Canadian Journal of Transportation Volume 2, Part 1 (2008)

Canadian Transportation Networks

Joseph Monteiro and Gerald Robertson

Address for Correspondence: Gerald Robertson, Industry Sector, Industry Canada, 235 Queen Street, Ottawa, Ontario, Canada K1A 0H5: gerald.robertson@ic.gc.ca. Joseph Monteiro is an economist with the Competition Bureau, Industry Canada.

Abstract

Networks in transportation have existed in Canada for some time and their importance has been highlighted since globalization. Some observers believe that they define the key to success in today's dynamic marketplace. This is hardly surprising in a world where being able to provide service is of paramount importance since the dismantling of regulatory, legal and international barriers. This paper considers 'Canadian transportation networks: gaps and opportunities'. It reviews the meaning of a network and the various networks in different transportation modes. The gaps and opportunities in Canadian transportation networks are examined thereafter. Then the economic rationale for networks and their impact is briefly considered. Finally, the treatment of networks under the Competition Act and in two other major jurisdictions are briefly examined.

Date of receipt of final manuscript: February 2009

1.0 Introduction

Networks have always been important in transportation. This is particularly true today in the context of globalization. Some observers believe that they facilitate success in today's dynamic marketplace. This is hardly surprising in a world where being able to provide service is of paramount importance.

In light of this, this paper will consider the theme 'Canadian transportation networks: gaps and opportunities'. Part 2 reviews the meaning of a network and the various networks in different transportation modes. Part 3 examines the gaps and opportunities in Canadian transportation networks. In Part 4, the economic rationale for networks and their impact is briefly considered. Parts 5 and 6 examine the treatment of networks under the competition laws in Canada and in two other major jurisdictions.

2.0 Transportation Networks in Canada

There is no unique definition of the term network. The Concise Oxford Dictionary defines it as an "arrangement with intersecting lines & interstices..." In mathematical topology, it is defined as "...a figure (in a plane or in space) consisting of a finite, non-zero, number of arcs, no two of which intersect except possibly at their end points."(Arnold, 1963, p. 31) Topology has a long history dating back to 1700 to solve the Konigsberg bridge problem. Some scholars note that this matter dates back even further to the Roman era when the issue of constructing one way roads arose to deal with congestion. In economics, the term network gained a toehold with the consideration of its 'effects'. The use of the term network effects can be traced to Harvey Leibenstein's use of the word 'bandwagon effect' in 1950 by which he meant 'the extent to which the demand for a commodity is increased due to the fact that others are also consuming the same commodity.' (See Besen, 1999.) Further use of the term in this context lay largely dormant until the 1980s, except for its application to communications.

Later, it began to be explored in greater depth in the context of the economics of standardization. To most modern companies networks are a strategic tool to gain competitive advantage. In transportation, networks in Canada first developed in rail but became prominent in connection with the development of 'hub and spokes' in airlines. They also occur in telecommunications and computers, broadcasting, cable television, finance and electricity. Today, networks are widespread and are part of the global economy, engines of fast growth. (Economides, 2004)

2.1 Rail

The development of networks in rail can be traced to rail mergers. By the early 1900s, three transcontinental lines had been built but insufficient traffic led to massive railroad bankruptcies and to consolidation and the formation of the Canadian National Railways (CN) in 1919. By 1999, the network movement gathered new steam when CN merged with Illinois Central (IC), becoming the only railroad in North America to reach three coasts: Pacific, Atlantic and the Gulf of Mexico. By 2005, the railway network consisted of 48,467 km of track.

2.2 Air

The network of airline services was initially conditioned by Government policy and bilateral agreements. Transcontinental and international routes were preserved for Trans Continental Airlines (now Air Canada i.e., AC). It was not until 1948, that Canadian Pacific Air Lines (CPAL) was given the right to operate in the Pacific which was later extended to certain parts of the world and across Canada. The era of deregulation, in the mid ’80s, ushered in the concept of 'hub and spoke' leading to a structure of 'networks' and 'alliances'. By the late 1990s, AC and Canadian (i.e., PWA and CPAL) had networks throughout Canada. There is also the network of 726 airports.

2.3 Road

As late as 1931, there was no road network linking all the provinces. Grants made by the Dominion in 1948 led to the completion of the Trans-Canada Highway in 1962. By 2002, the road network exceeded 1.4m two lane km: 110,000km -freeway and primary highways; 115,000km - secondary highways and other arterial roads; and more than 1.2m km of local and rural roads. The provinces of Ontario, Quebec, Saskatchewan, Alberta and British Columbia accounted for 80% of the road network. The road infrastructure to the United States consists of bridges and border crossings. In addition, the Confederation Bridge, the longest over ice, links the provinces of PEI and NB.

