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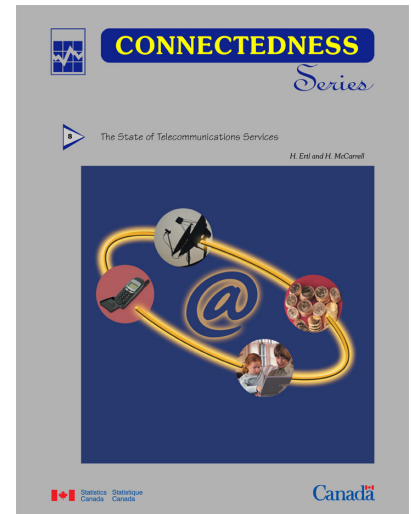
The State of Telecommunications Services

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Abstract

Technological advances and market liberalization have been transforming the telecommunications services industry for some time, from a mature utility to an exciting, competitive and dynamic industry. Assessing the state of competition in the industry at a time when its transformation is not yet complete is a complex task. Many factors are at play, including price behaviour and the market structure of telecommunications services. While this paper touches on such issues, it focuses explicitly on recent market concentration among the various products and markets. In the process, the paper documents the recent growth history of the industry and identifies the role of incumbent and alternative service providers.

Indicators of market concentration are developed for the most important market segments of local, long distance, data and private line services, both at the national and the provincial levels. The paper finds that mobile telecommunications services are the least concentrated, followed by wireline long distance, private line and data services. The wireline local services market, opened to competition only in 1997/98, is found to be the most highly concentrated. The three largest markets - Ontario, Quebec and British Columbia - have moved the farthest away from monopoly status, while the smaller markets of P.E.I. and Newfoundland, together with Saskatchewan where the introduction of competition was delayed, are found to be the most highly concentrated.

The State of Telecommunications Services

By H. Ertl and H. McCarrell

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1. INTRODUCTION

Canada's telecommunications service providers and their network infrastructure have kept Canadians connected for over a century. From plain old telephone services to the latest mobile devices, Canada has been among the pioneers of the products and the sophisticated networks that make them operable.

Until relatively recently, the telecommunications services industry was considered to be a mature utility. Service providers were well established, each with their exclusive operating territories, and interconnected to provide high quality seamless services across the country. Chief policy objectives were to have affordable access to quality services with the widest national coverage possible. This required operating efficiencies that were realized by economies of scale, leading to a steady consolidation of telephone systems. Whereas in 1941 there were 3,200 independent telephone networks in Canada, by 1985 this had dwindled to less than 100.

Technological advances rocked what seemed to be, at least on the surface, a static telecommunications world. Connectivity was being transformed from twisted copper pair to glass filaments capable of handling millions of calls simultaneously, and wireless media using radio spectrum. Not only were telephone handsets interconnected via wired and wireless telephone circuits, but computers and other information and

communications technologies (ICTs) entered the mix through the process of convergence. These advances opened the door to a world of mobile telephony and broadband, with multi-media, Internet and text messaging applications.

If the long-established telecommunications policy objectives of affordability and accessibility were to be maintained in light of the telecommunications revolution and new consumer demands, it was evident that considerable investments would be required. Government saw its role in reformulating the telecommunications policy and regulatory framework (Industry Canada 1997).

With the introduction of technological advances and market liberalization, the Canadian telecommunications services industry has undergone remarkable growth and transformation, specifically in the adoption and use of telecommunications services by consumers and businesses. Service providers have adapted to these fast changing market conditions and opportunities by an unprecedented wave of mergers, acquisitions and corporate transactions. By all accounts, the transformation is far from complete. The structural changes stemming from the increasingly competitive environment make the tasks of measuring and assessing telecommunications services even more critical.

Using data from the *Annual and Quarterly Surveys of Telecommunications*, this paper examines how the telecommunications services industry in Canada is performing in the context of a changing regulatory environment. Section 2 provides an overview of the growth and performance of the industry, based on key financial, investment and employment indicators. Aspects of prices for telecommunications services are also addressed. Section 3 describes the conceptual framework used to examine the industry's transition from monopoly to competitive markets. Section 4 develops and analyzes concentration indicators for selected market segments. Section 5 examines issues related to the financial situation of industry segments and supplier groups. A summary of the findings and conclusions are presented in Section 6.

2. OVERVIEW OF THE INDUSTRY

2.1 Deregulation

Many countries have sought to deregulate their markets for telecommunications services, with the intention of developing a self-regulating competitive market place. Canada has taken an incremental approach to introducing competition, gradually opening up monopoly-based telecommunications markets over the last twenty years. This began with private lines in 1979, followed by the liberalization of the terminal equipment market (1980-82), the resale of long distance services (1987), privatization (international long distance carrier Teleglobe, 1987; satellite telecommunications provider Telesat, 1992), facilities-based long distance (1992) and, more recently, local telephony (1997), payphones and overseas telephony (1998), and fixed satellite services (2000).

The telecommunications services industry is comprised of network operators and resellers of telecommunications services, traditionally classified to one of the five telecommunications industries under the 1997 North American Industry Classification System (NAICS 5133) – wireline (51331), wireless (51332), resellers (51333), satellite (51334), and other (51339) (Statistics Canada 1998).

NOTE TO READERS

Data for this study come from the Annual and Quarterly Surveys of Telecommunications, covering establishments primarily engaged in the transmission of voice, data, text, image and video.

The annual survey is a census of all telecommunications services companies. It underwent a major redesign for reference year 1997, reflecting regulatory, market, technological and statistical innovations, as well as an expanded survey universe – the new survey now covers all telecommunications activity under NAICS 5133. Both national and, where feasible, provincial estimates of activity by industry are possible, for the period 1997-1999.

The quarterly survey includes the largest establishments – major wireline carriers and the wireless industry – with undercoverage estimates based on the annual survey for those units that make up the industry but are not included in the quarterly (resellers, satellite and small wireline and wireless service providers). Approximately 99% of wireline and wireless revenue activity is captured (92.5% of revenue activity for the telecommunications services industry overall). National data from the quarterly survey are available for the 1999 – 2001 period.

For the purpose of this analysis, paging and radio common carriage (part of NAICS 51332), satellite telemetry and radar station operation (part of NAICS 51339), and satellite services (part of 51334) are excluded, with the exception of Section 2 – Industry overview – which is based on all activity for NAICS 5133. Another notable exclusion is that of Internet service providers (NAICS 51419), which is not part of the NAICS telecommunications services sector. Although retail Internet activities are generally excluded, those backbone wholesale services that support the Internet, and are supplied by the telecommunications services industry, are included.

2.2 Industry performance

The rapid transformation of global communications in recent years has led to impressive growth, on most fronts, in Canada's telecommunications services industry (Table 1). Growing business and consumer demand led to an increase in the industry's operating revenues by more than 43.0% since 1997, reaching nearly \$33 billion in 2001. Operating profits peaked in 2000 and fell only marginally to \$4.7 billion in 2001 (Statistics Canada 2002c). At the same time, telecommunications services contributed over \$24 billion to GDP (constant 1997 dollars) – a 68.2% increase since 1997 – accounting for 2.6% of total economy value added (Statistics Canada 2002b). This high level of activity has also been matched by a high level of investment. Capital spending topped \$6.0 billion in 2000 and reached a record \$ 7.7 billion in 2001 (Statistics Canada 2002c).

On the other hand, employment in the industry has been decreasing and stood at just over 92 thousand in 2001 – down by nearly 8% since 1997. As with many other sectors of the economy, there has been a trend towards increased part-time employment. Between 1997 and 2001, part-time employees increased by 13.5%, while the level of full-time employment dropped by 10.0%. The contraction in employment, in conjunction with increased output, translates into increased productivity in the sector which is an important contributor to higher incomes and a higher standard of living. Consistent with this notion is that employment expenses have been relatively unchanged over the last few years, despite the drop in employment¹.

