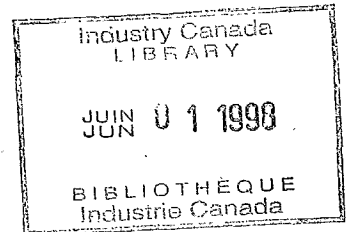


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Paper presented at the November 27 - 29
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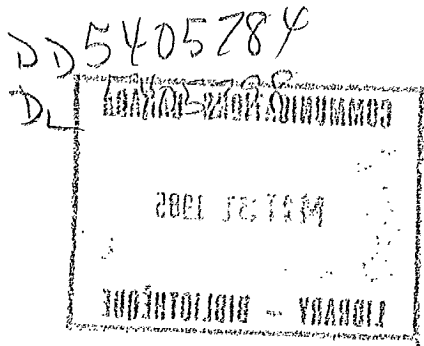


Department of Communications, Canada
Telecommunications Economics Branch
November, 1979

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Production of Information Infrastructure:
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Appendix I: Report of the Federal-Provincial Working Group on
Competition/Industry Structure in the Telecommunications Industry

1. Introduction and Overview

Over the past century communications has played a key role in the economic, social and cultural development of Canada. It has been, like transportation, an essential element of the economic infrastructure, in view of the great distances which separate metropolitan centres and of the large portions of this country which have remained undeveloped or underdeveloped. Communications has also contributed significantly to the social and cultural fabric of Canada by providing widely accessible networks for interpersonal communications and for the diffusion of information, entertainment and cultural programs to millions of Canadians.

Canada now leads the world in total capacity of telecommunications facilities, of many kinds, on a per capita basis. Telephone penetration is close to 100%. Every business and virtually every home has a telephone. A television set can also be found in almost every home. Cable TV penetration is higher in Canada than in any other industrialized country. The national average is about 50%, but it approaches 80% in Metropolitan Toronto and 95% in the Vancouver area.

In the coming years the importance of communications is expected to grow even further. The economy will become increasingly dependent on sophisticated data communication networks. At the same time, the technological revolution which is now unfolding in the fields of electronics and other information technologies will affect all aspects of our lives, both at home and at work.

The rapid technological change which characterizes the communications sector is fueled by the micro-electronics revolution and concurrent advances in satellite communications, fibre optics, digital transmission and switching. These new technologies are bringing about a confluence of the telecommunications and data processing worlds on the one hand, and on the other creating opportunities for providing new types of communications services to the business office and to the home.

The emerging technology of telecommunications offers the possibility of an eventual network affording universal access to the means of transmitting and receiving information in virtually any conceivable form. The information would be stored in electromagnetic form and transmitted at the speed of light, rather than be stored on printed paper and transported physically from origin to destination. Much of this concept is already technically feasible, and its practicability is not in doubt over the long term. Its rate of implementation, however, is limited to a large extent by existing telecommunications plant and facilities which were designed for more limited services, and by institutional barriers.

These technical changes will not only provide a wide range of new services but, more importantly, they will have a major impact on the Canadian economy. The introduction of the new information technology will cause significant changes in production techniques, in the level of employment and occupational mix, in the size and location of firms, in productivity and in the competitiveness of Canadian industry in foreign markets.

Under the impact of these changes, telecommunications policy makers and regulators must consider whether the public interest is best served by

maintaining the present industry structure, characterized by the far-reaching monopoly of the telephone companies, or whether alternatives would be more appropriate. One such alternative is complete deregulation of the industry; another, perhaps more realistic in the Canadian context, is the opening up of selected telecommunications sub-markets to regulated competition. This paper attempts to examine some of the economic problems and issues which may arise if more competition is allowed in the Canadian telecommunications industry.

The scope of this paper is restricted to the telecommunications carriers and manufacturers of equipment. Radio and television broadcasting has been excluded.

2. Structure of the Canadian Telecommunications Industry

The Canadian telecommunications carrier industry is characterized by regional telephone company (Telco) monopolies in public, switched network, telephone services, a national CNCP monopoly in public message telegraph service, and a Telco/CNCP duopoly in most other network services, including private line voice, data communications and video transmission services. This competition between the two carrier groups, in the supply of private line services that "fall clearly outside" the family of monopoly telephone services, has been acknowledged as being in accordance with federal government policy.