2.4 Water

In ocean shipping, Canada does not play a major role and consequently does not have what one would refer to as a network of shipping lines. The five world alliances have a significant share of the traffic on the Trans-Pacific, Asia-Europe, Transatlantic and Latin America trade lanes. To serve these lines there is, however, a network of ports which consists of 20 Canada Port Authorities, together with regional and local ports operated by Transport Canada.

2.5 Pipelines

Networks in the pipeline industries are of more recent origin. In the natural gas and crude oil industry, the first three pipelines in each were constructed in the 1940s and 1950s and have since increased to ten and twelve, respectively. These networks serve specific geographic markets: intra-provincial; interprovincial; and cross-border.

In sum, there is no unique definition of the word networks, nevertheless transportation networks are widespread in Canada having existed for sometime and are more developed in certain modes than others. They are akin to arteries which enable life giving blood cells to be carried to various parts of the human body.

3.0. Gaps and Opportunities

3.1 Background and Gaps

Canada is in the midst of a social and economic transformation. This transformation is being accelerated by deregulation, liberalization and globalization. This has resulted in: the growth and movement of people in and into cities, particularly four highly urbanized areas; a restructuring of the economy, with new products, jobs, markets and geographies of production; a more dynamic, vibrant and competitive economy with new patterns of movement; and increased trade.(Parsons 2003, p.10) These developments are having a major

impact on the overall transportation network; transportation corridors; urban networks and transit; and transportation related assets creating special challenges and gaps in the transportation network.

3.1.1 Overall Transportation Network

Canada has become one of the most urbanized countries in the world with one-third of its population living in its three largest cities and two-thirds in its twenty-five. Besides urbanization, population has increased from 26.1m in 1986 to 32.3m in 2005. As a result, more cars are being driven, more goods are being transported and all this over longer distances. Not surprisingly, the urban road network is unable to keep up with this growing demand. Apart from the movement of passengers on roads, there has also been a dramatic increase in the number of people flying by air which has increased from 31m. in 1993 to 63.6m. in 2005. This has placed an increased need for capacity and infrastructure at the airports and in particular airports classified as the National Airport System (NAS).

Besides the impact on road and airport networks, there has also been an impact on the network of ports and rails as Canada has always been a trading nation. Its exports and imports increased from 51.2% of the GDP in 1989 to 70-80% in 2005. This percentage while helpful in understanding the direction of the increase does not provide a sense of the true magnitude or volume of this movement. For example, truck traffic nearly doubled, rising from 7.1m border crossings in 1991 to 13.33m in 2005, i.e. 46.7%. In ocean transportation, containerized international cargo increased from approximately 9m tonnes in 1985 to 28m in 2003. In rail, the volume of traffic carried increased from 265m tonnes in 1990 to 354m in 2004.

These increases have put an increasing strain on Canadian networks. If this is so today, in 10, 25 or 50 years when Canada's population is expected to increase by 2.9, 7.7 or 10.2 million, the impact would be staggering.

3.1.2 Transportation corridors

An increase in trade and a shift in traffic has had an effect on cross-border and port gateway corridors. Trade has increased from about $217b in 1987 to $813b in 2005. Of its trading partners, US has been Canada's most important increasing from $155b in 1987 to $580b in 2005 (71% of the total trade in 2005, with exports representing 84% and imports 57%). Apart from the US, Asian countries are of particular interest. Trade with them has recently surged from about $62b in 1987 to $233b in 2005. Of particular interest is the rapid growth of trade with China rising from about $3b in 1990 to $36.5b in 2005. It is now second to the US surpassing Japan and Mexico.

Trade with the US mostly moves by truck. What is particularly noticeable is the concentration of its movement on few cross border sites. Of the 20 crossings accounting for 90 percent of total truck movement in 2005, the four busiest (Windsor, Fort Erie, Sarnia, and Niagara Falls) were in Ontario handling about 3.7m. trucks in 1991 compared to 7.45m. trucks in 2005 or 55.8 per cent of the total number of crossings. Apart from the increase in trade, there has been a shift in traffic caused by trade agreements (NAFTA and CUSTA) which means more north-south traffic. On a tonne-km basis, north-south for-hire trucking across the US border increased from 30% to 41% of the total between 1990 and 1996.The increase in trade from Asian countries has also brought a relative increase in traffic at West Coast ports compared to East Coast ports. Almost 75 percent (by value) of Canada's exports to Asian countries are shipped through BC. "Vancouver has, in fact, been the fastest growing container

port in North America registering an average annual growth rate of 13.5% from 1995 to 2005."(WESTAC, 2006)

This increase in trade and shift of traffic has not only resulted in lack of capacity or infrastructure along certain cross border corridors but also at BC ports and related infrastructure. As stated by one authority "China's increased trade with Canada and the U.S. has been a new driving force in North American business, putting more strain on transportation infrastructure and modal logistics." (Transport Canada, 2006a, p. 7)

3.1.3 Urban network and transit

The nucleus of Canadian activity is now in Canadian cities with the shift in rural population to urban areas. In 1900, 66% of the Canadian population lived in rural areas compared to 23% in 1991 and 20.3% in 2001. This shift was been accentuated by the fact that 80% of immigrants begin their life in Canada by taking residence in urban areas. The 2001 Census identified four areas of rapid increase in concentration of people: the Golden Horseshoe region in Ontario; Montreal and surrounding area; the Calgary-Edmonton corridor and the Lower Mainland Vancouver region.

