

**TELECOMMUNICATIONS AND
CANADIAN INDUSTRIAL POLICY**

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Advancing technology is clearly the agent of change ... The traditional telecommunications industry and its regulation have been based on structural and economic assumptions that are rapidly being undermined by technological change – not only in Canada, but around the world.

George Addy, Bureau of
Competition Policy

Canada's telecom choice: Lead the world, or be hewers of

wire and carriers of bits.

Derek Burney, Bell Canada
International Inc.

INTRODUCTION

Telecommunications and cable television companies in Canada and elsewhere are undergoing a rapid transformation in the technologies they use and in the services they can potentially deliver. No longer do these signal distribution companies rely exclusively on copper wire or coaxial cable as their primary transmission medium; increasingly, the backbone of their networks consists of fibre-optic cable, which carries information on a pulse of light, and wireless systems, which make use of the electromagnetic spectrum. Together, these innovative technologies have immeasurably expanded the carrying capacity of the networks, which can now incorporate interactive two-way voice, video, data and graphics information forms, converted to and from the digital language of computers, to provide new services such as video-conferencing, video games, high-capacity data retrieval and processing, video-on-demand (VOD) and much more. While voice communications, data communications and entertainment services were formerly the distinct preserve of, respectively, telephone, satellite and cable television companies, each can now be provided over the others' transmission facilities. Hence, the dissolution of conventional boundaries between telecommunications, cable television and computer activities is paving the way for the convergence of information carriage services over what has been dubbed the "Information Highway."

These new services present Canadians and their businesses with many new commercial opportunities, as well a plethora of new ways of organizing their daily and business relations – thereby sometimes blurring the differences between work, school and leisure. Furthermore, these sophisticated telecommunications services are becoming increasingly integral to the efficient and timely movement of information in the modern business world. They enable companies to take advantage of, for example, "just-in-time" inventory, electronic data interchange, airline computer reservation, and electronic banking and shopping systems. The associated savings from these new services and administrative practices will undoubtedly contribute to the competitiveness of the business sector; they will also improve the delivery of government services, in particular, health care and education, to the public.

In addition, developments in technology in the transportation sector are fostering the globalization of commerce. Relatively low-cost transportation and communications have enabled trade to proliferate beyond the traditional borders of nation-states, with a disproportionate share of this trade being conducted by multi-national, or, more correctly, transnational corporations. These companies' investment

decisions seem increasingly to be based strictly on economic grounds rather than on accidents of history and geo-political factors. Consequently, Canada's business sector is presented with a serious challenge if it is to remain competitive internationally. The so-called "Information Revolution" is indeed a double-edged sword.

This challenge is not only for individuals and their businesses, but also for the federal government. As the exclusive responsibility for telecommunications and broadcasting policy in Canada is federal, it is incumbent on the Government of Canada to provide legislation and policy appropriate to the social, cultural, political and economic setting of the day. Because of the demise of technologies characterized by "natural monopoly" conditions and the re-configuration of telecommunications and broadcasting activities along global rather than national lines, policy must be re-designed accordingly. Indeed, public policy must now provide broad, new ground rules for incumbent telecommunications and broadcast distribution companies as well as for new entrants. The significance of this policy reformulation cannot be overstated.

If a Canadian telecommunications company is not competitive in its own domestic market, it is unlikely to be competitive abroad. International telecommunications is largely founded on the national infrastructure, which, in turn, is founded on the local network infrastructure. Thus, the domestic networks make up an integral part of the domestic information sector and are important to the continued viability of Canada's business sector as a whole. This paper, therefore, focuses on providing the Government of Canada with guidance on industrial policy for the further development of the Information Highway; the long-term aim is to preserve and enhance Canada's international competitiveness in telecommunications and broadcast distribution.

THE INFORMATION AGE AND THE CANADIAN ECONOMY

The "Information Age" is not just an amazing array of new communications gadgets that are permitting more and varied discourse about the globe. It affects how people are re-organizing their lives at work and at home as a consequence of these revolutionary innovations. The introduction to this paper singled out recent technological advances that favour the dissolution of boundaries between broadcasting and telecommunications activities and the globalization of commerce by transnational corporations. But these innovations are also, in a way, turning back the clock to pre-industrial days, as some business activities are once again organized as cottage industries – although with far more strategic forethought put into their design and products than was the case in the past. Such activities can be grouped under the heading: "services." This development should not be surprising, given that the telecommunications and microprocessing innovations have freed professionals to be more imaginative and productive.

The past two decades have witnessed the dissolution of many large companies and conglomerates or their trimming down to more manageable size in the hope of becoming more productive and profitable. This rationalization has been undertaken in four ways: (1) companies have shed or spun-off and sold many of their less compatible divisions and subsidiaries in order to concentrate on core activities; (2) companies have formed strategic alliances with supplier and customer companies, whereby the former parent corporation takes on flagship status, with the supplier and customer companies playing a well-defined subordinate but supportive role;(1) (3) companies have reduced the number of middle managers in favour of reorganizing or contracting out their functions; and (4) companies have re-engineered their command-and-control coordinating structure to form a flatter and broader hierarchy, based on teamwork and financial incentives, that can take full advantage of the creativity and talents of its workforce.

