



Technology Policy and Distributional Consequences: The case of Mobile Phones in Canada.

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Introduction

As with most other information and communication technologies, the mobile phone has come to be perceived as a necessary accessory of modern life. In fact wireless communication technologies such as mobile phones have diffused faster globally than previous communications technologies (Castells et al., 2007). Along with this rapid diffusion are associated impacts on society. The question that we are concerned with in this paper is what are the distributional consequences of the production and diffusion of mobile phones in a developed country such as Canada. There are three reasons for the focus on this particular technology. First, it is pervasive enough to be relevant to a wide variety of sectors in society. Second, the technology is mature enough to look at policy interventions over time while still evolving so as to allow us to consider effects in the future. Third, the focus on mobile phones will allow further comparisons and analysis with countries with similar socio-economic characteristics.

While the immediate benefit of this paper will be relevant to the Canadian context, it is hoped that this paper could also shed some light on how technology policy choices can influence the distributional consequences of key technologies in other national contexts. Distributional consequences are particularly relevant when there is concern about existing inequalities both vertical (eg. income based) and horizontal (eg. group based). While this remains a concern in almost all OECD countries, this is especially true for developing countries such as those in Latin America which historically have experienced inequality in various forms.

The outline of this paper is as follows. After discussing the framework and methods used, we outline the historical development of the mobile phone sector in Canada. Next we examine the current industry, regulatory and policy context. This then leads to our

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analysis of distributional consequences. We look at the general effects on employment, adoption, and business competition. Finally we turn to the more specific differential effects on consumers and groups across various dimensions. Our analysis concludes with a general postulation of how telecommunication policies have contributed to these differential effects.

Methodology

The paper is based on a broader research framework that examines the distributional consequences of emerging technologies (see Cozzens et al., 2006). This framework posits a causal relationship between three sets of key variables. Of interest here are the distributional consequences on aspects of social and personal well being (the dependent variable) such as income, health, political power, social capital, cultural expression, etc. This relationship is mediated by a variety of national conditions and public interventions such as policies (the two main independent variables). The focus of this paper is to better understand how policies function as an intervening variable within this framework.

The main methodological approach of this paper is qualitative. Semi-structured interviews were conducted with persons familiar with both technologies in Canada. These can be divided into three main groups: academic, industry (major mobile phone providers and R&D groups), government (regulators, policy-makers) and NGO's and other civic groups. The major concepts explored with each group included the history of the technology within the country, the existing policy environment including potential changes and debates, intellectual capital issues, associated employment, and socio-economic benefits and costs. Interviewees were identified through a combination of snow-balling techniques and desk-research.

Historical development and diffusion of mobile phones in Canada

Canada has one of the largest land masses in the world and a relatively small population of approximately 38 million. Given these characteristics and a rural population, telecommunications has always been significant not just for governance and practical purposes but also in maintaining national identity (CRTC, 2005). Thus from the late the 19th century successive governments have sought to ensure the availability of communications throughout the country although their approaches have changed over time. These public interventions have been similar to that of the United States. By the start of the 20th century, a relatively unstructured telecommunications sector was shaped into a monopoly through the Railway Act. This was based on the natural monopoly rationale similar to that used by AT&T in the United States during the same period. That is, a monopoly could best realize the national goal of universal service given the large capital and infrastructural investments required. This then became the rationale for government policy during that time and was used in other industries as well.

The inattention of the incumbent Bell Canada to certain regional markets (most often on the basis of low returns) led to the entry of several smaller provincial and local operators. Thus the result was a market structured around several regional monopolies with Bell being the largest. This monopoly market structure remained relatively in place until the 1993 Telecommunications Act, although changes began to be made by the government in

the period immediately leading up to the Act. One success of the monopoly period was the achievement of a high level of fixed-line penetration in the country. By 2004 approximately 96% of Canadian households had a fixed-line telephone subscription, one of the highest in the world (Industry Canada, 2006, CRTC, 2005).

