

## Inter-Office Memorandum

To Fairbairn, Kay, Ingalls, Goldberg, Shoch      Date November 8, 1979

From Larry Tesler      Location Palo Alto

Subject Ethernet Plans      Organization PARC/SSL

**XEROX**

### Hardware

Bruce and I have verified empirically that the 8086 can keep up with the burst of data at the beginning of an Ethernet packet. This includes WAITing for a packet to start, checking the destination host number for "broadcast" or "me", and storing the whole packet into main memory. We had to use a software FIFO; that is, we interspersed MOVW instructions into the pre-REP instruction stream to keep ahead of the hardware. We may have been too conservative, so the FIFO may be able to go away in the real thing. (Note: The tests Doug and Dan did were invalid because they ANDed "broadcast" to "me" instead of ORing; they stored into local memory instead of into main memory; and they had other minor bugs. Does anyone want to critique our tests?)

I have thought of one improvement to the board. If, after turning on the receiver, the software could have the option, instead of going into a WAIT, to just get interrupted at the next start-of-packet; and if the first word of the packet were kept in the buffer until it was read by the 8086 (even in the face of other stuff from the wire pounding on it to move over); then, although we would surely miss the rest of the packet; we could discover that someone was trying to tell us something and we could then go into a real listen loop hoping for a retransmission. With this capability, we could use the 8086 for other purposes when the host machine had no intention to use the Ethernet, but still respond to unexpected requests from other hosts.

We have agreed that the Notetaker I Ethernet board should be readied for stitchweld now, but not actually stitchwelded until PUP Level 0 software is essentially completed. The latter will probably happen around the end of the year. By doing a Notetaker I Ethernet board (or several), we hope to get early experience that should greatly benefit both the Notetaker II Ethernet design and all future Notetaker Ethernet software.

### Software

Jim Althoff has agreed to start writing Notetaker Ethernet software December 1. He will work almost half-time for several months implementing board diagnostics, PUP Level 0, PUP Level 1, and finally some higher level protocols. We expect to discover hardware problems in the process. Jim will report them to Doug and Ron promptly. Jim has other network and process scheduler projects to keep him busy while he is waiting for any hardware fixes to be done. (We have taken Jim off the BSP project and have agreed that the BSP, though desired ASAP, is not critically needed until June, and that Bruce can handle the Dorado implementation without Jim's help.)

We hope that enough will be known about the use of the board by March 1 that we can confidently recommend an architecture for the Notetaker II Ethernet. Among the issues to explore are: How reliable is the analog phase decoder? Were the synchronizatiion and interrupt schemes successful? How bad is main memory contention? What processor will do what job (e.g., who checksums)? Can the Ether 8086 do work of other kinds when the Ether is not in use? Can we run "full-duplex" in software?