As a direct result of this corporate reorganization, small business based on professional services has boomed, creating new industries and new ways of behaving in the process. On-line information services, computer software companies, multi-media graphics design, electronic banking, mail-order businesses and a plethora of new activities are reshaping the commercial landscape. Evidence of this industrial reorganization can be found in Canada's national accounts. In 1990, 97.2% of registered businesses had fewer than 50 employees. Between 1980 and 1990, these businesses grew by 40%, with almost all the growth consisting of small businesses, and often a single person working out of the home.(2) In 1994, services accounted for \$349 billion of \$532 billion goods and services produced (valued at factor cost and in constant 1986 dollars), or 66% of Canada's Gross Domestic Product (GDP).(3) Services are primarily consumed in the home market; the export of services has never exceeded 14% of total goods and services exported. Hence, services constitute a class of lesser-tradeables that are used by the domestic business sector both as a final consumer end-product and as an intermediate input contributing to the business sector's competitiveness. This is particularly true of the "Information-Based Society" services now arising out of innovations in telecommunications and microprocessing.

Information-based services are now more important than ever to the competitiveness of Canada's business sector. From a sheer quantitative perspective, the revenues of telecommunications and cable television companies amounted to \$17.9 billion in 1994, representing 2.4% of Canada's GDP. Including the information-based activities of broadcasting and computer services companies, revenues in 1994 totalled \$36.8 billion, representing 4.9% of Canada's GDP.(4) The Information Highway Advisory Council (IHAC) further expanded the periphery of information-based industries to include telecommunications equipment, computers and office equipment, instrumentation, microelectronics and consumer electronics products. This increased the total revenue of information-based services in 1994

to \$50 billion, accounting for 7% of Canada's GDP.(5) Measured in terms of employment, telecommunications, broadcasting and computer services industries productively engaged 277,750 people, representing 2.1% of the country's total employment in 1994.(6) These jobs are disproportionately at the high-end of the skill class in the economy with an average salary of \$44,392 in 1994, well above the national average.
(7)

From a qualitative perspective, the contribution of Canada's information-based industries is equally impressive. Business activities are now more than ever geographically dispersed, thereby requiring more intra- and inter-corporate communications for better coordination and efficiency. Telecommunications enables businesses to show improved productivity in many aspects of their operations, including reduced costs for inventory, overhead, marketing, and distribution; decentralized operations; shortened product development cycles and response times; increased scope for management; and improved decision-making, job training, product support, and customer service.(8)

Both quantitatively and qualitatively, information-based industries contribute to the competitiveness of virtually all sectors of the Canadian economy. Such industries, with telecommunications and microprocessing acting as linchpins, transcend all other industries in the economy to occupy a strategic, if not a key determinant position in national competitiveness. It would not, therefore, be a big stretch to predict that the Information Revolution will mobilize and aggregate human capital ("knowledge") to much the same extent as the "Industrial Revolution" mobilized and aggregated physical and financial capital, to bestow advantages on those with immediate access to this type of capital. Undoubtedly, the individuals who possess the requisite knowledge will be the principal beneficiaries. Entrepreneurs that are best able to access, generate, combine, process and analyze information will capitalize on its rewards. For nations wishing to participate in this revolution, all that remains is to muster the courage to make the necessary institutional changes to liberate the activities now made possible by digitization, computer chip-aided information processing, ATM switching, and fibre-optic cable and wireless transmissions technologies. For such nations, the rewards would include a disproportionate gain in high-skilled, high-paying jobs. For those nations that choose otherwise:

Intellectual capital is simply the power of the human mind applied to knowledge and enhanced by information technology. Human intelligence is quickly becoming the dominant factor of production and the world's most fundamentally important market is the market for intellectual capital. Unlike physical capital, intellectual capital is not tied to geography. Highly mobile, knowledge workers and information entrepreneurs can move very quickly from nation to nation and take their companies with

them.(9)

Far more than any other form of capital, intellectual capital will go where it is wanted, stay where it is well treated, and multiply where it is allowed to earn the greatest return. Nations that respect the freedom of intellectual capital and accommodate it will prosper in the global economy. Those that imagine that this most powerful form of capital can be enslaved or entailed will wither.(10)

CREATING A TELE-COMPETITIVE ADVANTAGE FOR CANADA

Some industry observers remind us of Marshall McLuhan's vision of a "global village"; others foretell the "death of distance" as a barrier to trade and commerce; still others predict a borderless world with the demise of the nation-state. Like many forecasts, these will eventually prove inaccurate - in relative, if not in absolute terms. They do, however, provide a window allowing us to envisage how future generations will and will not organize themselves in the aftermath of the Information Revolution. Futurists can help by visualizing and defining the forthcoming character of the Information-based Society, even if they cannot provide an exact description.

The above three forecasts are best regarded as occupying one end of a spectrum whose opposite end predicts the pervasiveness and omnipotence of the nation-state. The truth will be found somewhere between these poles. Distance – one of many factors contributing to the emergence of the nation-state – will no doubt prove to be a less daunting impediment to trade in the digital future, but the forces of the Information Revolution have not proven so powerful as to overcome all the logistical problems of distance and shrink the world to one political entity. Strong arguments can be made in favour of selective industrial policies; governments do matter, both when they get industrial policy right and when they get it wrong. The appropriate role for government in creating a nation's tele-competitive advantage is therefore worth exploring.