In these urban areas, roads and automobiles are the primary means of transportation and motor carriers (vans and truck) are the principal method of freight delivery. In contrast, public transit accounts for only about 5% of urban passenger travel measured in passenger kilometres. While this reflects preference for the former, "... it also reflects the fact that transit is by no means available to all Canadians -- less than 60% live in communities served by transit -- and that only a much smaller proportion of all trips could be taken by transit instead of private car." (Vision and Balance, 2001, p. 217)

This suggests that the supporting transportation infrastructure and the development of transit has had difficulty keeping pace. The Minister of Transport in his *Transportation Blueprint* indicated "Our urban road network cannot keep up to this growing demand, and our public transit systems are struggling to provide an alternative to move people."(Ontario Ministry of Transportation, 2001 p. 9) "The Panel (Canadian Transportation Act Review Panel) sees urban areas as a source of major transportation problems and urban transit as a key component of a comprehensive multi-modal transport policy." (Vision and Balance, 2001, p. 215)

3.1.4 Transportation Related Assets

Other gaps include related physical assets, nonphysical assets and institutional practices or policies. There are related infrastructure capacity constraints. The Western Transportation Advisory Council (WESTAC) indicates that in the West: additional west coast terminal capacity for coal will be required; new container capacity beyond the TSI Terminal Systems Inc.'s new berth at Deltaport and Prince Rupert's phase 1 terminal will be required; and additional train slots for both commodities and containers will be needed.

The forecasted traffic growth and large transportation projects underway will make the shortage of skilled workers even worse. As indicated in the Gateway and Corridor Initiative "There are significant pressures in the Gateway, including shortages of workers, rising skill requirements, integration of immigrants and competing pressures for skilled labour from other sectors and regions". (Transport Canada, 2006b, p. 16)

Besides physical and non-physical assets, experts indicate that there are several institutional gaps: financing, regulatory and ownership. Most of the transportation system is

privately financed. Huge amounts of capital and innovative financing are needed together with regulatory changes. A study by Parsons states "The current financial environment is not supportive of a stable long term planning framework for transport infrastructure investments. New approaches are required."(Parsons, 2003, p. 18) Further, "investments will not be made unless there is the right fiscal and regulatory environment." Regulatory impediments also exist on access to global markets and foreign capital i.e. attracting foreign capital.

In sum, when societies and economies change, the infrastructure and institutions that support them must also change - including the transportation infrastructure. The failure to do so has created gaps. The old transportation network was not built for the new 'city-centred' reality of Canada. (Parsons, 2003, p. 21) Nor was it built for the present volume of trade. Speeches from the throne have recognized that modern infrastructure is a key to the prosperity of our cities and health of our communities. Not surprisingly, this has created new opportunities.

3.2 Opportunities

3.2.1 Overall Transportation network

Addressing overall increases in demand for transportation network have to be addressed from a practical standpoint. Before jumping to the conclusion that investment in network infrastructure should be made various alternatives have to be considered. Can one meet the increased demand by improving efficiencies of the existing network through new techniques and technologies? Can one meet the increased demand by using substitutable networks? Can one meet the increased demand by using the pricing mechanism to affect the use of different modes?

A recent study by Parsons provides a broad answer to the first two questions.

> Canada's transportation capacity issues are real. All modes of transportation are under stress. For many years the transportation industries of Canada addressed their capacity issues through increasing efficiency by investing in new technologies, better information management, just-in-time deliveries, improved management practices and fuel efficiencies. These measures allowed the industry to steadily increase productivity through most of the 1990s with productivity rising for the sector by 2.8% per year and output rising by 6.8%. However, by the year 2000 productivity growth was showing declines and the growth in output had fallen by 28%. (Parsons, 2003, p. 13)

Moreover, "Across Canada the infrastructure investment shortfall is much larger and has for many years been well documented." (Transport Canada, 2006b, p. 13) In 1998, the Council of Transportation Ministers estimated that $17 billion would be required to bring the national highway system to acceptable standards. An answer to the third question such as user pay, payment for social cost, etc. while likely to correct some distortion in demand is also unlikely to alter the need for large investment. This has led to concentration on the need for investment as a solution.