Ownership patterns vary widely amongst carriers. Bell Canada, by far the largest telephone company, is an investor-owned utility which is vertically integrated with its manufacturing subsidiary, Northern Telecom, and their combined research and development subsidiary, Bell Northern Research. British

Columbia Telephone Company (B.C. Tel) and the maritime Telcos are also investor-owned utilities; many smaller Telcos in Ontario, Quebec and B.C. are subsidiaries of Bell Canada or B.C. Tel. Canadian Pacific Telecommunications (CPT) is a wholly owned subsidiary of Canadian Pacific Limited. There are a number of federal and provincial crown corporations, such as Canadian National Telecommunications (CNT), Teleglobe Canada, Alberta Government Telephones (AGT), Saskatchewan Telecommunications (Sasktel) and Manitoba Telephone System (MTS). Telesat Canada, which operates satellite systems for domestic telecommunications, is owned 50% by the federal government and 50% by the nine other members of the Trans-Canada Telephone System (TCTS).

All telecommunications carriers are subject to some form of regulation. The Canadian Radio-Television and Telecommunications Commission (CRTC) regulates Bell Canada, B.C. Tel, CNT, CPT and Telesat; these carriers represent more than two-thirds of the assets and revenues of the carrier industry. The other major Telcos are regulated by provincial regulatory bodies, except for Sasktel which is regulated directly by the provincial legislature. Since Trans-Canada Telephone System (TCTS), a voluntary association of the major telephone companies which administers the integrated national telephone network, is not an incorporated entity, there is no direct regulation of "TCTS rates". Regulation has to take place at the level of the individual member companies and this can give rise to jurisdictional problems between the CRTC and the provincial regulatory authorities. Teleglobe, the international carrier, is not directly regulated. It determines rates for overseas services through bilateral arrangements with other international carriers. These rates have to take into account the requirements of governments and operating companies in the countries in which the services terminate, or through which they pass in transit.

Manufacturers of telecommunications equipment form a sector of the electronics industry, which is not regulated. The sector is dominated by Northern Telecom, the 69% owned multinational subsidiary of Bell Canada, which manufactures and distributes a broad line of telecommunications equipment for sale throughout Canada, the U.S. and in export markets abroad. Northern Telecom is North America's second largest manufacturer of telecommunications equipment, the first being Western Electric, the manufacturing subsidiary of AT&T. About 45% of Northern Telecom's consolidated manufacturing and distributing sales are to purchasers other than Bell Canada and its associated or subsidiary telephone companies.

Most of the Canadian manufacturers of telecommunications equipment are firms of very small size. Their operations are crucially affected by the procurement policies of the Telcos and CNCP, and by the terminal attachment policies that are in force. The Telcos do not allow any network addressing device which is not provided by them to be directly connected to the public switched telephone network. Unlike the situation in the U.S., where a growing number of customers own their own private branch exchanges (PBXs) and other telephone equipment, Canadian customers do not own any significant amount of terminal equipment other than modems and recording devices. The interconnection of customer-owned equipment to Telco networks is an area, however, where major changes may occur in the near future. The Harding and Challenge cases, as well as the CNCP Interconnection case, were all decided against Bell Canada. These may act as the precursors of an era of more liberalized interconnection and terminal attachment in Canada, similar to that which now prevails in the U.S. Bell Canada itself has, very recently, proposed a liberalization of its interconnection regulations for customer provided terminal devices, especially network addressing devices, if the CRTC finds this to be in the public interest.

The problem lies in how to avoid a takeover of the market by non-Canadian manufacturers and the massive importation of equipment now supplied by domestic firms.

Non-Canadian multi-national firms do not, as yet, account for a significant share of the telecommunications equipment used in Canada. The situation is changing, however, in the terminal market. It may be drastically altered if Canadian industry is unable to compete in the supply of micro-processor controlled intelligent, multi-functional terminals which are expected to come into widespread use over the next decade, first in the business office and then in the home. Intelligent and aggressive exploitation of micro-chip technology, combined with a rational industrial strategy, will hold the key to Canada's successful performance in this vital sector.

3. Policy Objectives and Environment of Telecommunications Regulation in Canada

Issues related to monopoly, competition, technical change and regulation are central to the performance of the telecommunications industry. These issues deal with how the boundary should be drawn between monopoly and competitive services to best serve the public interest, and how rates should be established for a variety of such services, in order to meet a set of efficiency and equity goals which are sometimes in conflict.