Economic theory is instructive on this matter. The nations that obtain the highest standard of living are those that deploy their labour and capital resources on activities that yield high and rapidly rising levels of productivity – here, there is little debate. Productivity is at the root of a nation's international competitiveness and three widely recognized strategies are required to maximize it. A nation could exploit its bounty of natural resources, according to the century-old trade theory of comparative advantage. A nation could seek to maximize scale and scope economies in manufacturing and distribution in pursuit of productive and allocative efficiency, according to the long-standing neo-classical theory of the firm. Finally, a nation could attain a higher rate of technical progress through fostering innovation and

technological change in activities where it has a competitive advantage, according to modern growth theory. History shows that Canada, since its inception, has executed the first strategy with considerable success; pursued some aspects of the second with varying degrees of success; and has yet formally to adopt the third strategy in a coherent fashion.

It can be argued that a national competitive advantage can be created and sustained by both firms and governments in selective goods and services under the right conditions. Indeed:

Competitive advantage is created and sustained through a highly localized process. Differences in national economic structures, values, cultures, institutions, and histories contribute profoundly to competitive success. The role of the home nation seems to be as strong as or stronger than ever. While globalization of competition might appear to make the nation less important, instead it seems to make it more so. With fewer impediments to trade to shelter uncompetitive domestic firms and industries, the home nation takes on growing significance because it is the source of the skills and technology that underpin competitive advantage.[\(11\)](#)

By definition, a national government must focus its efforts; a country can obtain a competitive advantage in the production of only a few goods and services, never in all. Initiatives must look forward, rather than looking backward in the hope of preserving past activities that have come to be associated with "a way of life." Furthermore, since it is the firm that competes in global markets, and not government, it is the firm that should undertake the principal initiatives in order to obtain a competitive advantage in international markets. The national government's role should largely be supportive; it should not pick the winners or losers directly, but do so indirectly by shaping the institutional structure in which firms operate in the home market. Indeed:

The proper role for government policy ... should be to create an environment in which firms can upgrade competitive advantages in established industries by introducing more sophisticated technology and methods and penetrating more advanced segments. Government policy should also support the ability of the nation's firms to enter new industries where higher productivity can be achieved than in positions ceded to less productive industries and segments.[\(12\)](#)

Unless the government has a more accurate vision of the future than does the private sector, it should not arbitrarily subsidize various companies and technologies. Instead, it should focus on "framework" policies. The failure of some governments to recognize this basic fact

has caused some industrial grants to go, not to the promising firms and technologies, but to the firms and technologies best able to work their way through the government grant bureaucracy.(13)

Governments have a significant role in fostering a mature, well-skilled labour force; education, as previously mentioned, is the quintessential resource of the Information-based Society. Governments will increasingly be challenged to ensure that their citizens continuously upgrade their work skills through providing, in partnership with the private sector, appropriately designed education and labour market policies for fostering life-long learning.

A principle which we very readily adopted [was] ... that life-long learning should be a key design element in the building of the information highway. What we are really talking about there is the importance of us being an adaptable society and a society where each of our citizens has the opportunity to adapt and to use these tools for his or her advantage.(14)

The Information Highway has also been identified as a pre-eminent national infrastructure ("*infostructure*") capable of having a significant influence on the competitiveness of a nation.(15) Given Canada's long history in telecommunications, advanced telecommunications infrastructure, and well-developed political-economic institutions, the telecommunications sector would be a prime candidate for creating and sustaining a competitive advantage for this country. The national government's role would be to ensure the preservation of the underlying forces that have invigorated this national infrastructure from the outset.

The productivity of the *infostructure* must be upheld and maintained by public policy. It can be argued that this can be accomplished not by directly favouring any one firm or technology, but by letting the market decide outcomes. Legislation for increasing the pool of funds available for creating and upgrading the Information Highway is one example of government support that could help create a competitive advantage for Canada. A second example would be legislation for promoting the rivalry amongst firms vying for the economic rents flowing to pioneers that deploy successful new technologies and production processes and commercialize new products and services.

INDUSTRIAL POLICY FOR THE NATURAL MONOPOLY ERA

It should be recognized that industrial policy affected the telecommunications sector in Canada and elsewhere almost from its inception. In other words, government involvement in telecommunications has always fashioned the structure and competitiveness of the sector in both positive and negative ways. Federal government policy with respect to telecommunications began with the development of telegraphy, expanded before the end of the

nineteenth century to include telephony, started to incorporate cable television via broadcast policy in the late-1960s, and today includes satellite and wireless market segments. While not comprehensive from the start, an ever-expanding *ad hoc* industrial policy rolled out with each new significant advance in the telecommunications sector, although with decreasing scrutiny and intensity. Each new technology brought with it an expanding and sometimes overlapping government involvement. At times, public foray into the sector involved all three levels of government, taking a form anywhere from light-handed regulation by a quasi-judicial government agency to extensive micro-management by a provincial Crown corporation.

The dominant explanation for the government's initial move into telecommunications has been the sector's natural monopoly characteristic. That is, though a great deal of capital is needed to lay an extensive cable network, construct numerous call-switching stations and create a variety of support services, economies of scale are so large that one firm could deliver this service at far less cost than two or more firms. The avoidance of duplicated infrastructure is the goal when a second, "cream-skimming" company is enticed into lucrative market segments. Often piggy-backed on to this technological phenomenon is the existence of "network externalities."[\(16\)](#)

Governments across the world therefore made it their policy to grant a monopoly charter to a company that in return assumed a statutorily imposed universal service obligation. In North America, after limited competition emerged (approximately 1890-1910), national governments chose to grant monopoly rights to private corporations subjected to economic regulation. European countries, in contrast, largely merged their telegraph and telephone services into their government postal operations; hence, the PTT acronym appended to their corporate names. Universal service obligations were complemented by regulations that introduced cross-subsidy pricing schemes from long distance to local services, from urban to rural services and from business to residential services.

