Figure 4 - Isochronous, 7 node bus, 200 byte packets, 0.001 to 0.002 interval.
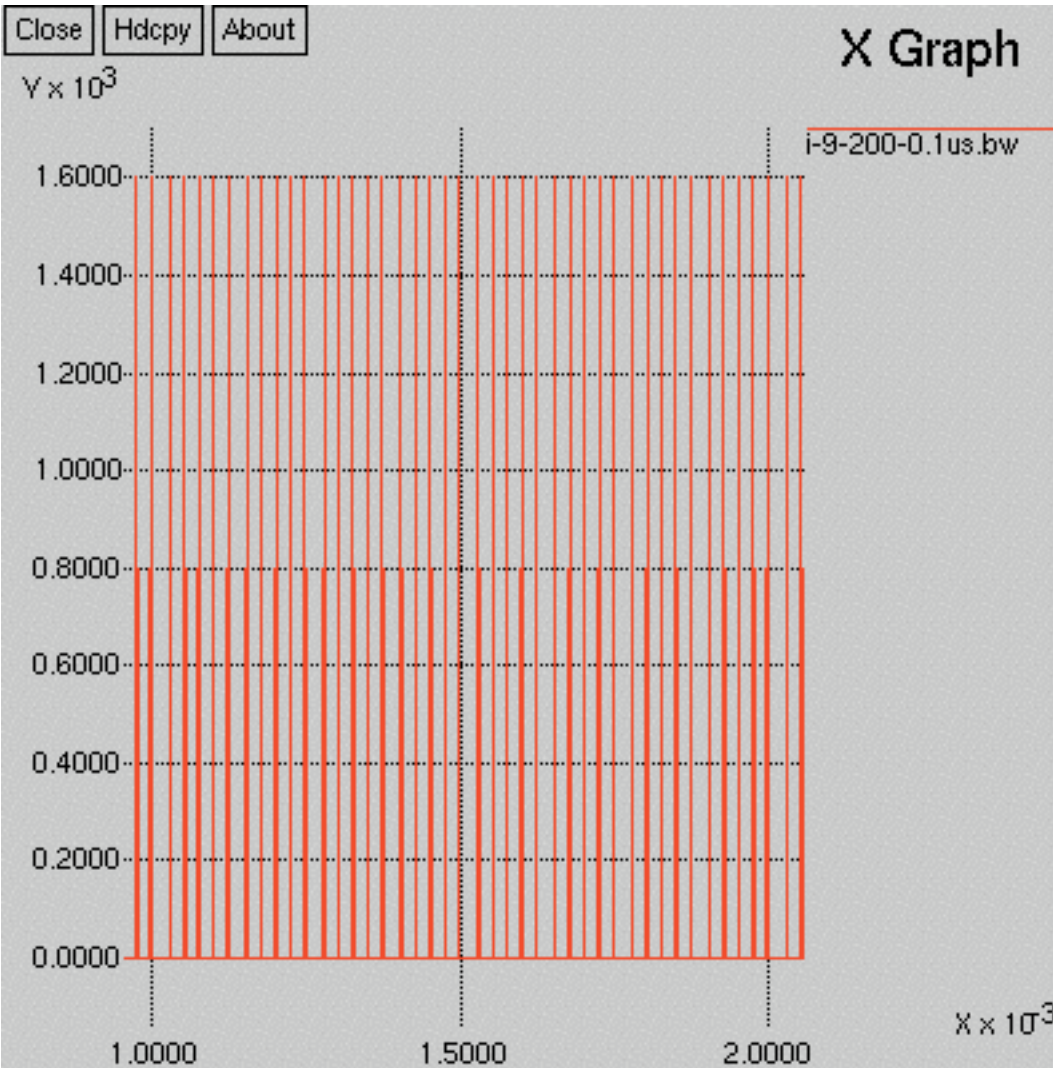
Figure 5 - Isochronous, 9 node bus, 200 byte packets, 0.001 to 0.002 interval.

