solid, flexible fibres of a special uniform, highly transparent glass. This glass, developed in the early 1970s, has a high refraction index at its centre and a lower one at its rim, and the bulk of the light is channeled down the centre. The fibres can carry it around bends and corners without dispersal or absorption.

Here's how the system works:

Electromagnetic signals—telephonic, televisual or whatever—are converted to beams of light by low-power lasers. They then travel along the fibre and, at the end, are converted back by a photosensitive detector. If the transmission covers a long distance, the light is intercepted and reinforced along the way by repeaters. (Far fewer repeaters are needed than in cable or microwave systems.) A single fibre can transmit more than 20,000 crystal-clear telephone conversations simultaneously.

Canadian scientists have made two important contributions to the technology: a technique permitting two-way transmission over a single fibre, and an optical coupler which allows transmission from one fibre to others.

Some experts believe that fibre optics may replace coaxial cable systems as a primary means of transmission and, as production costs come down, it may also replace copper wiring and provide cost-effective alternatives to microwave networks.

A 53-km-long fibre optic cable connecting Calgary and Cheadle, Alberta, began operation this year. It can carry 274 million bits per second—which translates into more than 20,000 simultaneous phone calls—as well as video and data signals.

The world's first fibre optic cable TV super trunk system is in use in London, Ontario. The 7.8-km cable, less than half an inch thick, contains eight optical fibres and can transmit fifteen TV channels.

The Canadian Department of Communications and the Canadian Telecommunications Carriers Association are conducting a $6 million rural test of fibre optics technology in Elie, Manitoba, a town 50 km west of Winnipeg.

A variety of services—telephone, multi-channel TV, FM radio and others—are being delivered to 150 homes through the glass strands. Each subscriber will eventually have a TV data channel as well.

Electronic Telephones

Canada, at the moment, has the world's most sophisticated electronic phones. They are, however, still in limited supply.

They are cheaper to produce and to maintain than traditional ones, and the voices heard over them have the high fidelity of a TV-record player console.

Traditional phones are still modeled on Alexander Graham Bell's original design: As the phone is lifted a pressure switch activates the system. When someone talks into the mouthpiece, sound waves vibrate a diaphragm which operates a microphone. The waves are changed to electrical pulses by a transducer and carried over the wire to the other end where another transducer converts them back to sound.

The electronic phone designed by Bell Northern Research and manufactured by Northern Telecom has an integrated circuitry of "chips". It has fewer parts and uses less energy. The bell ring of the traditional phone is replaced by an alternating pattern of two electronic tones that can be adjusted for both pitch and volume. Memory banks may be attached for frequently called numbers, that may then be dialed by pushing one designated button among the sixteen. (The extra six will be used in a variety of ways—in time, perhaps, subscribers will be able to call home and turn on the oven by pushing a button.)

The silicon chips being produced here by Bell Northern for Northern Telecom are the basic ingredients in the new phone system.