However, starting in the 1970's there was a slow shift towards the removal of regional monopolies. This was influenced in part by the demand for a more competitive environment given the higher costs for long-distance calls and telecoms equipment, policy changes in the United States and by the developments in technology that undermined the rationale for natural monopolies. One example of this was the mobile phone. While the first actual use of the technology occurred a few years earlier in the US (following key developments by Bell Labs and Motorola), commercial mobile phone networks began to take shape in Canada in the mid to late 1970's. Alberta Government Telephones (AGT; now Telus) started developing a cellular network to meet the demand from oil exploration companies. Similarly by 1977 Challenge Communications had developed a small subscriber base for mobile car phones in Toronto using push to talk technology. It was at this point that Bell Canada decided to enforce its monopoly status on Challenge Communications in this market by refusing interconnection to its network and requiring that its own proprietary equipment be used. The issue was brought before the regulator, the Canadian Radio-television and Telecommunications Commission (CRTC) who concluded that Bell had to allow Challenge Communications to interconnect to its network. This was the start of several actions by the CRTC to break-up the Bell monopoly (Van Hasselt, 2007).

The first set of mobile phone licenses were awarded for regional duopolies in late 1983 with the networks becoming operational in 1985. Competitive national licenses for personal communications services (PCS) were awarded in 1995 including 2 to new operators. Since then there has been substantial restructuring in the industry and increased adoption as mobile technology became more affordable. The diffusion of mobile phones in Canada has gradually increased although not as fast as in many other countries. In 1994 the mobile phone penetration rate (total subscribers per 100 inhabitants) was 6.41 and in 2007 the proportion was 57.57. In fact the CAGR³ between 2002 and 2007 was only 12.1%. This compares to a global CAGR for the same period of 23.2% (ITU, 2007). As in other countries, all major operators have developed 3G high-speed data networks and offer associated services on each.

Current Industry Environment

By the end of 2007, the total number of mobile phone subscribers was approximately 19.9 million (CWTA, 2008). These were mostly served by the three main competitors: Telus Mobility (owned by Telus Corporation), Bell Mobility (owned by Bell Communication Enterprises⁴) and Rogers Wireless (owned by Rogers Communications). There are also a few regional service providers including MTS Allstream (based in Manitoba) and SaskTel (based in Saskatchewan). In addition, several mobile virtual

³ Compound Annual Growth Rate - CAGR

⁴ Several other service providers fall under this group including Aliant Telecom, Telebec Mobile, and Northern Mobility.

network operators (MVNOs) exist using the facilities of the three main and regional operators. These include Virgin Mobile Canada, Videotron, Primus and 7-Eleven. The market share in terms of total subscribers for each of the main three operators in 2006 was Rogers (37%), Bell (30%) and Telus (27%). Together the remaining operators accounted for 6% of all subscribers. Similarly the three main operators account for 90% of industry revenue (CRTC, 2007).

These revenues were approximately 12.7 billion (CAD) in 2006 (CRTC, 2007). This represents an increase over previous years with an annual growth rate of 15.6 % in 2006. Another indicator of the profitability of the sector is the EBITDA⁵ margin⁶. For the mobile phone sector this was a relatively high at 44.1% in 2006, an increase of 4.3% over the previous year. Interestingly, the EBITDA margin for the fixed-line sector as a whole declined by 0.2% to 36.6% in 2006 (CRTC, 2007). Mobile revenues account for 36% of total telecommunications revenues in Canada although this is one of lowest proportions in the OECD (CRTC, 2007).

Apart from service provision, production is a significant though small element of the mobile telephony market in Canada. Thus, while the majority of equipment consumed in the mobile phone market (ie handsets) are imported from the major manufacturers in Finland, the US or South Korea, one notable exception is Research in Motion (RIM) based in Waterloo, Ontario. RIM's flagship product is the Blackberry handset which features mobile voice as well as data communications. Launched in 1997, there were some 8 million Blackberry subscribers across 110 countries by the end of the fiscal year 2007 (RIM, 2007). The majority of these subscriptions are facilitated through companies for their employees. Also, of these countries, Canada has one of the highest penetration rates for Blackberries. The demand for these devices is spurred in part by the improvements in worker productivity as suggested by a recent study (see Ipsos, 2007),

Other companies do exist that engage in production of mobile telephony devices/components, the majority of these are smaller and focus on the software aspects of production rather than manufacturing (Industry Canada, 2007b). Increasingly manufacturing of various components are outsourced to cheaper labor markets. A recent survey among some of these producers noted that the availability of high technology skills (eg. software engineers) is decreasing in Canada and can put future constraints on the sector (Industry Canada, 2007b).

