

Fibre Optics: Light-Wave of the Future

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The introduction of fibre optics may bring more heat than light into the turbulent telecommunications scene where technology, growing like Topsy, threatens to outpace the efforts of all involved, from legislators, to regulators to owners.

One scenario, for example, created by the advent of fibre optics is a confrontation between cable operators and the telephone companies (with the CRTC and the federal Communications Department as unwilling referees) as to who will make an ally of this powerful new competitor. For the cable companies, it may be a matter of dealing with the challenge of fibre before being co-opted by it. K.J. Easton, a cable TV pioneer and one of the founders of the Canadian Cable Television Association declared in 1977:

*Cable TV technology is now at the threshold of still another revolutionary development, the application of fibre optics in place of coaxial cable. An optical trunk cable is already in commercial service in a large cable system in England, and another is expected to be installed during 1978 in London, Ont. Within five or six years, this technique may be replacing at an increasing rate the coaxial cable on which cable TV has been solidly based for the last 25 years.*¹

*Fibre Is Thin
Filament Of
Glass That Carries
Laser Light*

What gives optical fibre transmission such an advantage over coaxial cable? It appears to be a question of capacity, cost and convenience. The fibre itself is a hair-thin, flexible yet strong glass filament which can carry bi-directional voice and video messages in the form of high-frequency light beams supplied either by laser or LED (light-emitting diode). One fibre can carry thousands of voice signals, several TV channels, and millions of "bits" of computer data. The optical cable consists of about a dozen of these fibres and can be linked or "interfaced" with existing computer systems.

Optical Fibre is eminently adaptable to the carriage of TV programmes and offers a bandwidth broad enough to accommodate three-dimensional holographic transmission. But there are technical problems, especially in the conversion of electrical impulses into light beams, that would have to be surmounted before coaxial cable, itself a carrier of formidable capacity, could be replaced:

*The present limitations on the ability of fibre optics to have any significant impact on our television lives are in the electro-optic transducers, rather than in the fibres themselves...there is still a long way to go before a reliable system can be implemented at costs approaching present coaxial techniques.*²

Although fibre is somewhat difficult to handle and repair, it offers, as opposed to metal cable: increased bandwidth, lower transmission loss with less need for amplification, smaller diameter and lower weight (it's being used in warplanes) and resistance to changes in temperature and humidity. It delivers studio-quality TV pictures and has complete immunity to interference, not only from electrical sources, but also from "snoopers"--it is practically tap-proof. This latter virtue no doubt accounts for the fact that Canada's first fibre optics system was installed at National Defence Headquarters in Ottawa by Bell-Northern Research in 1976.

In an age of supposed communications abundance, increased capacity alone would not give fibre optics a competitive edge over cable. Rather cost-per-message would be the determining factor. One point is that copper, used in telephone lines, is a depleting resource, whereas there is no lack of sand, the basic raw material for fibre; it is also possible that plastics could be employed in place of glass, and it is generally accepted that fibre could eventually be mass-produced at lower cost than wire cable. Moreover, optical fibre can be "overwired" on existing telephone lines and installed in telephone or cable conduits, adding no burden to already overcrowded urban trunk systems.

This cost-convenience factor makes optical fibre a natural choice for the telephone companies. Bell Canada, a leader in the field of OF research, is reported to be planning a start on conversion of its copper telephone lines to fibre in the 1980's.³ Gordon B. Thompson of Bell-Northern Research, explains that right-of-way

and installation costs generally exceed equipment costs in any cable system:

*Strangely enough, it is this fact that is producing the push to develop the fibre optics technology. The cost of duct space for telephone cables in metropolitan areas is so exorbitant that reclamation of space through the substitution of fibre optics for copper cables, in the face of increasing communications loads, is very good economic sense. The plain old telephone is pushing this new technology very hard.*⁴

What if the telephone companies were given the go-ahead to get into the broadcasting field? The installation of fibre that might be used in existing telephone circuits would produce a network offering a full range of interactive messaging on an individualized "point-to-point" basis. This would lead to two-way video, instant access to computer banks, "dedicated" narrowcasting to special interest groups and all the marvels usually associated with the "wired city" concept.