1 -- In order to understand the apparent increases in productivity and standard of living in an economy-wide context, further research is required to take into account the impact of outsourcing of services traditionally provided by telecommunications carriers (e.g. installation and repair services), as well as to consider to what extent the sustained level of labour costs is attributable to one-time pay-outs (e.g. early retirement) that facilitate restructuring in the industry and, as a result, do not contribute to ongoing higher incomes.

Table 1.
Telecommunications services industry, performance indicators, 1997-2001

	1997	1998	1999	2000	2001
Service revenues	<i>millions of dollars</i>				
Local	7,386.1	9,094.2	9,583.5	10,630.9	10,978.2
Long distance	7,514.5	7,545.6	6,781.1	5,888.2	5,124.3
Data and private line	2,784.1	2,785.1	3,073.3	2,852.6	3,545.4
Financial performance					
Total operating revenues	22,837.3	28,491.5	29,012.7	31,059.5	32,822.5
Total operating expenses	18,658.2	24,664.5	25,084.6	26,095.3	28,135.4
Operating profit	4,179.1	3,827.0	3,928.1	4,964.2	4,687.1
Gross domestic product (GDP \$1997)	14,739.0	15,395.0	18,592.0	22,015.0	24,785.0
Labour costs	5,119.3	5,508.8	5,995.8	5,628.0	5,733.9
Capital expenditures	5,769.8	6,448.1	5,982.3	6,002.2	7,677.4
	<i>thousands</i>				
Total number of employees	99.9	95.4	93.2	92.9	92.1
Operating statistics and ratios	<i>%</i>				
Operating profit margin	18.3	13.4	13.5	16.0	14.3
Labour costs (% of op. rev.)	22.4	19.3	20.7	18.1	17.5
Capital expenditures (% of op. rev.)	25.3	22.6	20.6	19.3	23.4

Note: Data include all 5133 NAICS industries. Data for 2000 and 2001 are based on quarterly estimates, except for GDP.

Facilities-based wireline service providers accounted for three-quarters (\$24.5 billion) of total industry operating revenues in 2001, and 79.6% of total industry employment. Local services accounted for the largest share of this total at 28.5% (\$7.0 billion), followed by long distance services at 19.1% (\$4.7 billion) (Statistics Canada 2002c). By most measures, mobile telephony providers are the second largest suppliers of telecommunications services in Canada. Mobile telephony companies account for 20.2% (\$6.6 billion) of total industry revenues and 16.8% of total industry employees. Between 1995 and 2001, their operating revenues more than doubled, while the number of cellular subscribers has grown exponentially from 2.6 million to 10.9 million. The most significant technological change for the wireless sector has been the integration of digital capabilities. Digital technology increases the capacity of the networks and allows the delivery of a number of new services, such as electronic mail and data transmissions through the handset (FCC 1998). Resellers, satellite and other services accounted for 5.1% (\$1.7 billion) of total industry operating revenues in 2001, and about 3.5% of industry employment (Statistics Canada 2002c).

2.3 Price trends

Between 1990 and 2001, Statistics Canada's Consumer Price Index (CPI) for telephone services increased by 17.4%, compared with 24.7% for the all-items price index. The telephone services index includes prices for basic local service, installation and repair, telephone equipment and long distance toll². The impact of CRTC-approved local rate hikes can be seen in 1996, 1997, and 1998 (Chart 1). These price increases, referred to as rate rebalancing, were put in place so that local prices would better reflect the apparent costs of providing residential local service, in order to facilitate the entry of new companies into the local market, in anticipation of local competition. The index fell substantially in 1999, as prices for long distance services dropped, presumably due to the increasing competitive environment of the long distance market (Statistics Canada 2002a).

2 -- The CPI measures price changes for a fixed basket of goods over time, based on the expenditures of families and households living in urban and rural households. The CPI for telephone services does not include prices for telecommunications services used by businesses.

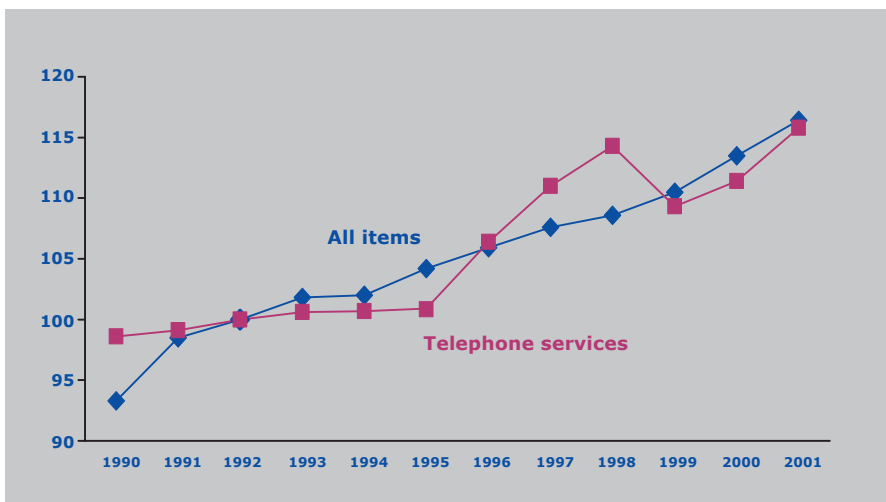


Chart 1.
CPI, all-items and telephone services, 1990-2001 (1992=100)

3. CONCEPTUAL FRAMEWORK

3.1 Product groups

While telecommunications service providers offer a wide range of products to Canadian businesses, households and government, this analysis is limited to the telecommunications industry's most important products: local telephony, long distance telephony (LD), data, and private line (or dedicated) services³. These products are in-turn delivered over fixed and wireless networks. To the extent that there are strong substitution effects between wireline and wireless services, the product would define a single market, as is the case for data and private line services (see Box 1 for a discussion on substitution). There are, however, several historical, technological and

regulatory reasons why market segmentation between fixed and mobile telephone services is appropriate⁴. Thus, the provision of local or LD services by wireline and wireless technologies will be considered here as different products, leading to the existence of different markets. Not surprisingly, the market structure for LD mobile services parallels that of local mobile services, largely because they are not provided - at least not yet - as stand alone services, but offered in conjunction with, or incidental to, local services. For this reason, this paper will consider local mobile services as a relevant proxy for mobile telephony in general.

3 -- In 1997, these services accounted for 75.0% of the revenues of incumbent suppliers and 96.0% of the revenues of alternative service providers.

4 -- Wireline and wireless telecommunications operate on different technological platforms; this has affected the development of the regulatory framework and consequent market structure. The history of these services also has contributed to their distinctiveness. Thus, fixed and mobile telephony are sufficiently different to delineate markets.

Box 1: Wireline and wireless: complements or substitutes?

The likelihood of a substitution effect is dependent on a variety of factors, such as the prices of wireline and wireless services, and the importance to users of distinctive features of each technology – mobility, clarity in transmission, security, convenience (e.g. not having to charge one's handset frequently, need for additional terminal equipment such as set-top boxes, dishes, etc.). The greater the extent of substitution or potential substitution, the more valid is the assumption that local or LD services can be considered to constitute a single product for a specified geographic area regardless of the technology employed.

Historically, with respect to telephones, wireless services were looked upon as a complement to wireline services rather than a substitute. In keeping with this notion, increases in fixed access were observed even as the number of wireless subscriptions increased rapidly. If there is to be substitution, the first signs could be expected to show up in niche markets, such as that for pay phones. In the face of steadily growing wireless subscriptions, the number of pay phones is in decline. Pay phones peaked at 182,345 in 1999 and have since fallen each quarter on a year-over-year basis, standing at 169,626 in the fourth quarter of 2001.