A key part of the production process in the highly competitive mobile telecommunications market is research and development (R&D). This is evinced in the operations of RIM for example which significantly increased the number of its product offerings in 2007 and spent the equivalent of 7.8% of its operative revenue on R&D (RIM, 2007). Nokia, a major mobile phone manufacturer established R&D operations in Canada most of which takes place at its Vancouver location. The Nokia Vancouver operation started in 1997 was set up because of the availability of high skilled labor, the

⁵ Earnings before Interest, Tax, Depreciation and Amortization (EBITDA) – it thus allows for international comparisons given country variations in accounting, taxation and interest rates.

⁶ EBITDA as a proportion of total revenues.

local wireless technology industry and links to North American entertainment and media industries. It is also the only mobile phone R&D facility in Canada (Lowe, 2003). Apart from the larger examples of RIM and Nokia, the majority smaller firms face constraints in carrying out R&D because of a lack of venture capital funding in Canada. Thus such firms often approach US VC funds for support (Industry Canada, 2007b).

In terms of contributing to employment in the industry, RIM's annual report noted that at the end of the fiscal year 2007 it employed some 6,250 persons (RIM, 2007). In addition, Nokia's Vancouver facility employs approximately 400 persons (Lowe, 2003). The largest set of employers is of course mobile phone operators themselves. In 2005, they employed 16,086 persons (Statistics Canada, 2007b). The average remuneration among employees of the mobile phone operators was 70,835 (CAD) in 2005, while the revenue per employee was 701,663 (CAD) (Statistics Canada, 2007b).

The Evolving Telecommunications Policy environment

Telecommunications policy is established by Industry Canada, as the relevant government department although its scope also covers some aspects of regulation. This includes the award of licenses for spectrum use. The activities of the mobile phone operators fall under the regulatory purview of the CRTC which was established in 1968. The CRTC is guided by the Telecommunications Act (1993), and the Broadcasting Act (1991). It reports to Parliament via the Minister of Canadian Heritage because of its role in broadcasting. The main goal of the CRTC is to develop an open and competitive market through regulation that emphasizes economic efficiency and is non-discriminatory. Its performance in this regard has been seen as effective and independent (OECD, 2002). In practice, the CRTC has a process for determining whether a market is sufficiently competitive to warrant forbearance. Thus since 1994 the CRTC has forborne from regulation of most of the mobile service providers.