3.2.2 Transportation corridors

A limited number of border crossings and integrated gateways can be considered as potential

opportunities for investment based on present trade flows:

Cross-border Corridors: Several sources have identified a second crossing at Windsor – the world's single most important gateway for land trade – as an immediate need. A few crossings have also been singled out as opportunities and projects have already been initiated such as: a new river crossing at the Detroit-Windsor Gateway; a fifth lane at the Niagara Falls Queenston-Lewiston Bridge; an expansion at the Fort Erie -Peace Bridge; and a new extension of the Highway 15 NEXUS/FAST truck lane in Surrey, B.C. at the Pacific Highway Border Crossing. Other important border-crossings that could be potential opportunities for investment are: Sarnia-Blue Water Bridge, Lansdowne-Thousand Island, Niagara Rainbow Bridge and Cornwall crossing all in Ontario; and the Lacolle crossing in Quebec.

Asia-Pacific Gateway and Corridors: To capitalize on the dramatic increase in trade between Canada and Asia, a number of reports have suggested the need for investment in the Pacific gateway. This opportunity was recently seized upon by the Federal government when it announced Canada's Asia-Pacific Gateway and Corridor initiative. It committed $591m to the Gateway project. A total of $283m was committed immediately to the following infrastructure projects: the Pitt River Bridge and Mary Hill Interchange, Roberts Bank Railway Corridor Overpasses and Underpasses, Twinning of the Trans Canada Highway in Banff National Park, and South Fraser Perimeter Road. In Prince Rupert too, a $60m plan was launched for a new container terminal. To optimize the potential and opportunities of Canada's Asia-Pacific gateway project other investments are needed in rail and road. In rail, British Columbia's immediate concerns include the inability of railways to handle projected growth over the next five years for example on the Calgary-Vancouver Corridor.

Atlantic Gateway: The recent $5.7b decision by Panama to widen the Panama Canal may create opportunities. The Premier of Nova Scotia is seeking federal backing of $400m for an Atlantic Gateway which includes improvement to the Port of Halifax and highway upgrades to NB. Some researchers also suggest developing East Coast-US-Mexico shipping.

3.2.3 Urban network and transit

Suggestions for improving urban networks and transit range from creating demand for substitutable and new networks to improving the efficiency of the present system.

Substitutable Networks: Opportunities exist for increasing the demand for mass passenger transit. This would not only lead to less congestion on the highways but also less pollution. Examples of the former are through support of GO Transit and through increase of inter-city bus systems which usually have underutilised capacity. Suggestions to reduce truck traffic range from using alternative transportation modes to altering relative prices for different modes. Others have suggested changing shipper loading/unloading times as this would be a more effective approach through greater shipper/receiver coordination, government encouragement and truck only lanes on major highways.

New Networks: Opportunities could exist for new forms of transit. Examples of the latter are investing in new transit lines and encouraging the use of car-pooling (which could also be considered part of the next section "Improving Efficiency") and by using disincentive

schemes such as increasing parking fees, special taxes, *etc*. Light rail projects, similar to the one being considered in Ottawa, may provide opportunities for cities in Canada of similar size or in high density cities along new routes.

Improving Efficiency: Opportunities exist for new techniques and technologies to improve the efficiency of the network or free flow of traffic. Studies have cited two major obstacles to free flow: collision and road construction. Proposals to deal with the former are giving a higher priority to clearing collisions on roads by reducing overlapping jurisdictional control by various levels of government and by streamlining police investigations to speed up the process. Proposals to deal with the latter are shortening the time that projects block the highway and improving construction techniques. New technologies can also improve efficiency and reduce congestion such as: utilizing new paving technologies and use of alternative materials; overhead signs on road status; other uses of ITS to clear trucks through weight inspection stations and border points through transmittal of custom documents, etc.

3.2.4 Transportation related assets

Other Non-Physical Assets: Opportunities exist for suppliers of terminal and related equipment. WESTAC suggest opportunities to meet the forecasted demand at: the new terminal at Deltaport, phase 2 of the Prince Rupert facility, Fraser River Docks and the Port's Richmond properties.

Other Non-Physical Assets: Opportunities exist for both skilled and non-skilled labour. The forecasted national demand for new truck drivers per year until 2008 is 37,000, according to the Canadian Trucking Human Resources Council. Research by the Construction Sector Council estimates a demand of 22-27,000 workers between 2005-8 for the Oil Sands and 2010 Olympic Games. Further, forecasts indicate a demand for 86,000 supply-chain persons in 3-5 years.

Institutional: Opportunities for creating the right environment for investment include - changing the public perception that tax funds collected in transportation activities are not returned into the sector; creating neutrality and stability in taxation between modes and regions of Canada for a stable infrastructure investment program to develop, *etc*. Opportunities exist for changing the regulatory requirements-liberalizing bilateral agreements, especially those involving BC as only 40% of Canada's bilateral air service agreements allow foreign carrier's access to Vancouver's International Airport; - raising ownership limits of airlines so as to attract foreign capital, etc.

