The central spot on the TV monitor is the output distribution of infra-red light from a single mode fibre.

Even with the use of highly efficient digital technology, Canada's existing transmission systems are in danger of eventually becoming overloaded. The off-air radio frequency spectrum is congested and cable networks are dense in many cities. At the same time, many remote communities are not receiving a full range of telecommunications services because of the high costs involved.

The solutions to these problems may come in part through the use of optical fibres — highly refined fibres of glass, each about the diameter of a human hair that can transmit information-carrying signals impressed on a beam of guided light, instead of using electrical signals guided by metallic wires. From half a dozen to thousands of such fibres are bundled into comparatively slim, flexible cables that are nearly impervious to environmental influences. Since each fibre can carry thousands of voice channels or equivalent amounts of video and digital traffic, the capacity of such fibre optics cable is, to all intents and purposes, unlimited.

To transmit information through an optical communication system, the electrical equivalents of voice, data or image signals can be converted into a series of light impulses by a device such as a laser or light emitting diode (LED). The light impulses are put into one end of a cabled fibre and transmitted down the cable to be reconverted to their original form at the destination. Where distance dictates, the signal is regenerated by a "repeater" and sent on, reconstituted in its original strength and clarity.

The advantages of fibre optic transmission include:

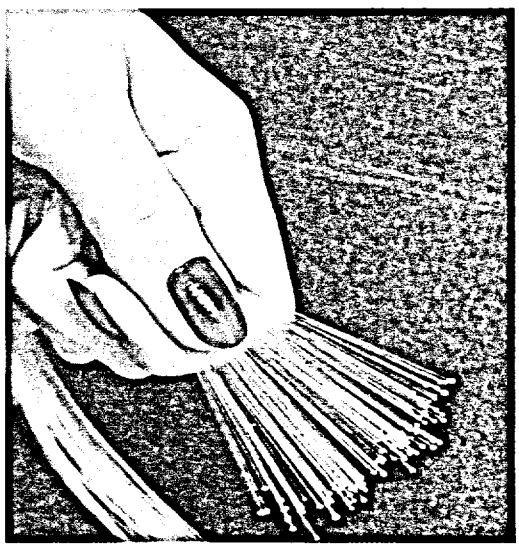
- the ability to carry not only voice, but data and video signals on the same cable;
- the ability to carry signals up to 50 kilometers without the need for repeaters (conventional copper based systems require repeaters every 3 kilometres);
- much higher transmission capacity compared to bulkier copper cable;
- low cost — glass optical fibres with sufficiently high performance for use in mass market telecommunications can now be fabricated at a cost of a few cents per metre;
- transmission quality that is virtually free of cross-talk or interference and it is very difficult to tap optical fibres without detection;
- the suitability of optical fibre for fully integrated digital telecommunications systems.

Fibre Optics Systems in Canada

The first fully operational optical communication system in Canada was installed in 1976 by Bell Northern Research at the national headquarters of the Department of National Defence. By 1979, Canada had its first commercial optical communication system which was located at Weir, Quebec.

But it was project Elie that marked Canada as a pioneer in the implementation of fibre optics technology. Project Elie the world's first rural fibre optic network, was designed to bring the latest in telecommunications services on a trial basis to two small, under-served communities in Canada's western province of Manitoba. When Project Elie became operational in 1981, 150 households in the area received single service telephone, cable television, FM radio, and Telidon, Canada's videotex system.

The $10-million trial has been a joint venture of the Department of Communications, the Canadian Telecommunications Carriers Association (CTCA), Northern Telecom Ltd., the Manitoba Telephone System and Infomart. The success of Elie has led to the extension of Telidon services throughout Manitoba and the Manitoba Telephone System is maintaining the Elie system to test new services. It is hoped that improving rural telecommunications will encourage residents to remain in their communities instead of migrating to large cities.



Fibre optics involves the transmission of information and voice communication through glass fibres by means of light pulses. A hair-thin fibre can carry several thousand one-way voice circuits simultaneously.