This phenomenon may be occurring in the broader fixed access market as well. For the first time, a decline in fixed access to the public switched telephone network (PSTN) has been registered in each quarter of 2001 over that of 2000. By the fourth quarter of 2001, PSTN access was 2.7% lower than a year earlier, while mobile access increased 24.1% over the same period. However, this decline would not be solely due to wireless substitution. The decline in secondary fixed lines can also be attributed to cable and satellite Internet access, and the replacement of fax lines by Internet applications, etc.

For data and private line (dedicated) services, it is likely that customers are less concerned with the technology employed than with the cost of the service. There is therefore a greater likelihood that these markets will be subject to substitution. An example of this would be the home delivery of program or Internet services by satellite, cable, or telephone lines. This is not to say there are not mobile applications for data or dedicated access but, for most uses, either fixed or mobile applications can be used to meet client needs. It is appropriate that the provision of these services be considered as a single market, irrespective of whether the circuits are wireless or wired.

3.2 The geographical dimension

It is also important to define the market in terms of a geographic area where there are competing service providers. Ideally, the geographic areas for analysis would be as small as cities and towns. The smallest area for which the data are collected however, is the province. This does not pose a constraint for long distance services, where business and residential consumers can choose their service providers fairly easily regardless of their locale – especially since the introduction of equal access provisions in 1994. Data and private line services also fit well with this approach since most activity is concentrated in urban corridors where there is overlap among service providers. Indicators for these products would not be applicable to the whole province, but only to those areas in which these services are available.

Analyzing local services at the provincial level, though, is more complicated. Provinces like Ontario and Quebec, and to a lesser extent, British Columbia have municipally-based independent providers in addition to the major provincial incumbents. But these incumbent local carriers, by definition, do not compete with one another in the same province. In order to account for this when calculating provincial competitive indicators, incumbent local carriers operating in the same province are grouped together and treated as a single incumbent carrier, so as not to give the appearance of more competition in one province than is really the case⁵.

National markets for telecommunications services are also beginning to surface, due to the emergence of national alternative carriers and the termination of the Stentor alliance in 1998. In recognition of this development, national indicators are presented where there are national service providers, or for comparison with national indicators for the United States.

When this is done, incumbent activities in incumbent territories are summed and treated as a single entity to determine market shares. Mobile services also approximate a national market. All entrants have national licenses and, with the purchase of entrant Clearnet, incumbent Telus also operates nationally.

3.3 Product suppliers

Service providers can be classified as either incumbents or alternatives for each market in which they operate. Incumbent operators, or incumbent local exchange carriers (ILECs), are those companies that had exclusive rights to provide local services in a specified region prior to deregulation. Incumbent operators range from municipal telephone companies and co-operatives to crown corporations and privately owned regional telcos, such as Telus, Bell Canada or NBTel (part of Aliant). The wireless and wireline affiliates of ILECs are also classified as incumbents. The alternatives to the incumbents are the entrants to the industry. They include competitive local exchange carriers (CLECs), resellers, competitive pay telephone service providers, and wireless service providers not affiliated with any ILEC.

Further, intercorporate ownership has also been taken into account. During the period in which the industry was moving toward increased competition, many companies re-organized, spinning off some of their operations into new companies. These new companies have been grouped with their parent company's operations for the purpose of this paper - provided that their operating activity takes place in their parent company's operating territories.

5 -- This technique was not employed for the alternatives because, unlike the incumbents, information pertaining to their operating areas is not self-evident and not collected. Since non-incumbent local service providers are still very small, this non-adjustment would have very limited impact on the chosen indicators.

Box 2: Indicators of concentration

Concentration ratios are based on the market shares of the top 'm' number of companies. "A firm possessing a market share of over 30 percent usually possesses significant market power," while single company shares of 40-50 % "generally reveal a single-firm's dominance with even higher degrees of market power" (Shepherd, 1997b). Four- and eight-company concentration ratios are presented to indicate how market dominance is changing with the advance of deregulation.

The HHI is a standard measure used by economists to evaluate market concentration. It is the sum of the squares of the company market shares for a given product in a given province or territory. Because the market shares are squared, the impact of a company with a larger market share is emphasized in the index:

$$\text{HHI} = \sum y_i^2, \quad \text{with market share } y_i = x_i / \sum x_i, \text{ and where } x_i = \text{revenue earned for company } i$$

in a specific territory for a specified product, where there are $i = 1 \dots n$ companies. If there was only a single provider of services, $n = 1$, $y_i = 100\%$ ($= 1.0$), the HHI would be (1.0^2) . If there were 100 companies, $n = 100$, each with $y_i = 1\%$ ($= 0.01$) market share, the HHI would be

$$= \sum \{ y_1^2, y_2^2, y_3^2 \dots y_n^2 \} = \{ 0.01^2 + 0.01^2 + 0.01^2 + \dots \} = 0.01$$

Besanko relates the HHI, market structures and price competition (Besanko et al. 1999 - see table below), and observes the presence of price rivalry even where there are high HHI levels or market concentration.

<u>HHI</u>	<u>Market structure</u>	<u>Price competition</u>
HHI = 1.0	monopoly	no price competition
$0.7 < \text{HHI} < 1.0$	monopoly	light price competition
$0.4 < \text{HHI} \leq 0.7$	oligopoly	price rivalry
$0.2 < \text{HHI} \leq 0.4$	monopolistic competition	product differentiation
$\text{HHI} \leq 0.2$	perfect competition	fierce price competition

By inverting the HHI, the number of equal-sized firms can be estimated in a given market. A market with an HHI of 0.5 would be made up of two equal-sized firms, a market with an HHI of 0.2 would consist of five equal-sized firms, etc.

In 1982, the U.S. Department of Justice (DOJ) adopted the HHI to determine if mergers would result in circumstances that would create undue market power. According to the DOJ, an HHI less than 0.1 is indicative of a highly competitive market. Thus, a merger of 2 companies in such an industry would not pose a risk to the competitive functioning of the market. HHIs between 0.1 and 0.18 portray a moderately concentrated market, and HHIs above 0.18 indicate a highly concentrated market. Transactions that increase the HHI by more than 0.005 points with the HHI above 0.18 raise 'red flags', and those that increase the HHI by more than 0.01 points 'raise significant competitive concerns' according to DOJ and Federal Trade Commission 1992 Horizontal Merger Guidelines.

Assessing competition based solely on market concentration measures therefore has its drawbacks. The Rothschild Index and the Lerner Index address this limitation by incorporating price data into their measures. The former is based on the ratio of the industry's price elasticity of demand to that of the firm. As this ratio approaches 1, industry and firm demand elasticities converge, indicative of a monopoly or cartel (where the firm's demand curve approaches that of the industry's), whereas ratios approaching 0 indicate significant competition. The Lerner Index measures how price diverges from marginal costs, since under competitive conditions, price approaches the firm's marginal costs. Elixmann et al. (2001), in their European study of competition, create an index based on HHI and price variations from the OECD average. They stated that prices 10% lower than the average are indicative of a competitive framework, whereas prices 10% higher than the average are indicative of a monopolistic framework.

3.4 Indicators

A number of analytical techniques can be used to assess the extent of concentration in a specified market, such as concentration ratios and Hirfindahl-Hirschman Indexes (HHI). Concentration ratios are based on the share of sales for the top 'm' number of companies. A higher ratio indicates a more highly concentrated market, conferring a greater degree of market power to the service providers. Multiple-firm concentration ratios, though, typically do not capture the dominance of a single company - bearing in mind that firms with very large market shares can potentially reduce competition in a market. The HHI accounts for this characteristic (Box 2 provides a more detailed account of the various methodological approaches).

4. CONCENTRATION ANALYSIS

4.1 Local telephony

Local services have been the backbone of the telecommunications industry throughout the 20th century, gradually supplanting the telegraph industry, which dominated the 19th century. The growth of telephony was dependent on building out networks that connected individual households and businesses to a public network. The development of the public network required enormous investments over many decades. One of the major difficulties in introducing competition relates to the cost and time horizon to develop such a network, and the consequent dominant position of the carriers that build and operate it, vis-à-vis entrant companies.