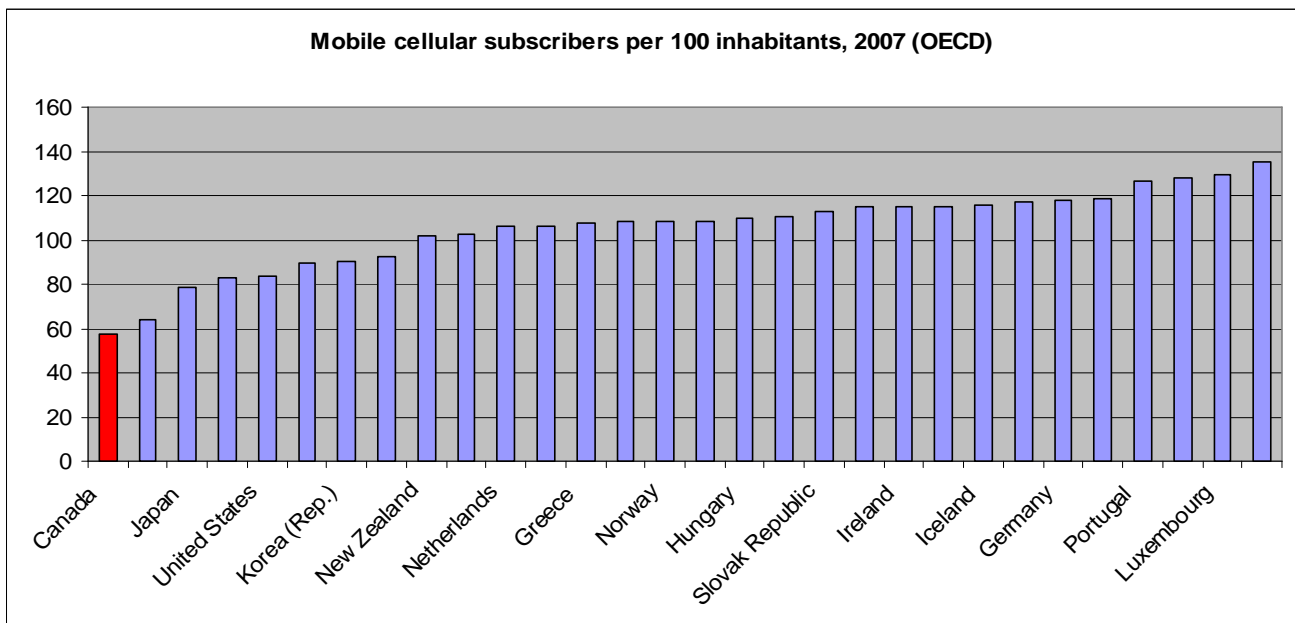
These decisions are in keeping with the general trend of government to rely more on market forces to govern economic activity as per the Competition Act (1986). The Act is based on the premise that competition is essential for an effective market economy. During the late 90's, the Director of Investigation and Research was an important agent in implementing it, working through what is now called the Competition Bureau. Together with the CRTC, the Director has helped shape and interpret policy that stressed competition in the telecommunications sector above other goals (Rideout, 2003). Another key element of the policy structure governing the sector is the Spectrum Policy Framework which was updated in 2007. It states that the objective of the government's policy is to maximize the socio-economic benefits of the spectrum resource for all Canadians. Furthermore, management of the spectrum should rely on market forces as much as possible (Industry Canada 2007 – Spectrum Policy Framework).

The main legislative document governing the mobile phone sector is of course the Telecommunications Act (1993) (Government of Canada, 1993). Section 7 of the Act states that the objectives of the Canadian Telecoms Policy include providing affordable and high quality telecoms services to Canadians, enhance the efficiency and

competitiveness of the sector, promote Canadian ownership of carriers and to promote an increased reliance on market forces for the provision of services.

Given that the various elements of the mobile phone policy environment emphasize the promotion of market forces and competition, a 2006 government commissioned report examined the extent of this competition as part of a broader review of telecommunications policy. The Telecommunications Policy Review Panel suggested that having only three main operators could mean there was less competition in the mobile phone sector in Canada (versus the US) and this had resulted in higher prices, lower usage, and less innovation (Industry Canada, 2006).

When compared to other OECD countries, Canada does not fare well in several dimensions. For example, in terms of mobile phone penetration, Canada had the lowest rate in the OECD in 2007:



Source - (ITU, 2007)

It has also been argued that other symptoms of low competitiveness include the limited scope of 3G services and availability in only a few large cities (CRTC, 2006), higher usage costs compared to the United States (60% more for the average user) and Europe (19% more) (Industry Canada, 2006), and the high cost of data transfers⁷. However, we should note that at least for low volume users, the average price basket (used by the OECD) for Canada is below the median when ranked with other OECD countries (OECD, 2007). Perhaps a more telling indicator is the rate of introduction of new products and services. In this regard Canada also lags behind other OECD countries, one common example being that the iPhone is not currently offered by any of the Canadian operators.