In sum, gaps have created opportunities and time is of the essence if Canada is to capture the growth opportunities and optimize its investment in its existing infrastructure. Some have called for a National Transportation Strategy and others for a National Transportation Investment Strategy.

4.0 Economic Rationale and Impact of Transportation Networks

4.1 The Theory of Network Externalities

The theory of network externalities advances the notion that benefits or costs may arise on the supply-side or the demand-side that are not taken into account in the pricing mechanism. On the supply-side, the joint provision of service by members may result in economies or diseconomies that are not captured or paid for by providers of the network. Similarly, on the demand-side, externalities may arise because they are not captured or paid for by users of the network. These externalities arise because of the subtle interdependencies in the welfare of different units - interdependencies which cannot readily be reflected in the pricing arrangement. (Baumol, 1965, p. 370) This is because it cannot be easily measured or because mechanisms do not exist to collect them or to collect them efficiently. This has implications for the allocation of resources even in perfectly competitive markets. An interesting implication of this for competition advocates is that where there are external diseconomies, the presence of monopolies can lead to outputs smaller, and therefore more nearly optimal, than those which would result from competition. (Baumol, 1965, p. 371) Network effects have largely been developed in telecommunications (with regard to benefits) and transport (with regard to costs). These externalities provide the basis for the theory.

Examples of externalities can be found in transportation. On the supply-side, the establishment of a shipping line at a port may lead to expenditures to create a pool of related services which a new shipping line which does not have to pay for. Or the expansion of an industry or a shipping line may make it cheaper for other shipping lines to operate because of lower cost in the supply of inputs. On the demand-side, the increase in cars or trucks on a highway network can increase congestion and ultimately result in gridlock which increases the cost to all vehicles which is not taken into account in the consumption or production pricing of transport services. Or the increase can result in more noise or air pollution whose costs do not have to be borne by the users of the highway. Or the addition of segments or arteries to a rail or road network may provide benefits to the existing users of these networks by enabling them to send traffic or travel to destinations that were previously not available to the existing users or by making complementary products available (e.g. more fuel and restaurant facilities).

The special features of markets with network effects have been described by Economides (2004). Those applicable to transport are highlighted. First, a firm can make money from either side of the network. Second**,** an additional user of the network is not rewarded for the benefit it brings to others. Third, the pace of market penetration (market expansion) is much faster in network industries than in non-network industries. Fourth, markets with strong network effects where firms can chose their own technical standards (e.g. different rail gauges) are 'winner-take-most' markets resulting in extreme market share and profit inequality. Fifth, in industries with significant network externalities, under conditions of incompatibility between competing platforms, monopoly may maximize social surplus. Sixth**,** inequality is natural in the market structure of network industries. Seventh, free entry in network industries does not lead to perfect competition and eliminating barriers may not significantly affect market structure. Eighth, 'winner takes most' is the natural equilibrium in these markets. Ninth, competition for the market takes precedence over competition in the market at least initially. Tenth, is the importance of path dependence - today's sales depend on past number sold.

4.2 The Impact of Transportation networks

4.2.1 The Impact of Expansion of Networks

First, the expansion of a network increases the potential of services and trade between various regions. It enables the development of resource industries which would not be possible without reasonable transportation facilities. In the event that an alternative transportation facility exists, it enhances the potential for competition and could lower price. Where an alternative does not exist, it provides services to captive shippers.

Second, it increases demand for the entire network and enhances the potential for the network to become more viable. The increase not only originates from the communities along the expanded network but also from other communities on other parts of the network who attempt to reach them. It also makes the previous network more financially viable as new communities would most likely transport goods and passengers on the previous network.

Third, expansion of the network increases the potential of intermodal and intramodal competition. For example, the extension of an existing subway in a city increases competition for bus, taxi or car users. Similarly, expansion of a second railway would increase intramodal competition.

Finally, there are numerous other effects such as uniting a nation e.g. when CPR was constructed, development of remote regions, improving standards of living in remote and underdeveloped regions, reducing congestion and population density in certain cities, *etc*.

4.2.2 The impact related to hub-and-spoke networks

The effects related to hub-and-spoke networks (air, sea, rail or trucking) are: enhancement of efficiency; enhancement of demand for the network; and reduction of competition or potential competition.

In the case of networks *that do overlap* the efficiency benefits from an agreement among carriers to enter into joint sharing capacity agreements or to form an alliance can be significant to the extent that there is greater scope for rationalization of the hub spoke system. The agreement or alliance can result in a significant reduction of competition on all overlapping routes.