In May of 1997, the Canadian Radio-television and Telecommunications Commission (CRTC) announced a new regulatory framework to aid in the establishment of competitive local markets (1997). Since then, a number of administrative and operational systems changes have developed.

These changes include: the introduction of local number portability (allowing users to maintain their existing telephone numbers while changing supplier); the establishment of interconnection arrangements between suppliers; rate rebalancing (increasing access rates to better reflect apparent costs) and changes to the administration of contribution (payments to support affordable local exchange services in high cost areas, historically derived from LD services, but now drawn from other telecommunications services as well); price caps regulation in place of rate of return regulation; unbundling and pricing of essential facilities (so entrants will have access to local facilities they could not otherwise provide). More recently, the CRTC has introduced new rules to determine the rates charged for local telephone services, reflecting the CRTC's assessment of the current state of local competition and projected development over the next several years (CRTC 2002). These new price regulations are designed to protect consumers while continuing to promote competition. These changes indicate the complexity of bringing about a sustainable and competitive local market⁶.

Local service revenues have increased nearly 30.0% over the three-year period 1997 to 1999, and by 49.0%, if 2001 is included. This rate of growth was in keeping with the growth of overall operating revenue, resulting in local services garnering a similar share (one-third) of total revenue for each year over the 1997-2001 period. Long distance revenues, which were on par with local revenues in 1997, have fallen to account for less than 16.0% of total revenues by 2001. The maintenance of local services as a cornerstone of telecommunications can be attributed to the growth in cellular services and to rate rebalancing. Alternatives have shown faster revenue growth than incumbents; however, the number of suppliers in 1999 fell back to 1997 levels after a small jump in 1998.

The relationship between competitive behaviour and concentration is complex, and although related, is not one and the same. On the one hand, highly concentrated industries can exhibit competitive behaviour and on the other, they can be highly collusive, involving price fixing to various degrees.

6 -- Although designed to be technology neutral, these changes are more likely to impact competition in local wireline services than local wireless services, due to the competitive framework already established for wireless telephony providers.

Fixed (wireline) local services

Given that local competition had just begun, it is clear that by 1999 local markets still reflected the monopoly market structure (HHI = 1.0) that was present at the time the CRTC announced plans to foster local competition (Table 2). Despite the intent of many wireline companies to provide local services, few have become operational, and some of the early entrants have already exited the market. The 1998-1999 increase in HHI observed in some provinces may reflect the weakness of non facilities-based local service providers (centrex resellers and extended area service (EAS) providers⁷).

EAS providers are expected to face growing pressures as incumbents seek to expand local calling areas. Even so, the success of these marginal service providers will not determine the success of local competition. The intent is to see the introduction of viable facilities-based alternatives. A year and a half after the deregulation of local wireline services, the local wireline markets remained highly concentrated; the top four carriers accounted for 87.0% of all activity in 1999, a slight drop from the 88.1% reported in 1997; the top eight firms accounted for 97.1% of all activity, a small decline from their share of 98.3% in 1997 (Table 6).

7 -- EAS providers exist in large metropolitan areas where long distance charges apply to calls made between the farthest locales within the region. The EAS provider expands a local calling area to adjacent LD territories by enabling their customers to terminate their otherwise long distance calls through a switch common to both territories, for a fee. This LD call therefore is transformed into a local call, effectively erasing the LD boundary.

8 -- In 1998, where there is a single provincial incumbent, a corresponding market HHI of less than 1 can be attributed to the presence of centrex resellers and extended area service (EAS) providers.

Table 2.
HHI for local wireline services, by province⁸

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NF	YK	NW	NU
1997	0.995	0.998	1.000	1.000	0.981	0.979	1.000	0.999	1.000	1.000	1.000	1.000	...
1998	0.991	0.980	0.997	0.995	0.992	0.996	0.997	0.997	0.998	0.996	1.000	1.000	...
1999	0.992	0.992	1.000	0.981	0.975	0.937	0.979	0.979	1.000	1.000	1.000	1.000	1.000
	1997/99												
% chg	-0.3	-0.6	0.0	-1.9	-0.6	-4.3	-2.1	-2.0	0.0	0.0	0.0	0.0	...

Mobile (wireless) local services

Mobile cellular services were introduced in Canada in 1985. The incumbent wireline carriers were licensed to provide cellular services in their territories and Rogers Cantel Inc. was awarded a national license, effectively creating a duopoly in local markets. In 1996 a third company, Microcell, was licensed to provide services, and then in October of 1997, Clearnet PCS became a fourth service provider. With potentially four service providers in a local market, the prospect for competition in local mobile services has increased well beyond that of wireline services, as indicated by the HHI levels in Table 3.

HHIs for local mobile services are lower than for wireline and they are falling. Whereas the wireline market structure for local services can still be considered a monopoly, the HHIs for wireless local services are consistent with oligopolistic markets, characterized by price rivalry. The decline in concentration has been greater in the Ontario and Quebec markets, reaching what economists describe as a monopolistically competitive state, where competitive behaviour is characterized by increasing product differentiation rather than price rivalry. Lower market concentration is visible, to a lesser extent, in British Columbia as

Table 3.
HHI for local mobile services, by provinces and Canada

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NF	YK	NW	NU
1997	0.528	0.639	0.771	0.571	0.633	0.675	0.653	0.665	0.854	0.781	1.000	1.000	...
1998	0.495	0.625	0.808	0.591	0.402	0.467	0.698	0.648	0.918	0.849	1.000	1.000	...
1999	0.433	0.581	0.794	0.579	0.359	0.356	0.694	0.647	0.925	0.861	1.000	1.000	1.000
	1997/99												
% chg	-18.0	-9.0	3.0	1.3	-43.3	-47.3	6.2	-2.7	8.3	10.2	0.0	0.0	...

well. In the other provinces, particularly Atlantic Canada and the North, there has been either no appreciable change in the HHIs between 1997 and 1999 or an increase in HHIs.

From a national perspective, market concentration for local mobile services has been steadily falling. Three of the four mobile service providers have a national reach, so the market for wireless services is the nearest of any telecommunications service to a national market (Table 4). The increase in the HHI indicator in 2001 (0.07 points) can be attributed to the Telus purchase of Clearnet, completed in October of 2000⁹.

The above indicators notwithstanding, the long-term viability of service providers is an important consideration in developing local markets. For the wireless industry (NAICS 51332), there have been negative operating profits for two of the four quarters for each of 2000 and 2001, and on an annual basis, operating profits were meagre. 2001 saw a return to profitability, but still not at the level earned in 1999, with roughly the same HHI. On a more positive note, earnings before interest, taxes, depreciation and amortization (EBITDA) have been growing and took a substantial leap in 2001.

Table 4.
HHI for local mobile services, Canada

1997	0.520
1998	0.478
1999	0.423
2000	0.342
2001	0.412
% chg (97/01)	-20.8

Table 5.
Profitability of wireless service providers (NAICS 51332)¹⁰

	EBITDA	OP. PROFIT	OP. PROFIT/REV
	\$000	\$000	%
1999	1,070,668	61,151	1.46
2000	1,168,933	-58,518	-1.05
2001	1,469,871	68,766	1.03

This paper does not consider pricing by region, but if it is found that there is little regional variability, then regions with fewer competitors would be benefiting from the prices established in the regions where there are more competitors - Quebec, Ontario and British Columbia - and applied to their areas.

9 -- Under U.S. Department of Justice (DOJ) guidelines, mergers that increase HHIs by more than 0.01 points where the HHI is above 0.180 points 'raise significant competitive concerns' according to US Federal Trade Commission 1992 Horizontal Merger Guidelines.

10 -- The large difference between EBITDA and operating profits reflects the large expenditures incurred by the wireless industry for network development. The small returns earned may negatively impact on this industry's ability to raise capital needed to extend or upgrade its network infrastructure.