*Cable Companies,
Bell Telephone
Bid For Licenses*

Canadian telephone companies and telecommunications carriers have indeed recently made it clear that they would like to operate cable systems, especially in the contentious field of so-called "non-broadcasting." This poses further regulatory problems and also brings them into direct conflict with the cable companies who are looking for new sources of revenue now that their service has reached near-saturation point in many cities.

The CRTC is currently considering applications from Ottawa Cablevision and Canadian Cablesystems Ltd., to set up two-way "non-programming" services (home security systems, business news, opinion polls and the like). CN-CP Telecommunications, Newfoundland Telephone and the Canadian Telecommunications Carriers Association have intervened against the applications saying that

*...they should be allowed to compete with the cable companies if they are granted permission to establish the systems. Some also argue they should be allowed into cable television themselves if the CRTC grants the cable firms' applications.*⁵

According to newspaper reports, Bell Canada questioned CRTC jurisdiction in the matter, claiming that such services are not really broadcasting. The issue has been stated in these terms:

*Some new services pose no problem of regulation. They fit the CRTC criteria of a broadcast undertaking. However, difficulty arises when the service cannot be clearly defined as under CRTC jurisdiction. These services, representing a departure from regular television fare, could pose a policy problem for the CRTC. To date, the problem has not been resolved.*⁶

One wonders if the CRTC will again be caught "with its plans down" over the fibre-cable-telephone issue. We only have to turn to the U.S. example to see the chaos that could result from further "muddling through" on cable regulation. Writing in 1975 in ACCESS, the magazine of the National Citizens Committee for Broadcasting, Washington, D.C., C.M. Oliver stated:

*Until as recently as October of 1974 AT&T was assuring government agencies that optical fiber, which is potentially capable of carrying two-way video signals and color movies through the telephone system would not be available to residential subscribers before... the year 2000...*⁷

He claimed that research by IBM, ITT and Bell had "paved the way for practical application of fiber optics," and that installation of fibre on a trial basis would be under-way by 1976:

*The developments have apparently caught the FCC flatfooted and jolted the cable TV industry which could be rendered virtually obsolete by broadband telephone service with a capacity for switched point-to-point television signals.*⁸

William Johnson, head of policy review and development at the FCC Cable TV Bureau, Washington, is reported as saying that there were no regulations to prevent U.S. telephone companies from selling Pay-TV and that "one result of the new technology

could be to reduce the typical cable company to a 'head-end salesman' transmitting TV signals over the 'phone system."⁹

*Elie, Manitoba
Field Trial in
Fibre Optics*

Canadian telephone companies have been taking initiatives towards cable involvement in connection with the continuing jurisdictional dispute over cable control between the federal regulatory agency and the province - particularly Manitoba and Saskatchewan. In 1976, the Department of Communications sidestepped or over-ruled the CRTC by allowing Manitoba Telephone Systems to take control of cable hardware, and also offered a "deal" to Sask Tel regarding cable ownership.¹⁰ This summer (1979), Manitoba Telephone, in conjunction with Bell-Northern Research and with the support of the Department of Communications, set up an optical fibre experiment at Elie, 60 kilometres west of Winnipeg. In this field trial of an OF rural network, participants are offered telephone service, at least five TV channels, FM radio and interactive computer services such as "teleshopping." Cable TV spokesman K.J. Easton comments, "Here is the danger to the future of the cable TV industry--if we don't do it, someone else will, and the telephone industry is..."¹¹

Another blow to cable operators came in November 1977 when the DOC allowed the federal agency Telesat (over CRTC objections) to buy a majority interest in the Trans Canada Telephone System. It was probably in response to this that ten cable companies in July 1978, formed an organization (Cable Satellite Network) to press for a tie-in with satellite earth-station systems. Laser-optical technology is easily adaptable to satellite systems and as far as space communications go, the laser beam could function effectively as a message carrier, not being subject to atmospheric attenuation as it would be at lower altitudes.