The asynchronous case is not quite as interesting. It is possible to see the packets receipts (they appear as the spikes), but not the ACK packets (they are not delivered to the Application level packet counter). The sub-action and fairness interval gaps do not clearly appear (they differ by a very small amount), and there is also some irregularity, possibly caused by times when the Cycle TImer packet is sent out by the root node. The following graphs shows Asynchronous transfers with 2, 3, 5, 7, and 9 nodes, sending 512 byte packets. Similarly to the Isochronous graphs, each graph is shown from 0.001 to 0.002 seconds.
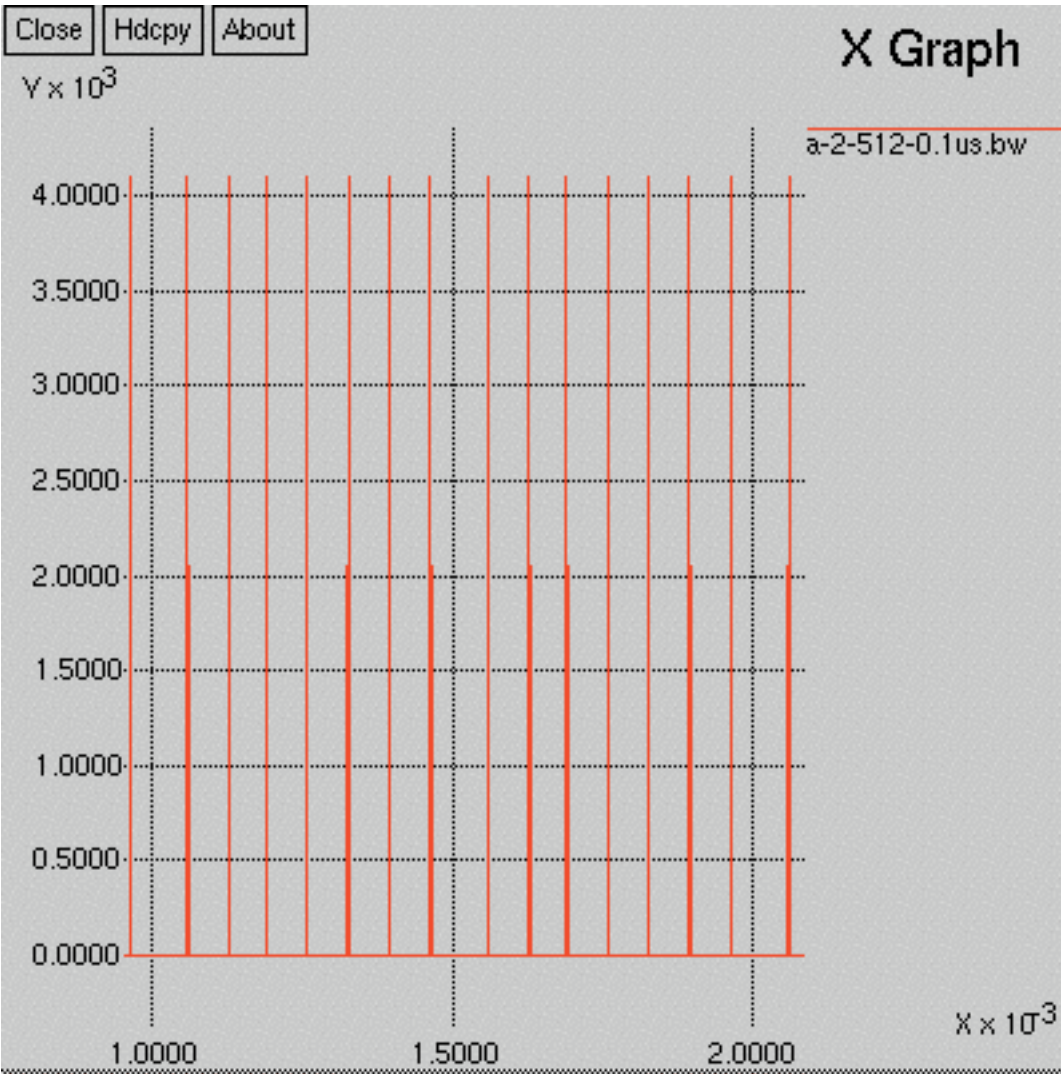
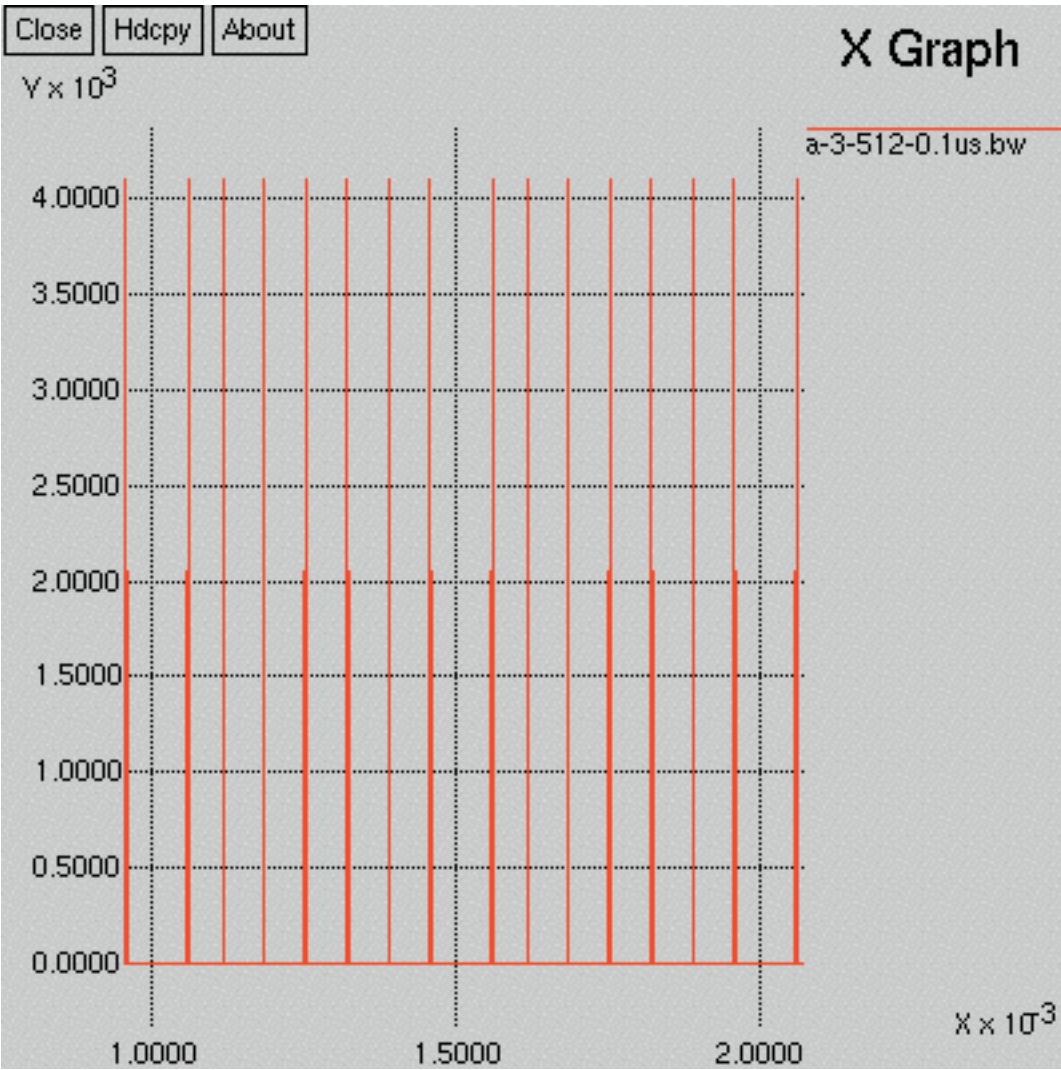Figure 6 - Asynchronous, 2 node bus, 512 byte packets, 0.001 to 0.002 interval.