Local mobile service providers showed a somewhat greater reduction in concentration than local wireline companies. The top four companies accounted for 88.3% of all local mobile revenues in 1997, which dropped to 76.6% by 1999. The top eight local wireless providers accounted for 95.1% of the market in 1999, down from their 1997 share of 97.5%. In the case of the wireless market the change in concentration ratios reflects more the growth in mobile services in underserved regions than a change in underlying dominance of the different service providers.

Table 6.
Concentration ratios for the provision of local services

	Wireless		Wireline	
	4m	8m	4m	8m
	%			
1997	88.3	97.5	88.1	98.5
1998	82.9	95.2	87.1	98.2
1999	76.6	95.1	87.0	97.1

4.2 Long distance telephony

The resale of wireline long distance voice services began in 1987 and, in 1992, facilities-based competition was permitted. In 1994, equal access gave the incumbents' competitors a boost, enabling their customers to make long distance calls without having to dial special access numbers. In 1998, the pay phone market was opened to competition and the CRTC deregulated incumbent long distance rates. This led service providers to launch initiatives such as flat rate and unlimited domestic long distance calling plans, which quickly lowered prices for LD services. Currently, there are no regulatory barriers to entering the long distance market. According to survey results, however, the number of alternatives has fallen from 160 to 92 and LD HHIs have increased over the reference period.

The shakeout in the market is undoubtedly related to the major contraction in the LD market; revenues have gone from \$7.5 billion in 1997 to \$5.1 billion in 2001 – a decrease of more than 30.0% (Table 1). At the same time, incumbent carriers have increased their market share, from 68.8% in 1997 to 74.1% in 1999 (Table 17). Alternative service providers accounted for 25.9% of the market in 1999.

Overall, the top four wireline service providers accounted for 68.3% of total wireline long distance revenues in 1997 (Table 7). By 1999, this had increased to 78.9%. According to Shepherd (1997a), these ratios indicate that the long distance market is a 'tight oligopoly', consisting of a small number of independent firms. Market shares for the top eight companies also increased over this period. This is in contrast to the falling, albeit more concentrated, ratios found in the local market. Higher concentration ratios reflect weaker and/or fewer alternative suppliers and increased market power for those that remain.

Table 7.
Concentration ratios for the provision of fixed (wireline) LD services

	4m	8m
	%	
1997	68.3	86.1
1998	79.6	96.0
1999	78.9	98.7

Table 8.
HHI for LD wireline services, by province, Canada and U.S.

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NF	YK	NW	NU	CA	U.S.
1997	0.489	0.763	0.801	0.576	0.601	0.659	0.750	0.672	0.792	0.594	1.000	1.000	...	0.494	...
1998	0.591	0.626	0.736	0.554	0.550	0.441	0.743	0.629	0.713	0.609	1.000	1.000	...	0.587	0.283
1999	0.765	0.827	0.922	0.717	0.600	0.427	0.770	0.706	0.832	0.896	1.000	1.000	1.000	0.645	0.258
	1997/99														
% chg	56.5	8.4	15.2	24.5	-0.1	-35.2	2.7	5.0	5.0	50.8	0.0	0.0	...	30.6	...

Provincial wireline long distance markets were highly concentrated in 1999, with Quebec and Ontario showing the lowest HHIs (Table 8). Even at that, Quebec's LD market has the equivalent of only 2.3 equal-sized competitors and Ontario's market has the equivalent of only 1.7 equal-sized companies, hardly the zenith of competition. Ontario's wireline long distance market is characterized by price rivalry, according to Besanko (oligopoly) while Quebec's approaches a market where there is product differentiation (monopolistic competition). Only in Quebec has the HHI fallen over the reference years – all other provinces experienced fairly significant increases in their HHIs.

Canadian long distance markets were opened to competition more than two decades after interstate competition began in the United States (Crandall and Hazlett 2000). In 1984, AT&T, the dominant U.S. telephone company was divided, leading to the creation of the seven regional Bell operating companies. This divestiture offered equal access to long distance carriers and intensified competition. With the U.S. Telecommunications Act of 1996, all markets were opened to competition. Long distance rates have fallen substantially in both countries.

A national wireline long distance market does not fully exist in Canada, since incumbent providers offer services only in their traditional operating territories. By treating geographically distinct incumbent activity as a single entity, the resulting HHI indicates an oligopoly structure in the national market. The Canadian HHIs for the national wireline long distance market are 0.587 and 0.645 for 1998 and 1999, respectively, significantly higher than the indices calculated for the U.S. national market. In addition, the Canadian market HHIs have increased over the reference period, while the U.S. market HHIs have become marginally lower¹¹. It should be noted, however, that U.S. national HHIs are lower than those for any of the U.S. states, suggesting that U.S. national measures may not have been adjusted to reflect the distortions that arise when LD operators are treated as national providers, when in fact they are not.

Estimates of U.S. state indices¹² are shown in Table 9 for residential toll only, based on market share data from the U.S. Federal Communications Commission (FCC). Most of the HHIs for U.S. states fall between 0.300 and 0.400, indicating product differentiation (monopolistic competition) and markets consisting of between 2.5 and 5 equal-sized firms. Canada's provincial indices generally lag those of the U.S.

11 -- Considering the difference in size between Canada and U.S., both at the national and the provincial/state levels, these comparisons should be seen as approximate.

12 -- HHI estimates have been calculated by the authors, based on market share data calculated by the FCC, from various sources. These indices may be between 3% and 5% higher than the actual HHIs, since the market shares for the smallest companies were estimated based on the residual value of their total market share and the size of the smallest respondent for which data existed in each state.

Table 9.
HHI for U.S. residential LD, by selected states

	CALIF	FLA	TEX	OH	WASH	NY	MICH	MASS
1999	0.344	0.412	0.321	0.388	0.335	0.397	0.378	0.463

However, research by Crandall and Hazlett (2000) suggests that despite the somewhat slower liberalisation of long distance services, Canada's market is now at least as competitive as that of the U.S. For example, looking at Tables 8 and 9, the HHI for the long distance market in Quebec (0.427 in 1999) is similar to that of Florida (0.412) and lower than the HHI for Massachusetts (0.463). In order for Quebec to move to an HHI approximating that of Texas (0.321) would require the introduction of one additional company of similar size to its top two providers.

4.3 Data services and private line telecommunications

Now that so much of telecommunications traffic is digitized, nearly all telecommunications can be considered to be data – the movement of bits and bytes of information over telecommunications networks. That is, however, a very broad notion of data. Data services in this paper consist of packet-switched communications, such as frame relay, IP (Internet protocol) and high speed circuit-switched transmissions.¹³ Private lines, or non (public)-switched services, are dedicated circuits (wired or wireless) – for the exclusive use of the client – that are not switched over the public network. This would include everything from low-speed data links for automated teller machines, private voice and data links linking multiple locations of a business, dedicated links for high-resolution video, program

transmission and backbone wholesale Internet services for Internet Service Providers (ISPs).

The provision of data services and the leasing of private lines were the first telecommunications services in recent times to be freed from tariff regulation, dating back to 1979. This paper only considers the state of competition for these services in the very recent past. Provincial HHIs are presented individually for data and private line services for 1998 and 1999, and from 1997 on a combined basis for the HHIs and operating data. The two categories have been combined because of definitional changes between 1997 and subsequent years¹⁴.

Data services

British Columbia and Alberta showed the least market concentration in 1998, followed by Quebec, Saskatchewan, and Ontario (Table 10). British Columbia and particularly Alberta, Saskatchewan, and Nova Scotia, however, registered increased market concentration in 1999. Manitoba also showed increased market concentration in what was already a highly concentrated market. Perhaps somewhat paradoxically, British Columbia and Nova Scotia were the only provinces with an increase in the number of service providers between 1998 and 1999, even as their HHIs rose. Nationally, there has been a small drop in the number of companies providing data services.