All this ferment over fibre occurred shortly after federal Communications Minister Mme. Jeanne Sauvé declared, at the 1978 National Convention of the Canadian Cable Television Association that fibre optics was "the light-wave of the future," adding that "the ordinary home telephone, an unlimited number of television channels and all sorts of data communications will be carried on a single hair-thin string of glass." The observer for the Cable Association commented: "She made no prediction as to who will end up owning those fibres."¹²

Practical applications of OF in Canada have been relatively limited owing partly to the "go-slow" regulatory climate surrounding cable development, although this country has been in the forefront of research and testing of fibre technology. Other countries have already put short-haul OF systems into operation. In Japan, for example, a fairly large-scale interactive network field trial was set up in 1976 near Osaka, with plans to extend the system to other parts of the country. Services include "practically all the features attributed to the most sophisticated two-way cable."¹³

The installation of such systems raises the perennial question associated with future mass media: will the new technology lead to better communication in the sense of people interacting with each other or will it accentuate the isolation and alienation of the individual alone with his "home console," as part of a great captive audience for the monolithic media?

*Japanese
Said To Stress
Social Goals*

The Japanese experiment tries to avoid the evils of the latter condition:

*The objectives for developing such a system are not based on profit return but on national social goals. A number of satellite cities, 'The String of Pearls', is being planned. These wired cities will give Japan a wider and more comfortable choice of home sites without cultural isolation. The overall objective with its emphasis on education, information and corollary services, is to seek to augment productivity by enhancing the quality of life for 110 million residents...*¹⁴

As for the OF experiment in Manitoba (Saskatchewan is also similarly involved), interest in the technology has been

*...as a means of extending modern telecommunications more widely, even to the farm, for primarily social reasons, e.g. the right of all citizens to equitable telecommunications services and the reduction of cultural isolation.*¹⁵

In the U.S. where the regulatory climate now seems to be easing up on ownership of FO systems by the telephone companies, corporate wheeling-and-dealing has already begun:

The U.S. first large-scale fiber optic CATV trunkline systems have been purchased by TelePrompter Corp. from Times Fiber Communications Inc. for use in Lompoc, Calif. and New York City. In 1976, TelePrompter was the first U.S. company to use fiber optics in a commercial communications system. Today TelePrompter, Manhattan, is still the only cable TV company using fiber optics...¹⁶

In New York City, the company operates a two-fibre system over a short distance. One fibre monitors the company's cable operations; the other carries 12 TV channels and one FM channel. The fibre shares the existing cable conduits.

On the human use of such systems, Glen O. Robinson, a former FCC commissioner and a member of the Telecommunications Commission, National Research Council, remarks:

*A single glass fiber will provide a capacity for three television channels which in themselves have a huge capacity for information (and a near infinite capacity for banality). A small bundle of such fibers could carry all the communications for which we have any beneficial use (as well as some for which no use can be conceived). Meantime...millions still struggle for one or two or three viewable signals...the central problem for regulatory and social policy for the future is less a matter of rationing scarcity than of managing abundance.*¹⁷

Returning to our own situation, the advent of fibre optics clearly makes it even more urgent for Canada to develop a coherent national telecommunications policy, especially to deal with the impact of new technology on established systems. As Hugh H. Edmunds and John Strick observed in 1976:

Pay-TV Pirates
On Closed Circuit
Fibre Optics?

*In the absence of some all-embracing communications strategy as exemplified in Japan, where both the telephone service and all two-way cable features will be carried by fibre optics, this technology in North America will only slowly find applications within the present structure...Without some such political will to direct the overall implementation of fibre optics then this new technology will simply be patched into the current system to replace obsolete parts. Once the cost reductions in fibre optics take place, pay-TV closed circuit ('pirate') operations may become economically viable on a much larger scale.*¹⁸

Perhaps some promise lies in the recent report of the "Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty" concerning reform of the telecommunications system as it copes with the "mixed blessing" of technological change.