The policy objectives of the proposed Canadian Telecommunications Act specify that regulation is to be flexible, adaptable to technological change and advances, and to ensure a proper balance between the interests of the public and the legitimate revenue requirements of the telecommunications industry. Among the policy objectives are also requirements for an efficient telecommunications

system, universally available, reliable telecommunications services, and just, reasonable and non-discriminatory rates.

Canadian policy does not, however, operate in a vacuum. Since the U.S. and Canadian telecommunications networks are closely interconnected and are based on broadly similar technology, and because of the close links between the two economies, developments in the U.S. do tend to influence developments in Canada, usually with a time lag. The issue of deregulation and widespread competition is the most pervasive topic in the U.S. telecommunications sector today. Similar pressures, therefore, can be expected to arise in Canada, both in the area of network services and in the terminal equipment market.

A Federal-Provincial Working Group was established in March 1978 to study issues related to competition and industry structure in telecommunications. The Working Group's report, which is summarized in Appendix 1, was presented at the meeting of Federal-Provincial Communications Ministers in October 1979. This report contains a statement of policy objectives, a set of policy principles which would assist in achieving these objectives, identifies a number of policy issues and makes a set of recommendations.

In addition to stressing the efficiency and equity objectives, the report states that public policy should permit a wide degree of consumer choice and ensure that services are both of high quality and responsive to consumer demand. No less than six of the twelve policy principles deal with the economic aspects of competition. The following principles are particularly important:

- a) The degree of competition that may be appropriate should be based on a judicious balance between the effectiveness of competition in promoting innovation, efficiency, optimal allocation of resources and the realization of a reasonable degree of consumer choice on the one hand, and on the other hand, the requirements for achieving universality at equitable rates, in the provision of certain telecommunications services.
- b) Users of basic telecommunications services should not bear an undue economic burden as a result of competition in non-basic service offerings.
- c) Competitive services should not be cross-subsidized by services provided on a monopoly basis, if this results in unfair competition.
- d) Where free entry and exit market competition is not operable or desirable, regulation is necessary.
- e) In the case of competitive services provided under regulation, regulators should place reliance on market forces to the greatest extent possible.

Separation between carriage and content has been considered a desirable policy principle, especially from a political point of view. By

largely excluding content from the scope of regulation and limiting it to carriage, any potential interference by regulators with the right to freedom of expression can be minimized. Moreover, since a "natural monopoly" is less likely in the provision of content than in carriage, competition may lead to economic benefits as well.

This principle, however, may have to be re-evaluated in an environment which is witnessing the rapid confluence of telecommunications and computing. If economies of scope can be shown to exist between certain types of carriage and content activities, such as the widespread use of "public" databases for Videotext type information retrieval systems, then a potential cost will be incurred by enforcing carriage-content separation. The rigid exclusion of the telecommunications carriers from providing computer based services may have to be reconsidered. This issue could arise in the provision of Telidon services, and in the role of "intelligent" carrier networks in Electronic Mail and Electronic Fund Transfer Systems.

The role of the established telecommunications carriers in providing computer based services has already become a major issue in the U.S. The carriers argue, with some justification, that if Satellite Business Systems (SBS) and Xerox are to be allowed to enter the field of telecommunications carriage as Specialized Common Carriers then, in the interest of free and fair competition, the established carriers should be allowed to provide computer based services through unregulated subsidiaries. The dilemma lies in the historical fact that telecommunications carriage has been a regulated industry, while the computing industry is unregulated. The Federal Communications Commission's efforts in the U.S. to draw an enforceable boundary between telecommunications services and computer based services have virtually collapsed, due to the rapid convergence

of the two technologies. The prizes for which the established carriers are competing with the new entrants are the huge new service markets related to the automated "Office of the Future" and, further down the line, the "Home of the Future".

Decisions regarding carriage-content separation may also determine the extent to which Canadian Cable TV companies will be allowed to compete with the telecommunications carriers in the provision of new home and business services. Stressing the desirability and need for carriage-content separation, the carriers can be expected to do their best to limit any ambitions the cable industry may have about eventually raising its status to that of a competing national, inter-city communications carrier using a satellite distribution system to complement its local, broadband loops. At the June 1978 convention of the Canadian Cable Television Association (CCTA), the president of TCTS addressed the meeting and bluntly asked "Will you be customers or competitors of the telephone industry?"