13 -- High speed refers to speeds greater than 64 kbps – the rate used for voice-grade communication.

14 -- Starting in 1998, data activity was captured in categories based on types of switching and bandwidth criteria, while in 1997 there was an explicit category termed "data". The 1998 change helped to better isolate data services from private line activities, which were incorrectly reported as "data" in 1997.

Table 10.
HHI for data services, by selected provinces

	BC	AB	SK	MB	ON	QC	NS	YK	NW	NU
1998	0.299	0.397	0.533	0.787	0.622	0.510	0.754	1.000	1.000	..
1999	0.321	0.501	0.982	0.811	0.590	0.498	0.928	1.000	1.000	1.000
	1998/99									
% chg	7.4	26.3	84.3	3.0	-5.1	-2.4	23.1	0.0	0.0	..

Table 11.
HHI for private line services, by selected provinces

	BC	SK	MB	ON	QC	NS	YK	NU
1998	0.713	0.910	0.804	0.594	0.538	0.416	1.000	..
1999	0.684	0.979	0.810	0.568	0.591	0.585	1.000	1.000
	1998/99							
% chg	-4.1	7.7	0.8	-4.3	9.8	40.6	0.0	..

Private line services

In general, provincial markets for private line services display a similar or higher level of concentration to that of data services (Table 11). Although freed from regulation for a considerable period, this market is still highly concentrated, reflecting the significant infrastructure required to provide these services.

One aspect of private services not reflected by the HHI is the growth of private networks for own use that has emerged in the past five years. Community organizations, small business consortia and even school districts have built their own private networks, bypassing the marketplace served by telecommunications companies.

Data and private line services

An additional year of information does indicate that over the reference period the level of market concentration for these products has fallen – with the exception of Saskatchewan, which saw an initial improvement and subsequent deterioration to end the period with a higher HHI (Table 12). Nova Scotia, British Columbia and Manitoba all experienced increased concentration from 1998 to 1999, although they were better off in 1999 than in 1997.

Competition in the provision of these services is important as they are anticipated to be a major area of growth for telecommunications services in the future. Data and private line services grew at a compounded rate of more than 6.0% from 1997 to 2001, and by 24.0% from 2000 to 2001. In 2001, the value of these services totalled \$ 3.5 billion (Table 1).

Table 12.
HHI for data and private line services, by selected provinces

	BC	SK	MB	ON	QC	NS	YK	NU
1997	0.538	0.822	0.741	0.642	0.740	0.749	1.000	..
1998	0.476	0.750	0.556	0.593	0.509	0.319	1.000	..
1999	0.490	0.980	0.650	0.567	0.502	0.486	1.000	1.000
	1997/99							
% chg	-8.9	19.2	-12.3	-11.7	-32.2	-35.1	0.0	..

For the 1997 -1999 period in which incumbent/alternative market shares are available, incumbents accounted for a majority of the market. However, alternative carriers have been gaining ground – in 1999 they represented 24.7% of the data and private line market, up from 18.1% in 1997 (Table 17). The top four and eight companies in this market account for 85.3% and 96.2% of revenues, respectively. These shares have increased over the reference period, an indication of the market dominance of the largest companies in delivering these services, despite the growth of alternatives (Table 13).

Table 13.
Concentration ratios for the provision of data and private line services

	4m	8m
	%	
1997	82.0	90.1
1998	78.7	91.2
1999	85.3	96.2

4.4 Aggregate analysis

Markets by product

Considering the diversity of products and markets, assessing the status of competition is a complex task. Indicators in the form of HHIs have been presented to give a sense of market power among the various products and markets. For comparison purposes, a relative assessment among the various telecommunications services can be made by ordinal ranking (1st, 2nd, 3rd, etc.) the HHIs for each province, and then summing and averaging the cardinal values of the ordinals¹⁵. The lower average ordinal value, the less market power is deemed to be present. The results of this methodology are presented in Table 14.

Table 14.
Index of market power, telecommunications services in Canada, 1999

Rank	Telecommunications Service	Provincial Ordinal Avg.
1	Local Mobile	1.5
2	LD Wireline	2.4
3	Private Line	2.7
4	Data	2.9
5	Local Wireline	4.3

Markets were found to be less concentrated in mobile services, followed by long distance wireline, private line and data services, and lastly, local wireline services. This is what might be expected given the deregulation time frames for the various products, as well as their specific characteristics. Mobile services, for example, lend themselves best to a geographic overlap of networks, therefore setting the stage for genuine competition. In addition, a competitive market structure was adopted when mobile services were first introduced – with the creation of regional duopolies.

The relatively similar ordinal ranking of the non-local wireline services (voice, data and private) is interesting. Because data and dedicated services have been unregulated for a considerably longer period than long distance voice services, one might expect a more developed competitive market structure for the former. Voice services, on the other hand, have been provided to a large extent by non facilities-based resellers, an area characterized by ease of market entry. Do these characteristics imply a saw-off and co-incidental HHI results? The data suggest that the

15 -- For example, if local mobile services had the lowest HHI in every province, its ordinal ranking would be 1 for each province and the average of these would be 1. The territories have been omitted, since each reported HHIs of 1 for all products.

number of resellers were in rapid decline over the period – there were 54.0% fewer in 1999 than in 1997, whereas the number of facilities-based carriers of LD services declined only 7.0%. With the decline in resellers, the competitive profile of the markets for these services seems to be converging – the same companies are increasingly responsible for providing a growing share of all three of these services¹⁶. The local wireline market is ranked the least competitive.

Markets by province

A generalized market structure index by province for 1999 is achieved by taking an average of the HHIs for each of the services by province (Chart 2). Overall, Quebec comes out on top, followed closely by Ontario and British Columbia. These are also Canada’s three largest telecommunications markets, and their sheer size is undoubtedly a key factor explaining the extent of competition found in those markets. Smaller markets may simply not be able to generate the level of activity that would justify market entry given the significant capital investments required.

Not only did Quebec and Ontario report the lowest HHIs in the country, but the average HHI for the telecommunications services listed in Table 14 declined over the reference period (1998-1999)¹⁷ for these provinces – indicative of falling market concentrations and increased competitiveness. HHIs for four of the five telecommunications services declined in Quebec, yielding an average drop of 5.1% in Quebec, and an average drop of 2.5% in Ontario (Chart 3). Despite British Columbia’s lower concentration compared with most of the other provinces, only two of the five services marketed there showed lower HHIs and they increased by an average of 4.1% from 1998 to 1999.

In the middle range, with HHIs between 0.700 and just over 0.800, are Alberta, Nova Scotia, Manitoba and New Brunswick, Canada’s fourth, seventh, fifth and eighth largest telecommunications markets respectively.

New Brunswick recorded the lowest average increase in HHI for the telecommunications services reported for that province, at only 0.4%. Between 1998 and 1999, two of its three telecommunications services showed a lower HHI, whereas two of five services in Nova Scotia and Manitoba, and one of four services in Alberta showed lower HHIs. Manitoba had the next smallest increase in average HHI of the middle group (6.0%), followed by Alberta (13.2%) and Nova Scotia (14.8%).

16 -- This seems plausible, given that these services are largely dependent on the same network infrastructure, with the exception of packet switched (data) services.