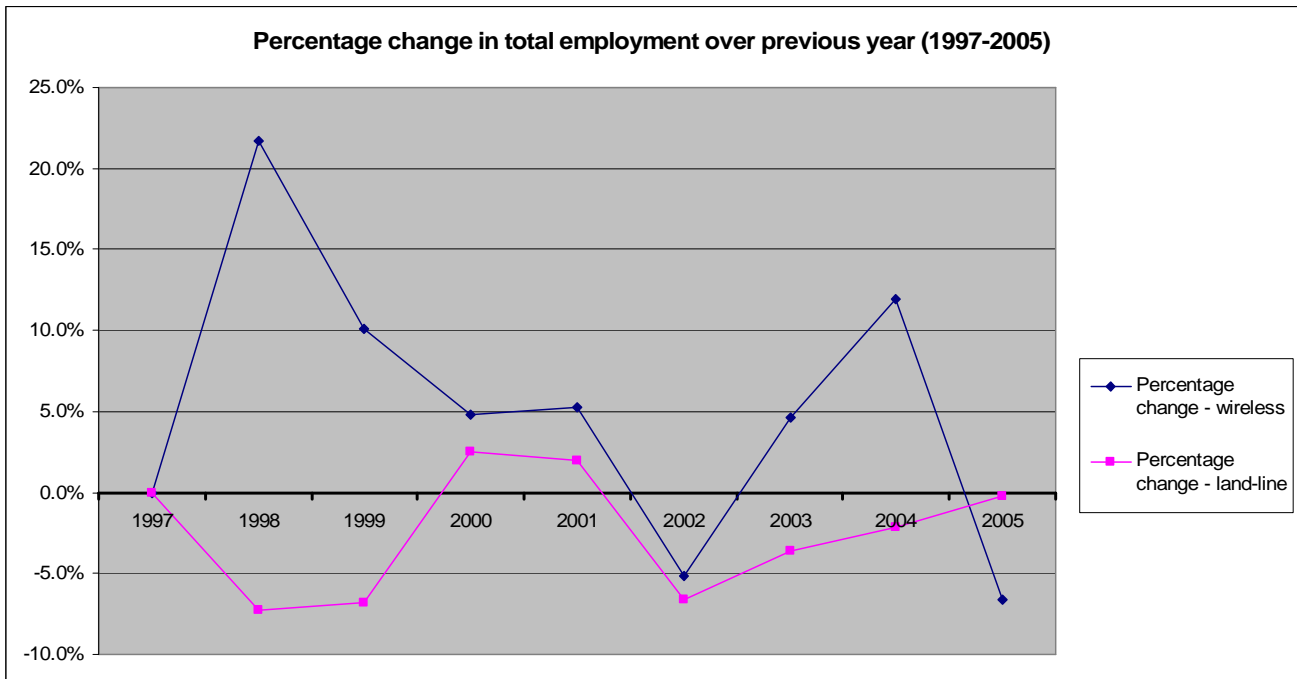
⁷ <http://www.thomaspurves.com/2007/04/09/canada-worse-than-3rd-world-countries-when-it-comes-to-mobile-data-access/> (Retrieved April 30, 2008)

However, the mobile phone companies and industry associations argue that the level of competition is commensurate with the size of the country and market. Also other factors that have been posited include the historical and geographical differences that make Canada unique and higher levels of penetration more difficult. For example, given the large land mass the government had mandated the provision of fixed line services throughout the country. Thus the country is far better served by fixed prior to the introduction of mobile phones than most other countries in the world. This then has led to lower uptake of mobile phones. Also in a few comparative cases, mobile subscribers have multiple SIM cards (typically from different networks) unlike in Canada. Thus, there can be a higher than 100% penetration in some markets (in Italy its 135.14). Another factor is that foreign ownership is limited in this market because of Canadian fears of being swamped by its much larger southern neighbor (OECD, 2002). This limitation on foreign ownership is in fact a stated objective of the Telecoms Act (Section 7(d)).

Also, Castells et al., (2007) suggest that policy focus can also be a significant factor. For example a market driven focus among Western European countries and an emphasis on adoption in China had led to higher adoption rates. The irony of Canada is that although as noted above telecoms policies emphasize the use of market forces, promote competition and limit government regulation, real competition has not been realized. Instead what exists is similar to an oligopoly (Barratt and Shade, 2007). Although the government might not describe the industry in such terms, Industry Canada will soon make available additional spectrum (in the 2Ghz range) for use for advanced services through an upcoming auction in May 2008. More importantly, the fact that this auction is a means by which new players can enter the market, implies that the government believes competition can be improved (Industry Canada, 2007a).

Distributional Consequences

In terms of the sector as a whole, Rideout (2003) argues that the competition-based policies of the government have in fact reduced employment in the sector.