More than 50% of all Canadian households with television sets now subscribe to cable - a level considered by many to be near saturation. With growth in subscribers tapering off and rates for existing services held down by government regulation, the cable industry has turned its attention to finding alternatives to broaden its financial base. One such alternative is Pay TV, which is already being offered on a commercial basis in the U.S. The other major area is new services. This includes non-video information programming, computer based information retrieval, protection services, utility meter readings and many other non-programming services. But since many of these services can also be delivered over the present telephone network, and they will

all be deliverable over the broadband switched networks of the future with their vastly increased delivery capacity, a clash between the telephone companies and the Cable TV industry is inevitable in this area if the present trends continue.

In this dispute, the strength of the telephone companies lies in the fact that they alone have, at present, a nationwide two-way communications network to just about every home and business office. Furthermore, new technology will enable the upgrading of the present narrow-band, analogue public switched network to a broadband digital network with almost no capacity constraints. This type of network is called integrated plant; its characteristics and probable rate of introduction are explored in the next section. The Telcos are primarily concerned with who will control any integrated plant introduced to Canada. Their view was unequivocally expressed by the TCTS president, as follows: "The telephone companies are convinced that they must be the owners of any such plant, to be made available on a common carrier basis to entrepreneurs for various purposes. We believe that it is in the public interest that, if we get to the point where there is one broadband cable distribution, it ought to be owned by the telephone companies. All manner of entrepreneurs would have access to this facility at equitable rates. This is the philosophy of the common carrier business".

The Cable TV companies, on the other hand, are fighting to maximize utilization of their present plant, and to retain ownership and control of their distribution plant in the future. They argue that new technology allows them to transform their existing one-way, local broadband distribution networks into a

nationwide, two-way broadband communications network, and that the excess delivery capacity of this network should be used immediately to provide new services. They are well aware of the natural appeal, to the general public, of the image of a single wire being strung into the house as opposed to two or more. But the president of CCTA argues as follows: "The price tag attached to the argument of orderly and efficient communications involves a loss of freedom and a loss of choice. That price is not only too high for the industry, but is too high for the consumer of these services."

It is unlikely that this matter will be resolved purely on economic grounds, or within the confines of current regulatory practice, since fundamental policy issues are involved. The Working Group on Competition/ Industry Structure has recommended that additional work should be carried out to develop further the policy issues and options raised in its report, on the role of carriers and broadcast receiving undertakings.

4. The Nature and Effect of Technological Change

4.1 Technological Trends

The new technologies producing the greatest change in telecommunications are very large scale integrated circuits (VLSI), digital technology, opto-electronic systems including fibre optics, satellites, new electronic information storage and retrieval devices, and specialized software for programmable devices. Breakthroughs in these and related areas are providing great potential cost reductions in switching and transmission equipment, increased flexibility in transmission and processing, increased storage and

retrieval capabilities, greater reliability and easier servicing. VLSI has also led to the development of the low-cost, micro-processor controlled intelligent terminal; multi-functional terminals can be expected to follow in the next few years.

Additionally, breakthroughs in these technologies are providing compatibility among different types of signals, allowing voice, data, television, radio and other communications to travel through a single communications medium, with equal ease and without costly conversion. This feature has given rise to the concept of the "Single Integrated Plant" for all telecommunications services, a concept where the "Economy of Scope" argument is carried to its logical conclusion.

The Telcos see the switched public telephone network evolving from a narrow-band, analogue network designed essentially for voice communications, to a broadband digital network capable of carrying voice, video, data and many other types of signals. All signals would be transmitted in digital form, thus allowing efficient multiplexing and optimal use of broadband, high-speed, long-haul links. Such broadband, digital switched networks would be free from the current bandwidth capacity constraints and be capable of supporting all the services which are currently being planned for the "Office of the Future" and the "Home of the Future".

The complete replacement of the current public switched network by a broadband switched network will, naturally, not occur within the next 10 years. The replacement of the twisted-pair copper wires which form the local distribution links, by fibre optic cables or other broadband loops, is a slow and costly process which may take 20-30 years to complete. But the enhancement of the

public network with digital switching and transmission facilities is already well underway, and can be expected to make significant progress by 1985.

Special purpose digital network communications services for voice, data, message/record, facsimile and other sophisticated forms of business communications should be well established by 1985. Two packet-switched networks, Datapac and Infoswitch, are currently operational in Canada. These are operated by TCTS and CNCP respectively. Three major new "intelligent networks" are currently being planned in the U.S. They are:

- a) ACS - Advanced Communications Service, a data communication service proposed by the Bell system.
- b) SBS - A total communications service proposed by Satellite Business Systems, a joint venture of IBM, Comsat and Aetna Life Insurance.
- c) XTEN- Xerox Telecommunications Network, an electronic message service proposed by Xerox.

