scarce commodity like the copper used in cable. Optical fibres are made of silica, which is found nearly everywhere in the world in large quantities. It is a basic constituent of ordinary sand.

Northern Telecom and Canstar Communications are already producing those strands of incredibly pure and exceptionally transparent glass which form optical fibres. They are also making the different kinds of optical fibres for a variety of applications. These fibres are constructed so that the glass used in the outer skin of the fibre bends light more than the glass of the inner core. The two bending effects combine to keep the light trapped inside the fibre and to prevent its escape into the environment where it would be quickly absorbed. The fibres themselves can be bent quite sharply without loss of light, despite the fact that unrefracted light only travels in a straight line.

Some light can be lost when one fibre meets another. Canadian industry has developed an ingenious detachable connector which reduces this problem to manageable proportions. Northern Telecom has produced a suitcase-sized portable fibre fusion splicing set which cuts the time and effort required to splice two fibres together so that the join will result in minimal light loss.

Telephones, television sets and data terminals use electricity which must be converted into light for passage through a fibre-optics transmission system. Canadian industry produces laser diodes and light-emitting diodes to perform this function at the transmission end of a telecommunications system. They also make photo-sensitive detectors to convert the light back into electrical signals at the receiver end of the system.

Glass fibres used for communications are hair-thin, solid, flexible filaments which can carry light beams from end to end, around bends and corners, without interruption. One fibre can carry more than 4,000 one-way voice circuits, many times more than traditional copper wire.

Two Canadian manufacturers are capable of designing and installing complete optical transmission systems. Northern Telecom offers not only installation services and training but also a complete system of compatible components and ancillary electronics for both digital and analog applications. Canstar Communications specializes in designing optical-transmission systems and also manufactures bi-directional couplers, a fibre optics switching device which permits two-way traffic through a single optical fibre.

Research and development are continuing into fibres which would lose even less light than those now in use. Government and industry scientists are also working on optical transmission systems which could form a complete integrated telecommunications network and be economically adaptable to any future technological advance in telecommunications. There is also a strong research interest in fibre-optics terminal devices which would carry much more information, especially in digital form.

At present Canadian optical transmission systems mainly operate inside a single office or installation. Bell-Northern Research, the research arm of Bell Canada and Northern Telecom, installed in 1976 a fibre optics link in Canada's National Defence Headquarters. This link provides secure customized telephone service, two-way closed circuit TV and a high-speed data service.

When they look further into the future, Canadian policy-makers and scientists expect that optical fibres, because of their small size and information-carrying capacity, might lay the basis for a fully integrated telecommunications system. Cable TV, data communications, videotex and telephone conversations may all eventually travel along the same optical link, instead of a different cable being allocated for each, as is the case now.

The first North American test involving the delivery of telephone service to homes by optical fibre began in December 1978 in the Yorkville area of Toronto. The fibre optics network contains both one and two-way links and is capable of simultaneously carrying telephone, video and data signals. Bell Canada, sponsor of the field trial, will be assessing the physical strength and reliability of the fibres as well as their over-all performance in real-life conditions. Ninety-five per cent of the system's components were made in Canada.

A multi-media test of fibre-optics technology in a rural setting has also begun in the small Manitoba community of Elie. Initially, this five-year, $6.1-million project will use optical fibres to bring to about 150 homes private telephone service, FM radio broadcasts and multichannel television. Eventually, this integrated fibre optics system will deliver Telidon as well as such services as teleshopping, telebanking and computerized information retrieval. The project is intended to demonstrate the role of fibre optics in the integrated telecommunications system of the future. It may also illustrate how optical fibres, with their lower installation costs and capacity for carrying signals over longer distances without amplification, can help to create in Canada a new dimension in rural telecommunications service.

Canadian cable companies, as well as other Canadian telephone companies, are conducting their own field trials. A consortium of cable companies in London, Ontario, have begun tests on an optical transmission link 7.8 kilometres long, consisting of eight fibres and capable of carrying 15 channels and two-way video transmission. Meanwhile, just east of the Rocky Mountains, Alberta Government Telephones will soon have installed a 53-kilometre fibre link to test the efficiency of the new technology over long distances.

Optical fibres will soon begin to replace copper cables and wire. The next step will be to use fibre optics technology in the transmission lines required for new telecommunications services. It will only be a little further down the road that Canadians begin to receive all their telecommunications services in light pulses travelling along glass fibres which together form a completely integrated fibre optics telecommunications network.