In the case of networks that do not overlap but share a common hub, an agreement among carriers to enter into joint sharing capacity agreements or to form an alliance can yield efficiency gains from seamless operation and a reduction of any duplicate resources from sharing of the hub. There will also be an anti-competitive effect of increased market power at the hub.

In the case of networks that do not overlap except on the hub-hub route and where there are no potential entrants into each others market (as in the case of international air alliances) an agreement among carriers to enter into a joint sharing capacity agreements or to form an alliance can result in efficiency gains in the form of seamless operations. In addition, efficiency may arise on the hub-hub route from rationalization, increased density, etc. There will also be reduction of competition on the hub-hub route.

In sum, the theory of network externalities advances the notion that benefits or costs may arise that are not taken into account in the pricing mechanism. Markets with network effects have special features. Expansion of networks increases the potential of services and trade to various geographical areas; increases demand for the network and potential for the network to become viable; increases the potential of intermodal competition; and can have other effects.

Of the three hub and spoke cases, the first case could lead to the greatest competition concerns. In addition, if the network structure itself changes, there would be an effect on traffic patterns and on transport related services.

5.0 Transportation Networks Under the Competition Act

Networks are not specifically referred to in any provision of the Competition Act. Nevertheless, they could raise concern if they result in anti-competitive acts leading to the abuse of dominance, predatory behaviour or collusion.

5.1 Abuse of Dominance

Network effects result in a market structure dominated by a few firms where bigger is better. It creates barriers to entry which tend to insulate an existing network from competition thereby enhancing its market power. Since costs of building a network in transportation are generally sunk, it enhances the barrier to entry. This makes market penetration by a new entrant much slower than would occur in non-network industries. These entry barriers increase the likely duration and the value of market power or monopoly power. It thus increases the incentive and the likelihood that the dominant carrier will engage in anti-competitive acts to maintain its dominance or for a new carrier to obtain its market power. The anti-competitive acts can range from: denying access, tying, entering exclusive agreements, refusing to supply, etc.

5.2 Predatory Behaviour

Predatory behaviour and predatory strategies are more likely in industries where the future payoff of such behaviour is greater. Since, in network industries, the winner takes the most, behaviour such as price discrimination or selling below costs to drive out a new entrant are more likely than in non-network industries. Further, the likelihood of success of such a strategy is higher for an established network firm given entry barriers faced by a new or potential entrant.

5.3 Collusion

Collusive behaviour is also facilitated in networks that are horizontal since there are typically fewer competitors than in non-network industries. In addition, it is easier to achieve and enforce collusive behaviour in such industries than in non-network industries.

5.4 Mergers

Vertical mergers in network industries have attracted a great deal of attention, especially among railways. Concerns about leveraging of market power from one network to another have been raised, but Chicago economists have claimed that the leveraging theory does not apply to a bottleneck monopolist. Econometric tests and other economists do not support their view. (Grimm *et al*. 1992, pp. 295-311. See also Tye and Horn, 2000, p. 16, Scherer and Ross, 1990; Riordan and Salop, 1995; and Riordan, 1998.) Further, the effect of integration on connected vertical networks is neglected.

The above has important implications for antitrust enforcement as it increases the incentives for network industries to obtain or maintain market power or to engage in anti-competitive behaviour leading to such power. It also alerts antitrust enforcers and courts to

certain types of antitrust strategies and point to certain characteristics of the market.

5.5 Antitrust Strategies and Characteristics

The types of antitrust strategies of network industries that have attracted attention are: denying access to new entrants and rivals; merging with vertical networks to exclude competitors; foreclosing entry by tying or through exclusionary agreement or through control of access to standards.

Certain characteristics are found in these network industries, however, they may not be because of anti-competitive behaviour. First, these markets display somewhat large market share inequalities together with profit inequality. Therefore, there should be no presumption that anti-competitive actions are responsible for the creation of market share inequality or very high profitability of the top firm. Second, free entry in network industries does not lead to perfect competition and eliminating barriers to entry may not significantly affect the market structure. Third, monopoly may maximize social surplus and breakup of monopoly into two competing firms could *reduce* rather than increase it.

5.6 Jurisprudence

Courts in Canada have dealt with denial of access to essential facilities under preemption of scarce facilities or resources in section 79. It is closely related to the essential facilities doctrine in US jurisprudence. This doctrine applies to situations where access to an asset is required for effective competition and this asset cannot be economically reproduced. According to this doctrine, under some circumstances, a firm may be required to provide access to such an asset to its competitors.