Mainly because of the threat from potential competitors in its lucrative central Canada market, Bell Canada Limited, Canada's first telephone services company, sold its telephone services in the Maritimes to local interests, re-gaining control of them in the 1960s.[\(17\)](#) Prairie provinces, largely dissatisfied with slow development and poor services offered by Bell Canada, went through a popular uprising that saw provincial Crown corporations taking over their respective provincial networks in the 1904-8 period; the exception was the Edmonton market, which remained in municipal hands until just recently, when it was privatized.[\(18\)\(19\)](#) BC Tel and Québec Téléphones, 50% owned by GTE Corporation of the United States of America ("U.S."), took up operations in British Columbia and Quebec, respectively.

The history and industrial organization of the Canadian

telecommunications services sector are indeed interesting. Further investigation suggests that several factors, coming about both by design and by accident, can explain Canada's excellent international competitiveness ranking (see Davidson and Hubert (1994)). Three positive factors are: (1) reliance on private corporations to operate the networks; (2) largely provincially organized monopolies rather than one national monopoly; and (3) relatively free and mobile capital. One negative factor would be the large cross-subsidy pricing schemes.

The first factor stems from the fact that private corporations have a greater tendency than Crown corporations to foster a management culture with a well-defined bottom-line approach to operations. A regulator should be able to appropriate a portion of the resulting production efficiencies and transfer them to consumers in the more remote communities.

Looking back, the decision to allow carriers to be privately owned and regulated, rather than government monopolies, proved wise. The most innovative countries of the world, in terms of services offered, are Canada and the U.S.; they were among the few countries that did not historically have government-owned Post, Telegraph and Telephone companies. ... In addition, government's insistence that domestic carriers offer service to all of the remote and sparsely populated areas of the country as a requirement for licensing challenged carriers by forcing them to be technically innovative in order to fulfill this difficult task. Creating challenges, rather than removing them ... fostered a truly competitive environment.(20)

The advantage of regionally or provincially based monopolies over a national monopoly is two-fold. First, recognizing that the economies of scale in a telephone network are largely situated in the local exchange and not between local exchanges, unit cost advantages are generally exhausted before they reach output levels of a province (or region, in case of the Maritimes). Therefore, there is relatively little to be gained from structuring the industry so as to give a carrier a larger operating jurisdiction than a province. In fact, in some settings, being larger simply means being more bureaucratic, which is not conducive to high productivity or competitiveness.

Secondly, having more than one carrier in the relatively small Canadian market meant that Northern Telecom (Nortel), the equipment arm of BCE Inc. (Bell Canada's parent corporation), had to be concerned about signal compatibility much earlier than did other equipment providers. Moreover, Nortel's obligation to offer its products and services to Bell Canada at a price not exceeding the best price offered other carriers (most notably Stentor members with the option of buying from other equipment providers), introduced competition into the Canadian equipment market and forced Nortel to be more efficient than foreign

equipment providers with a captive domestic PTT market.(21) This made Canadian telecommunications service providers more competitive in international markets.

The third advantage of Canadian industrial policy in telecommunications resulted from the government's insistence on relatively free and mobile capital to finance the industry's vast infrastructure. Bell Canada was originally 50% American owned, while BC Tel and Québec Téléphones remain so today. Access to low-cost financing for a vastly capital-intensive industry such as telecommunications was an industrial imperative. Only very recently has Canadian policy become tentative about the source of the sector's equity capital. At present, a 20% foreign ownership limit is placed on telecommunications carriers directly and a further 33% limit is placed indirectly, through a holding company; thus, foreign ownership levels are capped at 46 2/3% of the voting stock of a carrier. BC Tel and Québec Téléphones foreign ownership levels of 50% were grandfathered in the *Telecommunications Act* of 1993, however; therefore, this capital constraint has not been binding on them. Not until the most recent investment in Unitel by AT&T Canada and Sprint Canada's recent share offering in American capital markets have these restrictions possibly constrained Canadian competitiveness in telecommunications or adversely affected it.

The cross-subsidy pricing policies meant to encourage universal service decrease the competitiveness of Canadian telecommunications carriers. Statistical studies have shown that residential demand for local telephone service is relatively price inelastic compared to demand in the business sector and long-distance services; thus, the elimination of local service subsidies, it is suggested, would lead to a minimal or no drop in demand.

The reality is that studies show that the price elasticity of demand for local service is minus 0.1. That means that you could double the rates and less than one-tenth of one per cent of the people would drop their service. ... However, if I reverse the problem, if the price elasticity of demand for long distance is about one – some people say it is 0.8 per cent, some people say it is one per cent, some people say it is a little more than one per cent – that means that a 10 percent increase in the price of long distance leads to a 10 per cent reduction in the quantity demanded. ... So we have it exactly wrong. In other words, we ought to be putting the high mark-up on local and the low mark-up on long distance and in fact we are doing the opposite.(22)

Consequently, while the cross-subsidy schemes may have contributed to a higher market penetration rate in the past, they are of little value today. Their adverse economic impact on GDP was estimated at more than \$4 billion annually in 1995.(23) The high market penetration rates

in Canada may also be in part explained by the remoteness of our communities. Sparsely populated high-income countries such as Canada would naturally have a particularly high demand for telephone service, which would also serve as a valuable substitute for some transportation options.

