THE USE OF OPTICAL FIBRES IN COMPUTER COMMUNICATION

1. The main attraction in using optical fibres for communications is the ability of light waves to carry a vast amount of information as compared to ordinary twisted wire pairs. As an example, two strands of optical glass fibre, approximately one hundred microns each in diameter, can carry conservatively twenty-five megahertz of bandwidth in each direction. This is equivalent to approximately five video channels or 10,000 voice channels.

2. Coherent transmission of images requiring no conversion at the reception end is still only at the research level. Coded video or voice transmission either analog or digital has a fairly well-developed technology.

3. Northern Electric is presently investigating the market potential of optical fibre transmission, putting them in the forefront of the industry. A conversation with Mr. Bob Oakley of Northern Electric has yielded these facts:

- The fibre they are manufacturing is a single glass fibre externally coated with a plastic film. This is a different approach from other fibre manufacturers, such as Corning, who use glass fibre bundles, and Dupont who uses plastic fibre bundles.

- No radiation is generated when transmitting through optical fibres, unlike wire. This means no shielding is necessary. The security factor of the Northern Electric produce is much higher than other manufacturers because of their single strand approach. A bundle of fibres could be tapped by just a few strands being diverted. A single fibre is not easily tapped since the only method is to cut the fibre and insert a 'splitter'; a very delicate, highly-sophisticated operation. Much to Northern's chagrin, they have not as yet found a practical way of tapping into their single fibre strands without destroying the fibre itself. The reason for trying is quite obvious. If 10,000 voice signals can be transmitted, a single strand tapped at appropriate points would be a very cheap means of wiring.

- Fibre strength is quite extraordinary. Its tensile strength is equivalent to 22 gauge copper wire. However, as it is much thinner, coatings and bundling into cables are required to allow installation in existing conduits without damage.

  Flexibility is also quite high. Although it is extremely thin, its use in any length allows 180 degree bending without any problems.

  Contrary to some belief, optical fibres are not hollow. They act, however, like waveguides because of their transparency and surface coating.

- The transmission of information along optical fibres does not require appreciable energy consumption, nor are amplifiers needed every few feet, since optical fibres pose very little resistance. The main loss in signal strength is due to light energy absorption by the fibre material itself causing it to heat up slightly. The applied coating dissallows loss from the outside surface. Another source of loss is due to backward reflection when bends are encountered. All this still causes very little loss for most applications. In fact, a 2,000 foot stretch of fibre could easily be used without an appreciable loss of strength of signal.