A few noteworthy cases that dealt with this issue are: *A.C. Nielsen* (a sole supplier in Canada of sales reports), *Gemini* (control of the computer reservation systems by the merger of the two dominant air carriers), and *Interac* (control of the supply of shared electronic network services for consumer-initiated shared electronic financial services). In these cases, access issues were generally resolved through measures which change the incentives facing the parties or by ensuring adequate access without price regulation. (Anderson, *et al*. 1998 p. 199)

In sum, networks are not specially referred to in any provision of the *Competition Act* though anti-competitive practices that may arise in such industries raise greater concern in light of the structural characteristics of these industries. A great deal of care, however, should be exercised in drawing any conclusions from their market structure. Attempts to increase competition have emphasized access within the existing structure rather than creating competition with new competitive networks. Economides concludes his research on competition policy in network industries by noting that ..."the legal system does not yet have a framework for analysis of competition policy issues in network industries. ... economic theory of networks is so inadequate and unsettled that there is no commonly accepted body of knowledge on market structure with network externalities, based on which one could evaluate deviations toward anti-competitive behavior." (Economides, 2004)

6.0. Treatment of Networks by U.S. and EEC Antitrust Authorities

6.1 United States

In the US, network industries are not subject to special antitrust rules. However, anti-

competitive conduct involving networks which result in monopolization, attempted monopolization, and conspiracies to monopolize are dealt with under Section 2 of the *Sherman Act.* In addition, anti-competitive conduct can also be dealt with under Section 1 of the *Sherman Act* where it involves concerted action by two or more networks.

A common type of monopolization case is a claim where a network monopoly has unlawfully refused to deal with another company. This refusal led to the essential facilities doctrine (when it involved denial of access to a particular facility). The doctrine, as developed by lower courts, is established when the following elements are established: the control of an essential facility by a monopolist; a competitor's inability reasonably or practically to duplicate the essential facility; the denial of the use of the facility to the competitor; and the provision to the competitor of access to the facility if feasible. The term facility has generally been applied to tangible assets such as physical structures. (Economides, 2004) The facility, however, will not be deemed essential if equivalent facilities exist or if the benefits from access can be obtained in another fashion.

The origins of this doctrine can be attributed to a transportation case, *United States v. Terminal Railroad Association of St. Louis* (U.S. Supreme Court, 1959), involving a railroad network. The railroad originally owned one bridge, then acquired the other and the ferry system that could transfer railroad cars. The government challenged the acquisition under Section 1. The Supreme Court recognized that access to the unified system of bridges and terminals was essential for rail access and ordered access to all users on reasonable terms.

In the view of the Principal Deputy Assistant Attorney General Antitrust Division of the U.S. Department of Justice, "... network industries should not be subject to special antitrust rules. Network industries do not give rise to competition problems that are so unique that they require different or heightened forms of antitrust intervention; nor are the benefits of network industries so enormous or so fragile, or the difficulties of applying antitrust principles to network industries so great, as to warrant special leniency or forbearance from antitrust enforcement. Traditional antitrust principles of general application should be applied to network industries, as to other industries."(Melamed, 1999)

6.2 EEC

In the EEC, Articles 81 and 82 (formerly 85 and 86) of the Treaty are fully applicable to the transport sector. Article 82 concerned with abuse of dominance contains two essential elements: the existence of a dominant position; and the abuse of such a position. Article 82 also contains a list of non-exhaustive abusive practices which has been construed by the Court of Justice and the Commission to reach: (i) every act or practice whereby a dominant undertaking exploits its market power to the prejudice of its purchasers or suppliers (direct exploitation); and (ii) every act or practice causing an undue lessening of competition (monopolization). A refusal to grant access to an essential facility is also prohibited under this article when it has anti-competitive effects or in some cases also exploitative ones and which is not objectively justified.

The Commission defines an essential facility as a 'facility or infrastructure which is essential for reaching customers and/or enabling competitors to carry on their business, and which cannot be replaced by any reasonable means.' The concept of essential facility was first used by the Commission in transport cases concerned with harbour infrastructure and computer reservation systems (i.e., *Sea Containers v Stena Sealink* (Commission of the European Communities, 1993) and *London European-Sabena* (Commission of the European

Communities,1988)). Since then, the matter of essential facility has risen in connection with other industries such as banking, energy and telecommunications. This is particularly instructive as it arose in connection with networks, which suggests that the Commission could adopt a similar approach in its treatment of transportation networks.

Network access has been addressed by the Commission. In 1998, it adopted a Notice on the application of the competition rules to access agreements in the telecommunications sector, which clarifies its approach to Article 82 on these issues. Several principles used in the telecom sector on access should be applicable to other comparable network industries where there is dominance.

In sum, both jurisdictions have not shown any indication that network industries are so special as to require different treatment from other industries with essential facilities or that they need the application of a special set of rules in reviewing antitrust concerns in network industries. Nor is there any indication that these industries warrant special leniency or forbearance from enforcement.