Finally, as indicated above, technological developments are blurring the boundaries between telecommunications and broadcasting activities; therefore, an analysis of the impact of industrial policy on the competitiveness of cable television and direct broadcast satellites (DBS) companies is warranted. Here, we must be careful to differentiate between carriers and content providers (broadcasters). The overriding goal of the *Broadcasting Act*, the preservation of Canadian cultural heritage and sovereignty, can conflict with the goal of economic efficiency. After all, the Act chiefly aims to encourage Canadian programming content over Canadian airwaves, coaxial cable and DBS. The policy works in the following way:

Our stations have a schedule, which is 60 per cent Canadian, and 50 per cent of our prime time schedule is Canadian programming. However, our costs to produce that 60 per cent of our programming generate only 44 per cent of our revenue. ... For every dollar spent on foreign programming, a local station earns \$1.42 in revenues. For every dollar spent on Canadian programming, we are only able to generate 88 cents. For example, the CTV network ... detailed how an hour of Canadian drama cost them \$112,500 in licence fees. The average net revenue for the commercial spots sold in that hour was only \$69,600, resulting in a net loss of \$43,000 for a critical hour of prime time programming. The program's producer made a profit on the program, but the broadcaster, CTV, did not.(24)

The *Broadcasting Act* is predominantly concerned with the content of broadcast programming and not with its carriage. Cable television and DBS carriers were captured by the regulatory ambit only because, as distribution channels, they can have a significant impact on the effectiveness of broadcasting policy. The government again took advantage of the natural monopoly characteristic of cable television by granting regional monopolies whose economic rents were appropriated by the regulator in a number of ways: (1) 5% of revenues must be re-directed to fund Canadian programming; (2) the added cost related to carrying a greater number of Canadian broadcasters than would otherwise be the case; and (3) the loss in incremental revenue from being unable to distribute non-approved foreign broadcast services.

As in international telecommunications, non-economic pricing invariably leads to uneconomic by-pass; in this industry, this would be measured by the size of the so-called "grey" market - the number of Canadian residences that subscribe to American Direct-to-Home (DTH)

satellite services. This is conservatively estimated at 240,000 homes, representing 2-3% of the Canadian domestic market.

INDUSTRIAL POLICY FOR THE INFORMATION AGE

Past industrial policy in telecommunications and in broadcast programming distribution in Canada was somewhat effective because it focused on the underlying factors of competitiveness peculiar to these industries. Indeed, industrial policies of the past were principally designed to overcome natural monopoly and the high capital-intensive nature of telecommunications operations in order to ensure that consumers were not gouged. Industrial policies were not allowed to stray too far from this objective in pursuit of other objectives. Even when economic efficiency was subordinated to cultural heritage and sovereignty in the *Broadcasting Act*, the regulator, the Canadian Radio-television and Telecommunications Commission (CRTC), was constrained to consider economic factors so as to provide some balance in its decision-making.

Without a doubt, Canadian industrial policy in telecommunications has been somewhat successful. The operative question now becomes: will the government modify its industrial policies in telecommunications and broadcast programming distribution to meet the new conditions, most notable of which is a rapidly changing technology base? A period of rapid technological change places different demands on industrial policy and demands careful consideration of its implications.

By definition, technological change means that the political-economic landscape is shifting beneath the nation and that new strategies must be put into place to maintain, if not improve, our competitive position in the world. Industrial policy must be flexible so that industry can respond to the forces of change. Three strategic imperatives for telecommunications and broadcast distribution could be: (1) that industry regulation shift away from its current emphasis on economic factors towards an emphasis on social factors, such as copyright, high-tech theft protection and the maintenance of decent behaviour and privacy; (2) that capital continue to be relatively free to finance the completion of the new *infostructure* at a reasonable cost to society; and (3) that the pace of R&D and innovation rise to push the nation into the lead on several technological fronts.

In terms of the first strategic imperative, technologies in telecommunications and cable television have matured; they have brought about the demise of natural monopoly.

It is now clear that the first rationale for regulation – the existence of natural monopoly – may no longer be true as the proliferation of communications technologies and networks continue to evolve. Recent technological advances in fibre optic technology, in the use of the electro-

magnetic spectrum, and in micro-electronics are reducing the scope for natural monopoly in local service. More importantly, these technological advances are rapidly decreasing the costs of switching and transmission, the essential ingredients of telecommunications networks. (25)

Hence, economies of scale in the carriage of electronic information have been substantially reduced, suggesting that competition can now assume the same position in this sector as in unregulated sectors of the economy, thereby promoting economic efficiency.

Even if these economic developments in the local telephone services market were questioned, the convergence of telephone and cable television technologies and services as a result of the common digital format and the development of wireless telephony have already brought about duplicative investments in infrastructure. Hence, expensive capital outlays have not been avoided and lucrative markets are increasingly being skimmed by new technology-based competitors. Is there anything to be gained by prohibiting competition in telecommunications and cable television services?