Figure 7 - Asynchronous, 3 node bus, 512 byte packets, 0.001 to 0.002 interval.
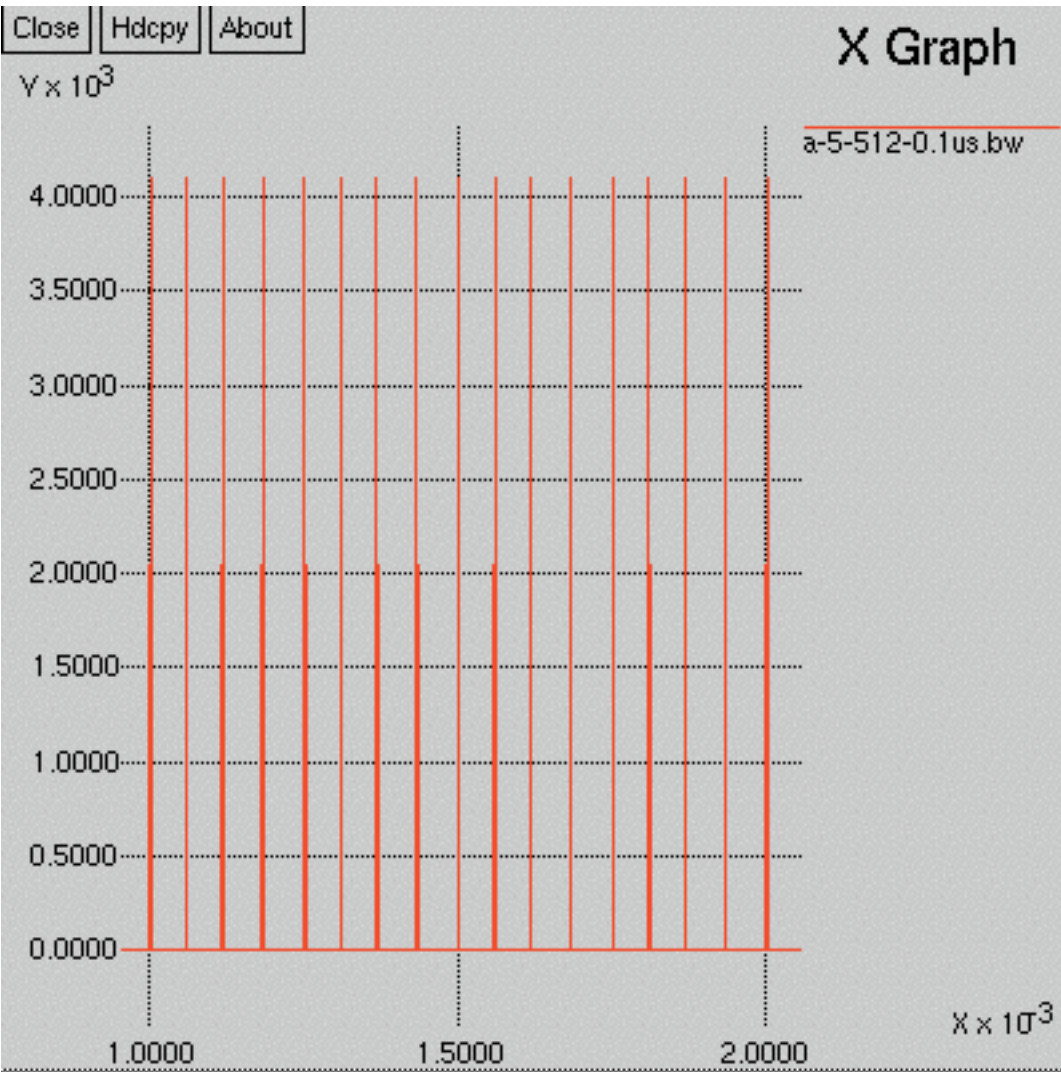