7.0 Concluding Remarks

Networks are a strategic tool to gain competitive advantage. They are widespread in Canada providing everyday links from home to work and life lines to diverse regions together with corridors for our export and import trade. Our economic futures are more closely tied to the sustainability of our transportation networks than we might care to admit. Continuing to develop the system must become our priority simply to protect the standard of living. (Parsons, 2003, p. 27)

Unfortunately, the transportation network that supports the rapid transformation of our society has not been keeping pace. This has had a major impact creating special challenges. While some worthy projects have been initiated such as the Asia-Pacific Gateway, the expansion of certain cross-border corridors and the $1.4b spent on Ontario highways in 2006, others need to be addressed related to urban networks.

Part of the current problems that we face arises because we have been slow to adjust to domestic and international changes and because the pricing mechanism has not been used fully to achieve our objectives in part. Industries with networks have special features and expansion or agreements among competitive networks have a number of effects.

From the competition perspective, networks are not referred to in any provision of the *Competition Act* though anti-competitive practices in such industries raise concern in light of their structural characteristics. However, care should be exercised in drawing any conclusions. Both the US and the EEC antitrust authorities have not shown any indication that network industries are so special as to require different treatment from other industries with essential facilities or that they need the application of a special set of rules in reviewing antitrust concerns.

References

Anderson, R.D., A. Hollander, J. Monteiro and W.T. Stanbury (1998) Competition policy and regulatory reform in Canada, 1986–1976, *Review of Industrial Organization* 13**:** 177–204.

Arnold, B.H., (1963) Intuitive Concepts in Elementary Topology, Prentice-Hall, Inc. Englewood Cliffs, NJ.

Baumol, W. J. (1965) Economic theory and operations analysis, second edition, Prentice Hall, Inc. Englewood Cliffs, NJ.

Besen, S., (1999) Innovation, competition and the theory of network externalities http://www.econ.yale.edu/alumni/reunion99/besen.htm. Accessed 9 March 2009.

Commission of the European Communities (1993) Commission decision of 21 December 1993 relating to a proceeding pursuant to Article 86 of the EC Treaty (IV/34.689 - Sea Containers v. Stena Sealink - Interim measures).

Commission of the European Communities (1988) Commission decision of 4 November 1988 relating to a proceeding under Article 86 of the EEC Treaty (IV/32.318, London European - Sabena).

Economides, Nicholas (2004) Competition policy in network industries: an introduction, NET Institute Working Paper No. 04-24, NYU, Center for Law and Business Research Paper No. 03-10. Available at Social Science Research Network http://ssrn.com/abstract=386626. Accessed 9 March 2009.

Grimm C.M., C. Winston and C. A. Evans (1992) Foreclosure of railroad markets: a test of Chicago Leverage Theory, *Journal of Law and Economics*, XXXV (October): 295-311.

Melamed, A. D. (1999) Network industries and antitrust**,** Address to The Federalist Society at the Eighteenth Annual Symposium on Law and Public Policy: Competition, Free Markets and the Law http://www.usdoj.gov/atr/public/speeches/2428.pdf. Accessed 9 March 2009.

Ontario Ministry of Transportation, Canada (2001) Creating a transportation blueprint for the next decade and beyond: the challenges.

Parsons, G. (2003) Opening the arteries for growth: transportation in the economic and social lives of Canadians, Western Transportation Advisory Council http://www.westac.com/pdfs/OAGNov03.pdf. Accessed 9 March 2009.

Riordan, M. H. (1998) Anticompetitive vertical integration by a dominant firm, *American Economic Review* 88: 1232-1248.

Riordan, M. H. and S. C. Salop (1995) Evaluating vertical mergers: a post-Chicago approach, *Antitrust Law Journal* 63: 513-568.

Scherer, F. M. and D. Ross (1990) Industrial market structure and economic performance, third edition, Houghton Mifflin Co. Boston, MA.

Transport Canada (2006a) Transportation in Canada 2005 http://www.tc.gc.ca/pol/en/report/anre2005/toc_e.htm. Accessed 9 March 2009.

Transport Canada (2006b) Canada's Asia-Pacific Gateway and Corridor Initiative http://www.tc.gc.ca/CanadasGateways/APGCI/document/APGC-PCAP_en.pdf. Accessed 9 March 2009.

Tye, W.B. and J. Horn (2000) Rail merger and access issues before the U.S. Surface Transportation Board in *Competition and Access in the Rail Industry*, The Van Horne Institute and the University of Saskatchewan: 1-29.

U.S. Supreme Court (1959) UNITED STATES v. TERMINAL RAILROAD ASSN, ST. LOUIS, 361 U.S. 116. Decided November 23, 1959.

Vision and Balance (2001) *Canada Transportation Act Review* http://www.reviewcta-examenltc.gc.ca/english/pages/whatsnew.htm. Accessed 9 March 2009.

Western Transportation Advisory Council, (2006) Preparing for success: forecasting surface

freight demand http://www.westac.com/pdfs/prepsuccess.pdf. Accessed 9 March 2009.