Industrial policy could move away from economic regulation towards competition. At this juncture, it should be noted that regulation is not a perfect substitute for competition in promoting economic efficiency. While rate-base, rate-of-return ("RoR") regulation is aimed at keeping tariffs closer to the costs of providing the regulated services, it is not a good mechanism for controlling other important economic factors. Real competition, on the other hand, not only constrains price to cost, it also restrains cost increases and leads to the adoption of efficient production processes, least-cost input factors and optimal organizational integration, both horizontal and vertical. Regulation often fails to perform these tasks adequately. We will consider four simple examples of regulatory-induced inefficiency. The first involves the labour input; the second, the capital input; the third, the joint provision of monopoly and non-monopoly services; and the fourth, matters of R&D, its innovation and its diffusion.

First, in a regulatory environment it is easier for management to acquiesce to the salary and job description demands of workers and unions, since a company without rivals (or whose rivals' prices are controlled by the regulator) can simply pass on extra labour costs to consumers, without the fear of significant loss in demand. The benefits of regulation are thus usurped. The Stentor companies have classified an inordinate number of employees in management positions, which are outside the collective bargaining process, in order to constrain, but not eliminate, this distortion. As a result, one can confidently predict that an inordinate number of middle management jobs in the Stentor companies are likely to disappear in the near future, if they have not already done so, as their corporate cultures and managements based on monopoly dominance adjust to the new economic environment.

Second, under RoR regulation, profits are enhanced by increasing capital inputs; this encourages an over-investment in capital equipment and in capital-intensive/labour-saving technologies, as well as a search for non-optimal sources of financing (i.e., excessive reliance on debt relative to equity). For example, consider a community of 100,000 households, where it would be optimal for a telephone company to invest in 100 first-tier telephone switching centres (i.e., 1,000 households connected to one switch) with one central local switching centre. If it costs \$100,000 per switch, this local network would require a capital investment of \$10.1 million (101 switches x \$100,000). Under a 15% RoR rule, more profit could be earned if the monopolist were instead to invest in 200 first-tier switches (that is, 500 households per switch) to connect to 20 second-tier switches that, in turn, connected to one central local switch (a system often referred to as aggregation). This network would comprise 221 switching centres at a total investment cost of \$22.1 million (221 switches x \$100,000). Annual prescribed pre-tax profit under these network configurations would be \$1.5 million and \$3.3 million, respectively. So RoR regulation will likely lead to an over-investment in capital equipment and to a very expensive network. This is one of many reasons why Canada has a "state-of-the-art" telecommunications infrastructure and provides the highest service quality in the world.

Third, a company providing monopoly and competitive services using the same physical assets could assign and misallocate the joint and non-specific overhead costs to the monopoly services, thereby using its cost information advantage over the regulator to prey upon competitors.

Fourth, and most important of all in a rapidly changing environment, R&D is a very expensive and risky activity that requires a much higher rate of return than other business activities. It will not pay to invest in R&D if these high rates of return cannot be attained. Thus, RoR regulation, which restrains and sometime prohibits these returns, undermines innovation in the industry. In an unregulated market, by contrast, there will be higher rates of return for a short time, until competitive forces react; thus, R&D and its timely diffusion throughout the sector are encouraged.

In advocating a competitive market structure for telecommunications and broadcast distribution, one must clearly recognize that economic forces will be put to bear on the elimination of all cross-subsidy policies. These regulatory policies would include not only the subsidy from long distance to local services, from urban to rural services, and from business to residential services, but also from broadcast distribution to broadcasting. Hence, if the government wishes to favour the recipients of these subsidies, it might consider alternative economic instruments.

Past telecommunications cross-subsidies are provided to all who subscribe, despite the fact societal concerns are targeted to those who

are classified as "poor."

The result is that we are subsidizing 75 per cent of the people who are not poor, who can afford it and would not stop using it if they did not. Besides, I would challenge you and suggest that most Canadians are not so ungenerous that, if we had a cash subsidy or a telestamps scheme, they would be [un]willing to support it.(26)

One might further pose the question: is it just the service that we wish to subsidize, when there is also considerable associated technology? The answer to this question would incorporate the following analysis:

The cost of providing a universal switch broadband network in Canada is about \$30 billion. That works out to about \$1,000 per capita ... Every household would have to have the equivalent of a 486DX33 or DX66 computer. They would have to have a large hard drive on it. They would need extensive compression/decompression technology. At current prices, the minimum would be \$1,500, probably closer to \$2,000, worth of hardware in the house beyond the \$1,000 to connect fibre to the last mile.
(27)

In response to concern about "have" and "have not" households emerging from this Information Revolution, it must be remembered that television took 40 years to become universal, while the computer is taking over 20. The Information Highway will likely have at least four generations of technologies, each of which will eventually supplant its predecessor but with periods of considerable overlap. The key to universality is to make the latest technologies available in the schools, which thus become the most advantageous place for government investment to bring about an information-based society.

One should also recognize that there is great concern over the viability of existing cross-subsidies from broadcast distribution to Canadian broadcasting.

The technological tidal wave coming our way will make it nearly impossible to have a regulatory framework to protect and nurture Canadian programming as the CRTC has managed to do in the past.(28)

If the services offered over cable television and DBS also become individually available over the Internet or alternative networks at comparable cost, consumers could "cherry pick" their favourite programming services, thereby forcing the disassembly of current cable television and DBS service bundles. The CRTC's ability to demand that cable television and DBS services bundle their services, to disapprove of competitive foreign services, and to ensure simulcasting when a

program is aired both on an American and a Canadian service are integral to the cross-subsidy funding of Canadian programming. The new technologies are indeed a cause for concern to Canadian broadcasting content. So a direct subsidy ought to be considered.