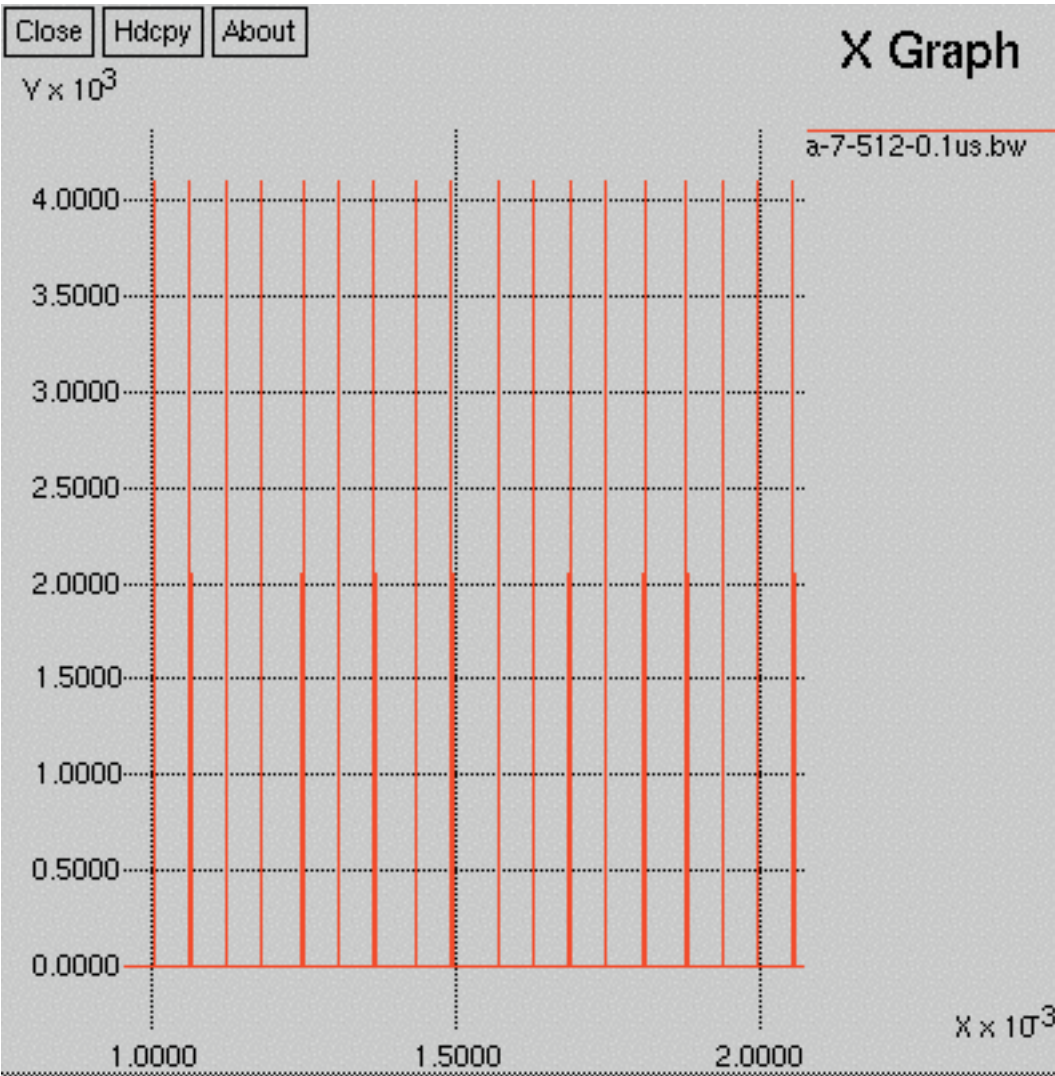Figure 8 - Asynchronous, 5 node bus, 512 byte packets, 0.001 to 0.002 interval.