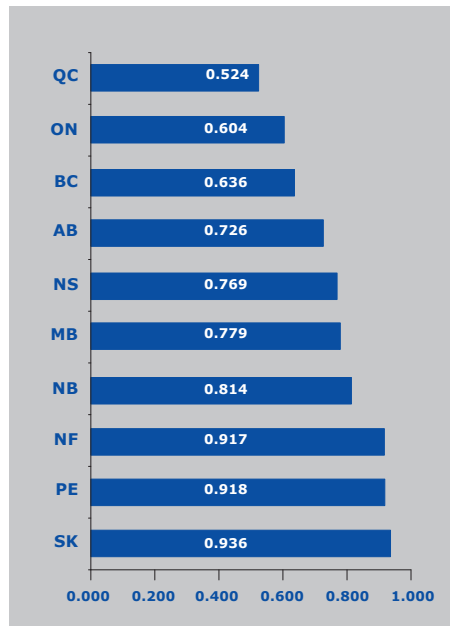
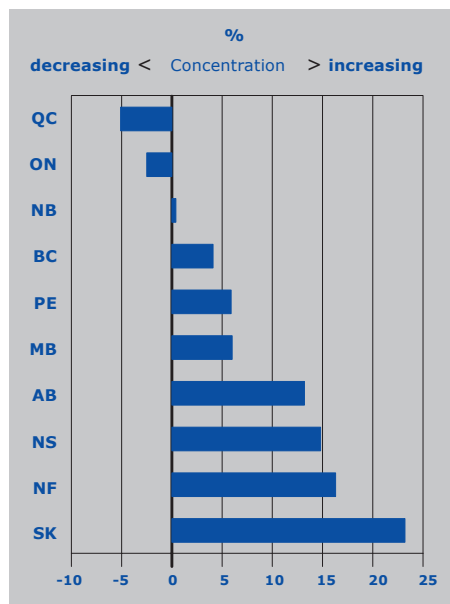


Chart 2.
Average HHI for telecommunications services, by province, 1999



17 -- The reference period is 1998-1999, since results for data and private line services as separate products are only available for these years.

Chart 3.
Average change in HHI, by province, 1998-1999

The provinces displaying the highest HHIs are Newfoundland, P.E.I., and Saskatchewan. In Newfoundland, each of the three products for which HHIs were calculated showed markets with increased concentration, as did four of the five in Saskatchewan. P.E.I.'s average HHI only increased by 5.9%, however, meaning that it fared better than five other provinces. Newfoundland and Saskatchewan posted the greatest increases in concentration between 1998 and 1999, with their average HHIs rising by 16.3% and 23.2%, respectively. P.E.I. and Newfoundland are the two smallest markets in Canada, and this has probably contributed to their higher levels of concentration.

As for Saskatchewan, despite constituting the sixth largest market (considerably larger than P.E.I. or Newfoundland), its competitive profile has lagged all other jurisdictions. This may be attributed to the delayed introduction of competition in that province compared to other jurisdictions. Saskatchewan was granted a five-year exemption¹⁸ from CRTC regulation at the time the new pro-competitive Telecommunications Act was enacted in 1993. Facilities-based long distance competition introduced in other provinces in 1992 did not come into force in Saskatchewan until November 1996. Likewise, local and pay phone competition was delayed until the year after regulatory approval for deregulating these services in other parts of the country.

18 -- This exemption was related to SaskTel's status as a crown corporation and was extended until June 30, 2000.

Table 15.
Number of product markets registering falling HHIs, by province, 1998-1999

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NF
Product markets with lower HHI	2	1	1	2	4	4	2	2	0	0
Product markets	5	4	5	5	5	5	3	5	3	3

5. MARKET PERFORMANCE

The viability of competitors in specific market segments is critically dependent on the long-term sustainability of individual companies, which in turn depends on the whole suite of services they provide. It is therefore crucial to consider company operations in the aggregate as well¹⁹. Table 17 displays industry totals and incumbent/alternative supplier groups for the telecommunications providers for the 1997-1999 reference period.

5.1 Operating statistics

Operating revenues

In 1999, operating revenues for the relevant telecommunications service providers included in the analysis

amounted to \$28.8 billion – \$23.1 billion by incumbent carriers (80.1% of the total) and \$5.7 billion by alternatives (facilities-based carriers and resellers). To date, alternatives have grown to account for 19.9% of telecommunications revenues. This share has increased over the previous two years, from 17.2% in 1997 and 18.1% in 1998. Facilities-based carriers now earn most of the revenues in the alternative group, whereas in the early years the bulk of alternative activity was reselling.

Based on operating revenues, the HHI indices for all provinces and territories are trending downwards over the reference period (Table 16). Ontario and Quebec have the least overall market concentration, with British Columbia and Alberta closely following

19 -- Other services include wholesale, calling features, connection, sale of goods, retail Internet, terminal equipment rental, installations, customer repair and maintenance, directory advertising and database services.

Table 16.
HHI for operating revenues, by province

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NF	YK	NW	NU
1997	0.606	0.740	0.899	0.767	0.544	0.545	0.867	0.767	0.968	0.758	0.988	1.000	..
1998	0.481	0.357	0.625	0.566	0.436	0.301	0.671	0.523	0.674	0.639	0.905	0.771	..
1999	0.472	0.483	0.656	0.570	0.434	0.461	0.602	0.556	0.710	0.546	0.860	0.716	0.959
	1997/99												
% chg	-22.1	-34.7	-27.0	-25.7	-20.2	-15.4	-30.6	-27.5	-26.7	-28.0	-13.0	-28.4	..

their leads. The largest changes in HHI can be seen in Alberta and New Brunswick, as the indices are reduced by 35.0% and 31.0%, respectively. The reversal in Alberta's HHI from 1998 to 1999 reflects the market consolidation in that province when Telus bought out EdTel. Likewise, Quebec's mid-term change reflects Bell Canada assuming control of Teleglobe. Prior to this change, Quebec reported significantly lower HHIs than any other province. After the consolidation, while still having the lowest HHI in the country, it was not significantly different than Ontario, British Columbia or Alberta. Judging by any criterion, however, Canadian markets for telecommunications services are still considered to be highly concentrated. The telecommunications industry would be considered to be an oligopoly, based on Besanko's criteria, with monopoly characteristics in P.E.I. and the territories.

Assets and capital expenditures

Between 1997 and 1999, total assets increased by 14.3%. Over the same period, the alternatives' share of total assets went from 16.4% to 25.7%. With revenues less than 20% of the industry total, their asset share now stands at nearly 30% above their corresponding revenue share. The growth in assets is directly related to the growth in capital spending. This is particularly important for alternatives' who are making large investments to build their networks. Even though the incumbents account for 70.0% of

sector capital spending, this translates to only 18.1% of their operating revenues, whereas the alternatives' 30.0% of total sector spending represents 31.2% of their revenues. Although the high spending by incumbents reflects their commitment to keep abreast of technological changes, the alternatives clearly have a challenge in even establishing a presence in incumbent operating territories.

Operating profit

The capital investment and subsequent asset position of the alternatives has not been rewarded with profits. Between 1997 and 1999, operating income increased by 8.4% to \$4.9 billion for the incumbents, but pushed further into the red for the alternatives. Losses for the alternative service providers were more than three times those reported in 1997, increasing from \$336.2 million in that year to over \$1 billion in 1999.

Employment

Reporting companies employed over 92 thousand persons in 1999. Alternative carriers have a lower proportion of employee expenses to revenues than incumbents do. This may reflect operating realities of alternatives who have smaller networks to operate and therefore need fewer employees. Facilities-based alternatives tend to target business customers over residential customers, which would yield higher revenues and therefore higher returns

per employee, whereas non facilities-based alternatives tend to target residential customers. Overall, neither incumbents nor alternatives are definitively more productive than the other, based on the reference period²⁰.

Salary levels are higher for the incumbents than the alternatives despite similar revenues per

employee. This may reflect the levels of profitability of the two groups and the seniority of the employees. Nevertheless, full-time equivalent (FTE)²¹ remuneration (labour costs) increased for each group from 1998 to 1999, by 15.5% for the incumbents and by 4.1% for the alternatives.

20 -- For a more precise examination of productivity, comparisons should be based on value added rather than revenue.

21 -- Full-time and part-time employees are summed and converted to full-time equivalents. This is calculated by dividing total part-time labour costs by the average full-time salary.

Table 17.