From a competition and theory perspective, the optimal [situation] is to have rates that are adjusted to reflect, to the extent possible, their true economic costs, and where there are social policy objectives that do not get reflected in those costs we should try to devise other means of achieving them, perhaps by direct subsidies. When I testified before the CRTC last year I indicated that a direct subsidy by the *Income Tax Act* is the way to do it. If the government thinks this is the legitimate public policy objective, that is one means of doing it.(29)

In terms of the second strategic imperative, it is estimated that the amount of investment required to complete the construction of the Information Highway in Canada will be \$30 billion over the next two decades.(30) To keep pace with competitor countries, reliance on foreign sources of equity capital will be necessary. Therefore, our philosophy with regard to Canadian sovereignty should be more concerned with the conduct of capital and less concerned with its source.

Finally, the third strategic imperative recognizes that R&D work is the life-blood of a dynamic industry. The nation that does not innovate, does not have a future; the nation that does not invest in R&D, follows rather than leads. Despite notable exceptions within the telecommunications equipment sector, R&D activity in Canada has always been relatively small. This level of R&D in Canada is due partly to the fact that all the economic benefits of such activity cannot be appropriated and partly to the "branch plant" mentality of some foreign-owned multi-nationals. This latter myopic position appears to be disappearing, however, as the emergence of a more global view is transforming multi-nationals into transnational corporations. Preferential fiscal treatment may be called for to rejuvenate these economically vital investments and, given the new-found importance of the Information Highway, special attention could be given to directing existing R&D funding towards Canada's telecommunications sector.

REFERENCES

Addy, George N. "The *Competition Act* and the Canadian Telecommunications Industry." Address to the Institute for International Research Telecommunications Conference, 29 March 1994.

Addy, George N. *Competition Policy, Regulation and the Information Highway*. Unpublished Manuscript. The Bureau of Competition Policy, Ottawa, 1995.

Amesse, Fernand, Louise Séguin-Dulude and Guy Stanley. "Northern Telecom: A Case Study in the Management of Technology." In Steven Globerman. *Canadian-Based Multinationals*. University of Calgary Press, Calgary, 1994, p. 421-453.

Bureau of Competition Policy. *Competition Policy, Regulation and the Information Economy*. Submission of the Director of Investigation and Research to Public Notice CRTC 95-130. Ottawa, January 1995.

Bureau of Competition Policy. *Implementation of Regulatory Framework: Local Inter-connection and Network Component Unbundling*. Submission of the Director of Investigation and Research to Public Notice CRTC 95-36. Ottawa, January 1996.

Crandall, Robert W. "Managing the Transition to Competitive Telecommunications Markets." In Steven Globerman, W.T. Stanbury and Thomas A. Wilson. *The Future of Telecommunications Policy in Canada*. Bureau of Applied Research of the University of British Columbia and Institute for Policy Analysis of the University of Toronto, Toronto, April 1995, in p. 67-81.

Crandall, Robert W. and J. Gregory Sidak. "Competition and Regulation Policies for Interactive Broadband Networks." The Bureau of Competition Policy, *Competition Policy, Regulation and the Information Economy*. Submission to the Public Notice CRTC 1994-130. Ottawa, January 1995.

Crandall, Robert W. "Policy Principles for Local Competition in Telecommunications." The Bureau of Competition Policy. *Implementation of Regulatory Framework: Local Interconnection and Network Component Unbundling*, Appendix I.

Davidson, William H. and Ronald D. Hubert. *A Telecompetitiveness Infrastructure: Enabling a New Future for Canada*. Mesa Research, Sponsored by Northern Telecom, May 1994.

Davidson, William H. and Ronald D. Hubert. *Telecompetitiveness and the Wireless Sector: Competition Without Chaos*. Mesa Research, Sponsored by BCE Mobile, May 1995.

D'Cruz, Joseph R. and Alan Rugman. "A Theory of Business Networks." In Lorraine Eden. *Multinationals in North America*. University of Calgary Press, Calgary, 1994, p. 103-116.

D'Cruz, Joseph R. and Alan Rugman. *Business Network Theory and the Canadian Telecommunications Industry*. Unpublished Manuscript. University of Toronto, Toronto, 1995.

Globerman, Steven. "The Economics of the Information Superhighway."

In Thomas J. Couchene. *Technology, Information and Public Policy*. John Deutsch Institute for the Study of Economic Policy, Queen's University, Kingston, November 1994, p. 243-279.

Information Highway Advisory Council. *Connection, Community and Content: The Challenge of the Information Highway*. Supply and Services Canada, Ottawa, September 1995.

Niman, Neil B. "Picking Winners and Losers in the Global Technology Race." *Contemporary Economic Policy*, Vol. 13, July 1995, p. 77-87.

Porter, Michael E. *The Competitive Advantage of Nations*. The Free Press, New York, 1990.

Porter, Michael E. *Canada at the Crossroads: The Reality of a New Competitive Environment*. Supply and Services Canada, Ottawa, October 1991.

Thierer, Adam D. "Unnatural Monopoly: Critical Moments in the Development of the Bell System Monopoly." *Cato Journal*, Vol. 14, No. 2, 1994, p. 267-285.

Winseck, Dwayne. "A Social History of Canadian Telecommunications." *Canadian Journal of Communication*, Vol. 20, 1995, p. 143-166.