SBS will make use of direct broadcasting satellites, ultra-high speed links (6.3 million bits per second), and rooftop dish antennas for local distribution. Xten will use satellite transmission for the long-haul links, and cellular radio techniques for local distribution. Both systems would bypass the terrestrial, switched telephone network.

4.2 The Effect of Technological Change

The primary effect of technological change is to alter the characteristics of production processes. This, in turn, has an immediate impact

upon the existence of economies of scale and scope. Proponents of greater competition argue that the telecommunications industry does not exhibit economies of scale as significant as those often claimed or believed, and that technological change is further weakening its "natural monopoly" characteristics.

The presumption that the telecommunications industry is characterized by large economies of scale and its therefore a "natural monopoly" has been a central rationale for its regulation. The existence of scale economies does not, of course, necessarily or automatically require public utility regulation. Rather, the need for regulation depends on the size and nature of economies of scale in an industry and the market power of the firm or firms in it. The case for regulation is strongest if 1) economies of scale are strong, and 2) private market power is substantial in the sense that the products and services offered are important and there are few readily available substitutes.

Econometric evidence, as well as recent engineering and simulation studies, on economies of scale in the telecommunications industry indicate that, while there are some measurable economies of scale, they are not very large for the telephone system as a whole and differ for different products and services.

Overall, long distance communication -- including transmission, switching, multiplexing, and all their associated costs -- seems to experience some modest economies of scale. The most pronounced economies of scale appear to exist in certain types of terrestrial long distance transmissions. In local service there is no evidence that very large exchanges achieve any particular economies or that relatively small exchanges incur cost handicaps because of

their limited size. No economies of scale seem to exist in the manufacture or distribution of customer premises equipment, if recent U.S. experience can be taken as a reliable guide.

New technological developments -- e.g., large-scale integrated circuitry and satellite transmission -- may well reduce the present economies of scale for the existing terrestrial networks of the telephone companies, thus further weakening much of the usual rationale for regulation. These and similar developments have also produced, and will continue to create, new products and services that compete more and more effectively with those offered by the established carriers, thereby reducing the market power of the existing firms and diminishing the need for regulation, if widespread competition is allowed to occur.

The development of "tailor made" private networks for critical applications like airline reservation systems, online banking services and EFT related services, occurred because the public switched telephone network was unable to provide the capabilities required for these data and message communication services. New technology may reverse this trend towards the creation of private networks. The new packet-switched and "intelligent" public networks should be able to accommodate most forms of sophisticated business communications services, including integrated voice, data, message/record and facsimile services. The economic viability and success of these special purpose public networks may well depend upon whether large business organizations will be prepared to reduce their use of private networks. The economics of the two alternative modes of use will be an important component of any such decision. It should be noted that the pricing characteristics of the two modes are likely

to be quite different; this question is discussed further in the next section. For a given private network, the overhead cost is fixed, and the marginal cost for incremental usage is zero. Capacity can only be added in discrete increments which then translate into increases in the fixed cost. The cost of using the public, packet-switched networks like Datapac and Infoswitch is usage sensitive; overhead fixed costs are small and the marginal cost is significant. This marginal cost may, or may not decrease with the volume of usage, depending upon the pricing scheme adopted. The SBS offering, however, does involve large fixed costs, and is therefore likely to be attractive only to very large businesses, like the U.S. Fortune 500 list of companies.

A difficult point about both private networks and special purpose public networks for sophisticated business communications services, is the extent to which they are likely to affect the user of basic telecommunications services. The Working Group on Competition/Industry Structure laid down a policy principle that users of basic telecommunications services should not have to bear an undue burden as a result of competition in non-basic service offerings. There is a legitimate concern that the provision of sophisticated business communications services may occur at the expense of the unsophisticated user, and result in an increase in rates for "Plain Old Telephone Service" (POTS) to the residential and small business user. It is not possible to answer this question empirically at the present time. What is certain, however, is that this is an important equity issue which must be resolved eventually.