Figure 9 - Asynchronous, 7 node bus, 512 byte packets, 0.001 to 0.002 interval.
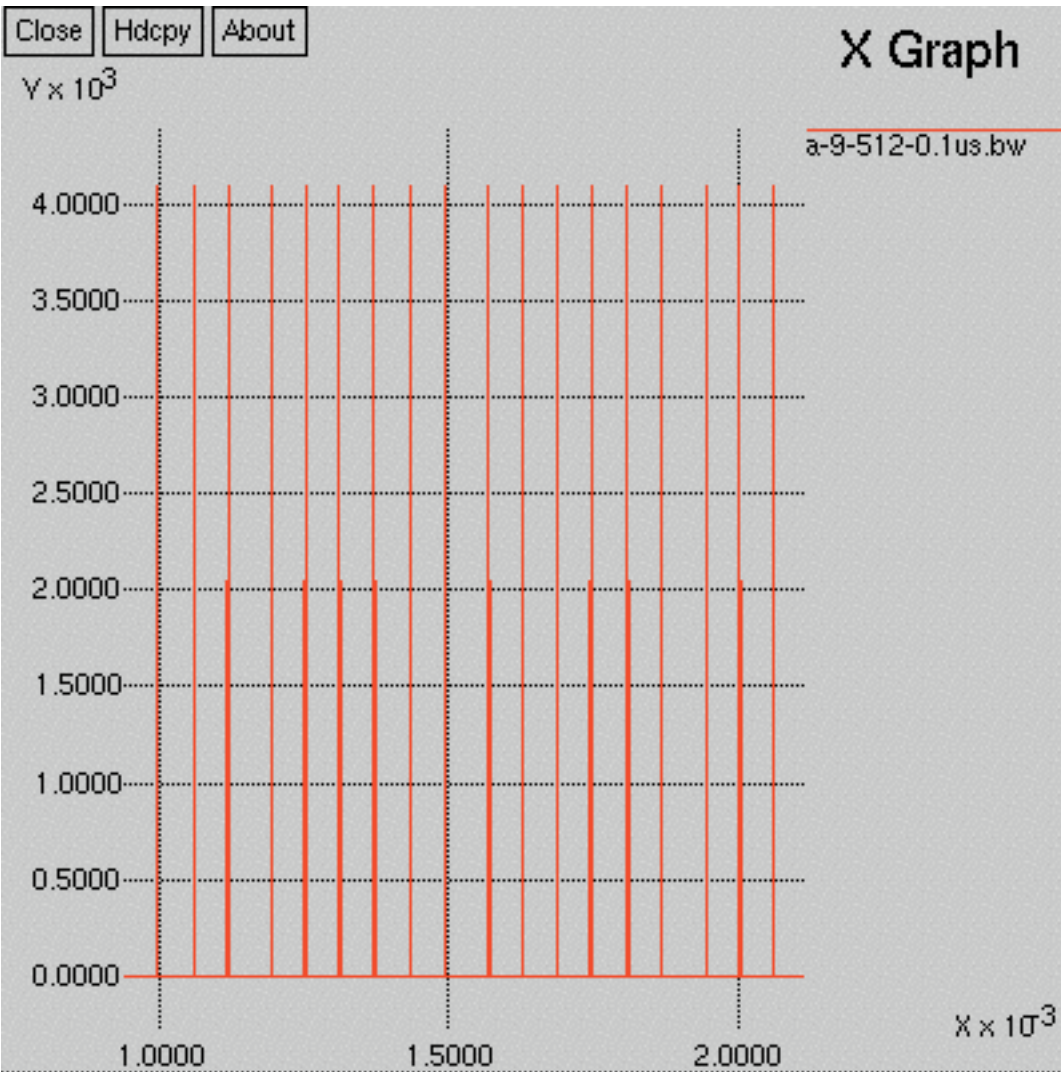
Figure 10 - Asynchronous, 9 node bus, 512 byte packets, 0.001 to 0.002 interval.