(1) These alliances make up what has come to be known as a "business network" since it is a hybrid relationship between a pure market or pure corporate hierarchy (see, for example, Joseph R. D'Cruz and Alan Rugman, "A Theory of Business Networks," in Lorraine Eden, *Multinationals in North America*, University of Calgary Press, Calgary, 1994). In an interesting application of a business network to the telecommunications sector, these authors suggest that the Stentor Alliance might be considered a "nascent" business network.

(2) House of Commons Standing Committee on Industry, Taking Care of Small Business, 1994, p. 2.

(3) Bank of Canada, Bank of Canada Review Autumn 1995, Table H4, p. S88.

(4) Statistics Canada, Catalogue 56-001, Cable Television Statistics, 1994, Table 1, p. 2; Statistics Canada, Catalogue 63-016 Quarterly, Services Indicators, Tables A2, A3 and C2, p. 23, 24 and 62, respectively; and Bank of Canada (1995), Table H1, p. S84.

(5) Information Highway Advisory Council, Connection, Community,

Content: The Challenge of the Information Highway, September 1995, p. 5.

(6) Statistics Canada, Catalogue 63-016, Tables A5 (p. 27) and C6 (p. 67); and Bank of Canada (1995), Table H5, p. S89.

(7) Statistics Canada, 63-016, Tables A6 (p. 29) and C7 (p. 69).

(8) William H. Davidson and Ronald D. Hubert, *A Telecompetitiveness Infostructure: Enabling a New Future for Canada*, Mesa Research, Sponsored by Northern Telecom, May 1994, p. 16-17.

(9) George N. Addy, *Competition Policy, Regulation and the Information Highway*, Unpublished Manuscript, The Bureau of Competition Policy, Ottawa, 1995, p. 9-10.

(10) Walter Wriston, cited in *ibid.*, p. 10.

(11) Michael E. Porter, *The Competitive Advantage of Nations*, The Free Press, New York, U.S.A., 1990, p. 19.

(12) *Ibid.*, p. 618.

(13) Neil B. Niman, "Picking Winners and Losers in the Global Technology Race," *Contemporary Economic Policy*, Vol. XIII, July 1995, p. 79.

(14) David Johnston, Proceedings of the Standing Senate Committee on Transport and Communications, First Session, Thirty-Fifth Parliament, Issue 34, p. 24-25.

(15) By *infostructure*, one means all the elements of a country's information communications infrastructure, which would include the capabilities related to the creation, capture, storage, processing, transmission and reception of all forms of information.

(16) A network externality arises when a user of the telephone system attaches more value to a network that incorporates greater numbers of users. In order to capture this greater consumer valuation, price regulation has been used to have toll services (long distance services) cross-subsidize local services in the hope that the others, most notably those considered "poor," will buy local telephone service and thus add to the network's size. Cross-subsidy means that the monopoly profits earned on toll services will compensate the telephone company for providing local telephone service at less than its cost.

(17) Bell Canada Limited was initially 50% owned by AT&T. It was American-owned in part throughout most of its history, but American ownership has declined to virtually nil since the 1970s [see Dwayne

Winseck, "A Social History of Canadian Telecommunications," *Canadian Journal of Communication*, Vol. 20, 1995, p. 143-166].

(18) Apparently, the municipality of Edmonton did not want to be involved in any subsidization of rural services.

(19) The slow and poor telephone service offered the Prairie provinces was more likely due to poor regulation, however. Inadequate accounting and compensation for depreciation as determined by the Board of Railway Commissioners has been singled out as the probable cause [see Winseck (1995), p. 153]. Prairie telephone service under provincial Crown corporations appears to have been not much different from that in the U.S. Midwest, where telephone service was provided by private corporations subject to regulation [compare Winseck (1995), Adam D. Thierer, "Unnatural Monopoly: Critical Moments in the Developments of the Bell System Monopoly," *Cato Journal*, Vol. 14, No. 2, 1994, p. 267-285, and David Gabel, "Competition in the Network Industry: The Telephone Industry," *The Journal of Economic History*, Vol. 54, No. 3, September 1994, p. 543-572.

(20) Michael E. Porter, *Canada at the Crossroads: The Reality of a New Competitive Environment*, Supply and Services Canada, Ottawa, 1991, p. 112.

(21) *Ibid.*, p. 106-7.

(22) William T. Stanbury, *Proceedings of the Standing Senate Committee on Transport and Communications, First Session, Thirty-Fifth Parliament, Issue 28*, p. 16.

(23) *Ibid.*, p. 15.; Robert W. Crandall, "Policy Principles for Local Competition in Telecommunications," p. 3, in *The Bureau of Competition Policy, Implementation of Regulatory Framework: Local Interconnection and Network Component Unbundling*, Ottawa, January 1995, Appendix I.

(24) Michael McCabe, *Proceedings of the Standing Senate Committee on Transport and Communications, First Session, Thirty-Fifth Parliament, Issue 29*, p. 5.

(25) *The Bureau of Competition Policy, Supplementation of Regulatory Framework: Local Interconnection and Network Component Unbundling*, Ottawa, January 1995, p. 11-12.

(26) Stanbury (Issue 28), p. 16.

(27) *Ibid.*, p. 5, 7.

(28) McCabe (Issue 29), p. 5.

(29) George N. Addy, Proceedings of the Standing Senate Committee on Transport and Communications, First Session, Thirty-Fifth Parliament, Issue 30, p. 9.

(30) Stanbury (Issue 28), p. 5.