5. Trend Towards Increased Competition and Associated Policy Issues

Rapid technical change is the principal agent which is eroding the traditional monopoly boundaries of the telephone companies. The new technolo-

gies have brought new suppliers of telecommunications hardware and services into the market, and created strong pressures for both terminal attachment and systems interconnection to the public switched telephone network. In the U.S., there has been a strong trend towards increased competition for the last 11 years, and competition is now a fact of life for the American Telcos, especially AT&T. There is much less competition in the Canadian telecommunications services market. Public telephone local and message toll services, which represent over 85% of the total market, are still provided by the Telcos on a monopoly basis, while private line voice, data communications and message record services are provided on a duopoly basis by TCTS members and CNCP. The recent CRTC Decision, approving CNCP's application for two types of interconnection to Bell Canada's local exchange facilities, is a significant landmark in the history of the Canadian telecommunications industry. But while it improves CNCP's competitive position in the duopoly, it does not necessarily confer similar rights on other potential competitors.

Strong doubts and reservations exist about whether unrestricted entry into network services, particularly by U.S. firms like SBS and Xerox, is in the Canadian public interest. For this reason regulated competition, either by the present duopoly or by a small oligopoly, is likely to be the prevailing scenario in this area.

In our opinion, neither pure monopoly nor complete deregulation is a plausible situation for the Canadian industry as a whole, in the near future. Far more likely is a situation where regulated monopoly (for basic services), regulated competition (for other network services) and widespread competition

(for station apparatus and terminals) could co-exist in different sectors of the Canadian telecommunications industry.

There are a number of difficult economic problems associated with regulated competition, especially when it co-exists with a monopoly. These include the drawing of an appropriate and enforceable boundary between monopoly and competitive services in the face of technological change which tends to erode such boundaries; pricing policies for monopoly and competitive services including the perennial problems of cross-subsidization and predatory pricing; and the conditions under which new entry is to be permitted to the competitive services area.

The outstanding issues therefore relate, first, to workable definitions of the "monopoly sector" and the "competitive sector", and second, to the degree of control that the regulator should exercise over entry and pricing in the "competitive sector". A viable solution to the cost separation problem lies at the heart of all pricing strategies. Regarding new entry, Value Added Carriers (VAC) may represent a useful policy option to foster competition in the provision of network services, especially new services, while maintaining Canadian control of the physical network. This would require, however, a Canadian equivalent to the U.S. Federal Communications Commission's (FCC) Resale and Shared Use decision; at present, Value Added Carriers are not permitted in Canada.

The interaction between the terminal equipment and telecommunications services markets also needs to be considered. Local service, which is currently charged for at flat rates by the Telcos, uses a bundled charge for the following components costs:

- i) The cost of the terminal equipment
- ii) The cost of access to the network
- iii) The actual cost of the local calls.

Widespread competition in the terminal market, especially if combined with a liberalized attachment policy, may require major changes in the pricing structure of local services, including both unbundling and usage sensitive pricing. The pressure for usage sensitive pricing (USP) will become even greater if the local public switched network has to handle significant volumes of non-voice traffic. The design of the local public switched network, and the price of basic local service, is based on the average 6 minute voice call and a certain pattern of expected calling volumes. Non-voice traffic has different characteristics, and therefore should expect to be charged for at different rates. It is interesting to note that packet-switched networks, by definition, have usage sensitive charges, while private line networks are priced on the basis of fixed monthly charges.

A strong trend towards usage sensitive pricing of local network service seems to be developing in the U.S. AT&T and the other major Telcos have been carrying out USP experiments for a number of years. Bell Canada has just applied to the CRTC for permission to carry out a one year USP experiment, limited to two cities, in 1981. The results of this experiment could be used by Bell Canada to justify further initiatives in the area of usage sensitive pricing for switched networks services.

Finally, one must note that widespread competition in the supply of terminal equipment inevitably raises questions about Bell Canada's vertically integrated structure and equipment procurement policies. Like AT&T, Bell Canada is vertically integrated with its manufacturing subsidiary, Northern Telecom, and their joint research and development subsidiary, Bell Northern Research. Proponents of vertical integration claim that such a structure, giving Northern Telecom guaranteed access to a large domestic market, is necessary to finance the vast research and development expenditures necessary to maintain leadership and international competitiveness in telecommunications manufacturing. Opponents call for open, competitive procurement policies and even divestiture of the manufacturing subsidiary; they claim that vertical integration has hindered or slowed down innovation in the telecommunications equipment market. Very little solid empirical evidence is available on this subject. In this respect the situation of Bell Canada and B.C. Tel, which have vertically integrated subsidiaries, is different from that of the other telephone companies.