This system, the Department of Communications stated, is "in the midst of a crisis more profound than any that has affected it since the 1920's." The new technologies, the statement continues, "could compromise the country's capacity to control future fundamental economic and cultural directions." Alternatively, they could benefit Canada in these spheres if parts were imaginatively and quickly applied.¹⁹

FOOTNOTES

1. Easton, K.J. "A Short History of Cable TV." *In Search*. Fall 1977, p. 8
2. Thompson, G.B. "Future Mass Media" in *Report of the Royal Commission on Violence in the Communication Industry*. Vol. 7. 1976.
3. Marshall, J. "Bell Soon To Use Glass Fibres and Light to Transmit Messages." *Globe & Mail*, January 31, 1977, p. 4.
4. Thompson, *op. cit.* p. 190.
5. "Carriers Object to Applications for Two-Way TV" *Globe & Mail*, November 22, 1978. (See CRTC "Notice of Public Hearing." November 16, 1978).
6. Canadian Communications Research Information Centre *Newsletter*. Vol. 4, No. 1, 1978, p. 2.
7. Oliver, C.M. "Three Phone Companies to Install Optical Fibers by 1976." *Access*. March 24, 1975, p. 4.
8. *Ibid.* p. 4.
9. *Ibid.* (In January 1978, a draft bill containing proposals for a "Communications Act 1978" was presented by Rep. L. Van Deerlin based on the principle of "maximum deregulation, competition and minimum control." The draft calls for "Deregulation of cable TV at the federal level and removal of restraints placed upon the entry of AT&T into the telecommunications field in exchange for divestiture of Western Electric, its equipment manufacturing arm." A premise is that "scarcity is no longer a factor in radio broadcasting and that the dominant role of broadcast television in our lives is destined to be eclipsed by emerging technologies, most notably cable and fiber optics." (Quoted

- in Friedman, M. "A New Communications Act: The Debate Begins." Columbia Journalism Review September/October 1978, p. 42).
10. Edmunds H.H. and Strick, J. "Economic Determinants of Violence in Television and Motion Pictures and the Implications of the Newer Technologies." Report of the Royal Commission on Violence in the Communications Industry. Vol. 7, 1976.
(The federal DOC agreed on November 10, 1976 with Manitoba to give Manitoba Telephone Systems control of cable hardware in exchange for federal jurisdiction over broadcast-type programming, including Pay-TV; DOC also offered cable ownership to Sask Tel in exchange for federal control over content. (p. 180, note.)
 11. "Cable Comments" in Cable Communications. Toronto. August 1978, p. 7.
 12. Reported in Cable Communications July 1978, p. 23.
 13. Edmunds and Strick. *op. cit.* p. 167.
 14. *Ibid.* p. 168.
 15. *Ibid.*
 16. Cable Communications. June 1978, p. 8.
 17. The New Communications: Planning for Abundance Current. September 1977, p. 49.
 18. *Op. cit.* p. 168. In a paper presented to a communications conference at University of Windsor in May 1978, Edmunds pointed out that "...the almost unfettered industrial exploitation of the new technology in our environment can have disastrous cultural results." He also questions "whether in view of the economics of cable, that when extension of this service becomes unprofitable, money and effort, either through cross-subsidization or the public purse, should be lavished on it. Even optic fibre has its limits."
 19. Quoted in R. Sheppard "New Committee Will Help Reform Communications." Globe & Mail Dec. 1, 1978 p. 8.

Note the cautious statement in CRTC "Public Announcement," June 7, 1977 re "UHF Broadcasting Spectrum Requirements for Canada": The impact of new technological developments such as broadcast satellites and fibre optics...cannot be accurately assessed at this stage of development. Until such time as these technological advances can be adequately demonstrated to offer viable alternatives to the conventional system, it would be inappropriate to restrict the ability of this system to meet the expected service requirements." (p. 5).

BIBLIOGRAPHY

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- Editorial: "Cable Television". CRTC, Ottawa: "Public Announcement" June 7, 1977: "UHF Broadcasting Spectrum Requirements for Canada".
- "Notice of Public Hearing". Nov. 16, 1978 re applications by Canadian Cablesystems and Ottawa Cablevision Limited.
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