Telecommunications market shares and performance, by supplier group

Supplier categories	Incumbents			Alternatives			Total		
	1997	1998	1999	1997	1998	1999	1997	1998	1999
Service revenues* (\$millions)									
Local	6,498.9	8,033.9	8,148.8	887.2	1,060.3	1,434.6	7,386.1	9,094.2	9,583.4
<i>number of parent units reporting</i>	55	56	54	62	73	64	117	129	118
Long distance	5,164.5	5,278.0	4,966.6	2,346.6	2,248.8	1,732.4	7,511.1	7,526.8	6,699.0
<i>number of parent units reporting</i>	34	29	30	160	126	92	194	155	122
Data and private line	2,281.4	2,163.3	2,199.9	502.8	621.8	723.5	2,784.2	2,785.1	2,923.4
<i>number of parent units reporting</i>	38	35	33	65	51	39	103	86	72
Financial performance** (\$millions)									
Total operating revenues	18,831.0	23,174.0	23,073.4	3,899	5,110	5,725	22,729.7	28,283.7	28,798.2
Total operating expenses	14,316.5	18,481.9	18,125.3	4,235	5,970	6,752	18,551.3	24,451.8	24,877.4
Operating profit (loss)	4,514.5	4,692.1	4,894.4	-336	-860	-1,027	4,178.3	3,831.9	3,867.1
Assets	37,021.4	36,042.6	37,626.3	7,265	10,671	12,997	44,286.1	46,713.6	50,622.8
Equity	13,914.0	14,035.5	14,187.6	-106	-240	-248	13,808.2	13,795.4	13,939.3
Labour costs	4,464.7	4,699.5	5,010.0	623.6	754.2	939.1	5,088.3	5,453.7	5,949.1
Capital expenditures	3,961.2	4,530.8	4,167.5	1,793.3	1,872.7	1,783.7	5,754.5	6,403.5	5,951.2
Total number of employees (thousands)	83.7	78.8	72.9	15.4	15.6	19.2	99.1	94.3	92.2
Employees (FTE) (thousands)	..	74.6	68.9	..	15.0	17.9	..	89.6	86.8
Operating statistics and ratios (%)									
Operating profit margin	24.0	20.2	21.2	-8.6	-16.8	-17.9	18.4	13.5	13.4
Labour costs (% of op. rev.)	23.7	20.3	21.7	16.0	14.8	16.4	22.4	19.3	20.7
Capital expenditures (% of op. rev.)	21.0	19.6	18.1	46.0	36.6	31.2	25.3	22.6	20.7
Revenues per FTE employee	..	310,444	334,835	..	341,496	319,872	..	315,629	331,750
Labour costs per FTE employee	..	62,956	72,704	..	50,405	52,472	..	60,860	68,532

*service revenues are from final end users only (retail) and do not include wholesale

**data include only NAICS 51331, 513321, 513331, part of 51334, part of 51339 industries

.. not available for specific reference period

1997 does not include 'program transmission' which is part of private line services

5.2 The role of alternatives

Alternatives to the incumbent service providers have made an important contribution to the development of the telecommunications marketplace. They have grown at twice the rate of incumbents since 1997 and now account for 19.9% of total operating activity, up from 17.2% (Table 17). This progress has been eventful and contingent upon a high degree of flexibility and resiliency in a highly dynamic market. Whereas 60.0% of their revenues were earned from LD services in 1997, this had fallen to 30.0% just three years later.

This rapid transformation of the LD market, fostered by falling prices, in conjunction with the regulatory changes being put in place to ready local markets for competition, such as rate rebalancing, has posed a severe challenge for the alternatives. The contraction in the LD market, by 10.8% from 1997 to 1999, disproportionately affected the alternatives. They took a \$614 million hit to their main revenue source, compared to incumbents, whose LD revenues dropped by only \$198 million. Many alternatives exited during this period or were consolidated into other entities. While there were four fewer incumbent LD service providers, there were 68 fewer alternatives - over 40.0% of alternative suppliers. This has probably accelerated in the subsequent period to 2001, with LD revenues down an additional 24.4% from 1999 to 2001.

Through this period, alternatives have sustained a significant level of capital investments in each of the three years (\$1.8 billion), accounting for about 30.0% of the telecommunications industry total, and more than 50.0% above their corresponding share of revenues. This has led to a 78.9% increase in assets for the alternatives. Incumbent investment has not led to an appreciable change in their total assets, however, probably due to the restructuring (write-offs, etc.) they have undertaken in preparation for competition, such as the movement from rate of return regulation (where profits were limited to a percentage of the value of the firm's asset base) to price cap regulation.

The telecommunications industry has traditionally been the source of plentiful well paid jobs. Alternatives have contributed to this, increasing their workforce by 25.3% over the reference period, accounting for over 19 thousand employees in 1999. While incumbents are slowly shedding their workforce to increase productivity, the increasing number of persons employed by alternatives brought their share of total employment slightly above their share of total industry revenues by 1999. Revenues per employee are roughly comparable to incumbents over the period.

The alternatives' level of activity has not yet been rewarded by profitability, however. There have been increasing operating losses in each of the three years, in absolute terms as well as a percentage of operating revenue. Losses have tripled to over a billion dollars and stood at nearly 18% of operating revenues in 1999. The negative operating income position has led to the alternatives' negative equity position. This has serious consequences for the sustainability of these companies in the future, in terms of meeting their operating costs and funding the expansion and upgrading their networks and facilities. Their incumbent competitors, in stark contrast, showed improving operating profit over the 1997-1999 period: \$4.5 billion, \$4.7 billion and \$4.9 billion respectively.

This brings to light the ongoing debate of Canada's foreign ownership restrictions in this sector. Questions remain as to what degree the relaxation of restrictions would alter the competitive nature of the industry.

5.3 Convergence

Convergence will also play an important role in the development of competition in telecommunications. As the telephone companies are increasingly concerned with better quality, pricing and a variety of services, cable, Internet and satellite companies are focusing on alternative delivery systems. Gradually, the overlapping area expands, as telecommunications carriers enter

into the broadcasting distribution market and cable companies begin to offer telecommunications services.

This integration of networks redefines markets and changes the way in which companies compete, extending beyond wireless and wireline telephony (Chan-Olmsted and Jamison 2001). The convergence of traditional telecommunications broadcasting distribution media is most apparent in the area of high speed Internet access.

6. CONCLUSIONS

Regulatory reform leading to the introduction of competition in telecommunications services dates back approximately 20 years for private and data services, 15 years for mobile services, 10 years for long distance voice services, and was just introduced for local PSTN access in 1997-1998. This paper has considered the market structure for these major telecommunications services, in provincial markets from 1997 to 1999, and on a national basis for mobile services, from 1997 to 2001.

Overall, mobile services emerged with the least concentrated markets, followed by wireline long distance, private line and data services. The most concentrated market was found to be wireline local services. The different regulatory time frames for each product, along with their distinguishing characteristics, contribute to their various market structures. The three largest telecommunications markets – Quebec, Ontario and British Columbia – have moved the farthest away from monopolies, while the markets in P.E.I, Newfoundland and Saskatchewan emerged as the least changed.

Despite many challenges, the alternative service providers have made significant contributions to the development of the telecommunications market – they account for a growing share of industry operating activity, capital investment, and employment. However, their growing operating losses and negative equity position continue to threaten their sustainability in the marketplace.

Clearly, more work needs to be done in this area, in an effort to measure the impacts and outcomes of the regulatory decisions that have helped shape the state of telecommunications services in Canada. Competition in the industry depends on many complex and interrelated factors, including the regulatory framework, the viability of alternatives, innovative technology, consolidation of the sector, and convergence. However, we must not forget the consumer, without whom there would be no reason to compete at all. The telephone has come a long way since Alexander Graham Bell made the first long distance call from Brantford to Paris, Ontario in 1876. In the past 125 years, Canada has developed a telephone system recognized to be among the best in the world. The decisions and choices made now will shape the kind and quality of services we can expect in the future.

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