6. Review of DOC economic research activities related to Regulation and Competition

The Telecommunications Economics Branch of DOC conducts economic research designed to provide inputs to two basic policy areas: the policies related to the provision of telecommunications services and the development of a national industrial strategy for the Canadian telecommunications industry. An important element of this task is to assess the economic impact, for policy purposes, of rapid technological change due to advances in micro-electronics, transmission and switching technologies, satellite communications and the general confluence of computers and telecommunications; both on the provision of telecommunications services and on the economy as a whole.

Major research areas include economic analyses of the telecommunications carrier industry, economic/marketing studies of telecommunications based New Home and Business Services and studies related to the Information Economy. The carrier industry studies have mainly focussed on the largest firm, Bell Canada. Studies have been conducted to investigate the existence of economies of scale and scope, and the impact of technological change on productivity, employment levels and occupational mix.

Using sophisticated econometric techniques, models have been developed for both the demand for telecommunications services at a disaggregated level (local, message toll and other toll services), and the production of such services. A multi-input, multi-output cost function approach is favoured for the production side; considerable progress has been made in developing a technology index and obtaining statistically well-behaved models. Problems remain on the demand side, in developing robust estimates of own and cross-price elasticities, especially the latter. The cost function model enables marginal costs to be estimated for these services, and compared to the marginal revenues obtained from the demand model. It has indicated the existence of moderate "ray economies of scale", but no definite conclusions could be drawn about the existence of economies of scope. This study has provided valuable input for the DOC position on the important CNCP Interconnection case.

A follow-up study currently under way will examine a variety of economic efficiency and equity issues related to alternative pricing strategies for telecommunications services. Cost function models provide an alternative

economic approach, compared to the traditional accounting methods, of allocating common costs between services jointly produced by common plant. Once the costs associated with producing a service are assigned, since the revenues are accurately known from accounting records, it is possible to study the problem of cross-subsidization between services. If cross-subsidization between monopoly and competitive services, or "predatory" pricing of competitive services is found to exist, then the regulator must decide upon what intervention is required. It is hoped that results from this study will complement information obtained from the ongoing Cost Inquiry, which is being conducted by the CRTC.

In cooperation with the Canadian Telecommunications Carriers Association (CTCA), a major project has been formulated to study the productivity performance of CTCA member companies. This multi-year study, when completed, will provide sound operational productivity and efficiency measures for Canadian telecommunications carriers, on a comparable basis. It should assist in the cost allocation problem for monopoly and competitive services produced using common plant, and could provide inputs into policies aimed at creating more efficient forms of regulation.

The branch has also sponsored a preliminary study of the vertical integration issue. The project attempted to analyse the issue of technological progress and cross-subsidy in Canadian telecommunications, in the perspective of the vertically integrated firm and industry. No empirical model of the vertically integrated Bell Canada/Northern Telecom/Bell Northern Research operation could be built, because of lack of data. The project did, however, come up with a useful quantitative description of the Canadian telecommunications industry and the degree of market power exercised by Bell Canada within.

that industry. Theories of vertical integration were reviewed, and the relationship between common carriers and their suppliers was described. The impact of market structure on innovation was explored, as was the effect of firm size on R&D expenditures.

Given the current interest in industry structure and vertical integration, as shown by the Restrictive Trade Practices Commission (RTPC) Inquiry and the Working Group's report, the branch expects to conduct further research in this area. The absence of adequate and reliable data on carrier-supplier relationships in general and internal pricing policies in particular, however, greatly adds to the difficulties of any empirical work in this area.

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APPENDIX 1

Report of the Federal - Provincial Working Group

on Competition/Industry Structure in the

Telecommunications Industry

1. Introduction

The Federal-Provincial Working Group on Competition/Industry Structure was established in 1978 by federal and provincial Ministers responsible for Communications. The Working Group was asked by Ministers to

"address the policy issues surrounding the industry's structure and competition, and to develop policy principles or criteria, which would ensure that telecommunications services in Canada are provided in a manner consistent with the public interest",

and

"develop and recommend to the Ministers terms of reference for any studies with particular reference to elements of public interest concern, structure of the industry, jurisdiction, regulation, technology, and such other areas as the working group decides which should be considered."

2. Policy Objectives

To satisfy the public interest requirement of the Ministers' resolution, the Group reached a consensus on a statement of policy objectives which, if satisfied, will ensure that the public interest is being served. The statement is as follows:

Developing and maintaining an efficient telecommunications infrastructure which can provide universal access to a broad range of telecommunications services at economic and equitable rates is a fundamental goal of public policy.

Public policy also should permit a wide degree of consumer choice and should ensure that services are of high quality and responsive to consumer demands.

Innovation and the efficient use of societal resources should be encouraged.

The development of telecommunications systems and services should contribute to regional development, encourage growth in employment in Canadian industry and enhance its international competitiveness.

Canadian control must be assured and in the areas of ownership, management and technology, Canadian participation should be maximized.

3. Policy Principles

The Working Group developed the following policy principles which would assist in achieving the overall objectives.

1. (a) Standards should be established and maintained to ensure the technical integrity of the telecommunications systems where an interface takes place between the facilities of different entities.
- (b) Quality of service performance standards should be established and maintained when interworking takes place between the facilities of different entities.
2. Regulators should give due regard to the impact of their decisions upon users in other jurisdictions when dealing with matters affecting competition and industry structure.
3. The degree of competition that may be appropriate should be based on a judicious balance between the effectiveness of competition in promoting innovation, efficiency, optimal allocation of resources and the realization of a reasonable degree of consumer choice on the one hand, and on the other hand, the requirements for achieving universality at equitable rates, in the provision of certain telecommunications services.
4. Regulators should ensure that, within their respective jurisdictions, competitive services provided under different regulatory authorities are treated in as similar a manner as possible.
5. Where free entry and exit market competition is not operable or desirable, regulation is necessary.
6. In the case of competitive services provided under regulation, regulators should place reliance on market forces to the greatest extent possible.
7. Canadian participation, consistent with a high level of efficiency, should be maximized.
8. An acceptable measure of cross-subsidization, as may be deemed to be in the public interest within a jurisdiction, is an appropriate means to achieve universality, at equitable rates, in the provision of certain telecommunications services.
9. Users of basic telecommunications services should not bear an undue economic burden as a result of competition in non-basic service offerings.

10. Competitive services should not be cross-subsidized by services provided on a monopoly basis, if this results in unfair competition.
11. Regulated carriers should be permitted to earn a reasonable financial return consistent with the requirement for providing high quality basic telecommunications services.
12. Technical or procedural barriers of an artificial nature should not be used to restrict user choice.

4. Policy Issues

The Working Group also identified twenty-one policy issues, and organized them into four major categories: Competition; Common Ownership and Control; Services and Facilities; Jurisdiction and Regulation. The Group concentrated its efforts on those issues which were felt to be most pressing, and produced papers, for consideration by Ministers, on:

- Basic Service and Universality
- The Boundary Question
- Vertical Integration
- Terminal Attachment
- Information Processing and Information Bases
- Role of Broadcasting Receiving Undertakings and Carriers
- Inter-jurisdictional Impacts

5. Recommendations

The report of the Working Group concludes with thirteen recommendations dealing with the policy objectives, policy principles and policy issues.

The Working Group recommended that:

1. Ministers endorse the policy objectives developed by the Working Group, with any appropriate modifications.
2. Ministers endorse the policy principles developed by the Working Group, with any appropriate modifications, to provide policy guidance.
3. Ministers refer to the Working Group for consideration any issue in the appendix not dealt with; instruct their officials to maintain a watching brief on all remaining issues, and refer them to Ministers with detailed analysis as circumstances require.

4. Ministers agree with the concept of establishing a floor package of basic telecommunications service which they deem should be available to all Canadians.
5. Ministers instruct the Working Group to develop for their consideration such a floor package of services.
6. Ministers instruct the Working Group to continue work on the boundaries question - to determine and collect whatever information is available and to commission studies where adequate information is lacking.
7. Ministers agree that the issue of vertical integration directly relates to the structure of the telecommunications industry in Canada and as such should be decided by reference to telecommunications policy objectives as well as to general competition policies.
8. Ministers agree that the issue of vertical integration is one for their further consideration, and instruct the Working Group to undertake further work.
9. Ministers authorize the Working Group to give further consideration to the extent to which questions relating to terminal attachment might be beneficially addressed jointly by governments.
10. The carriers not be restricted from providing information processing services so long as such services are not provided to the detriment of subscribers to the monopoly services of carriers, or in such a manner as to constitute unfair competition.
11. Regarding the issue of carrier provision of information bases, Ministers approve the compilation of existing data and reports and the preparation of a summary for the next meeting of Ministers.
12. Ministers direct the Working Group to undertake additional work to develop further the policy issues and options raised in the paper on the role of broadcasting receiving undertakings and carriers.
13. Ministers authorize members of the Working Group or other officials to assess the relative advantages for different approaches to minimizing negative inter-jurisdictional impacts.