Source – Broadcasting and Telecommunications. *Service Bulletin* (Statistics Canada, 2007b)

In the figure above we compare the percentage change in employment between the traditional land-line and mobile phone industries. Although it is difficult to identify any causal relationships in employment rates from this data, we note that increases in employment in the mobile phone industry usually occurred with decreases in the fixed line industry. Furthermore, over the entire period, employment in the mobile phone industry increased by 53.20% while it decreased by 20.52% in the fixed line sector. This is part of the general shift from wired to wireless that is occurring globally and even though the shift has occurred slowly in Canada, the consequences for employment appear substantial. Of note also is that significant drops in employment in the mobile phone sector in 2002 and 2005. In both cases, a large part of the decrease came in terms of part-time workers.

While the structure of the mobile industry has no doubt had impacts on related sectors such as fixed line phones, there have been consequences on the consumer. From this point of the view, it is the lack of competition that is most relevant. The issues of high prices, lack of alternative options or advanced services have already been mentioned. All of which have had a direct influence of adoption. Approximately only 64% of households have access to a mobile phone with limited use of advanced services (Decima Research, 2006). This is in fact evident when one notices the availability of payphones even in major urban areas such as Toronto and Ottawa. In other developed countries they are far less visible. In many developing countries with penetration rates closer to 100%, payphones are almost non-existent except in mandated locations. In addition, a 2004 survey (using a convenience data sample) showed that customer satisfaction in the Canadian mobile phone was lower than in other Canadian communication markets (eg. cable, fixed-line, etc.) (Turel and Serenko, 2006).

The lack of competition also has broader impacts on businesses with at least one commentator noting the competitive disadvantage Canadian companies face because of higher costs when compared to foreign (US) competitors (CBC, 2007). Interestingly enough, the current arguments around the lack of competition and its implication for competitiveness, particularly with the US, are synonymous to those used against removing telecoms monopolies in the 1970's (CRTC, 2005).

The regulatory environment has implications for the average Canadian consumer as well. One concern is the preservation of net neutrality or the non-discrimination of use in terms of content, equipment, etc. If the separation of carrier and content is not preserved then the consequences for low-income Canadians could be such they are made worse off when faced with the so-called "two-tiered" Internet (Barratt and Shade, 2007). This is most relevant to the mobile internet and even though such services are not as popular as in other countries, their use is increasing (CRTC, 2007).

More specifically we can look at consequences related to issues of access. As noted above, whether measured generally among individuals or households, penetration levels are low. To go further, access to mobile phones is influenced by age, education and income. For example, in 2006 the age-group 20-49 had the greatest rate of ownership while the highest increase in ownership between 2001 and 2006 was among teenagers (CRTC, 2006). Similarly, in 2006 individuals from the age-group 18-34 were almost twice as more likely to report having access to a mobile phone than those 55 years and above (Decima Research, 2006). Younger users are also more likely to use and subscribe to additional features on their mobile phones such as text, downloading music, web ,etc.

An income disparity is also evident. High income persons (60K CAD and above) were more than twice as likely to report having access to a mobile phone than those earning less than 30K CAD (Decima Research, 2006). This result is in keeping with global trends where countries with lower penetration rates will exhibit a significant income differential in diffusion. But as penetration approaches saturation then income differences go away (Castells et al., 2007). Thus income differences are a function of the stage of technological diffusion with newer technologies will more likely be used by richer groups. Given the relative maturity of the mobile phones markets even in Canada, the continued existence of the income gap is a cause for concern.

Other factors that are associated with differentiated levels of access include education (Decima Research, 2006) and gender (CRTC, 2006). Of all mobile phones users in 2005, males represented 52% while women were 48%. However, in terms of other mobile devices such as Blackberries or PDA's users were two to three times more likely to be a man. Similarly, men were two to three times more likely to use multi-media features on these devices (CRTC, 2006).

There is also a geographical dimension. At the household level in 2006, Alberta had the highest penetration (79%) with most other provinces in the 60% level. However, Quebec had the lowest (51%) penetration rate (Decima Research, 2006). This variance could be partly explained by the dominance of one operator over others in a given community. For

example, in many of the Atlantic provinces, Bell dominates in terms of market share while in the Alberta and BC, Telus and Rogers have more of the market. In the North (Northwest Territories, Yukon and Nunavut) Bell has 100% of the market (CRTC, 2007).

The situation in the North points to another concern, that is the emphasis on urban over rural areas. This is obviously the result of a larger urban population but nevertheless leaves fewer options for the minority of people who live in the rural and remote areas which make up most of Canada's landmass. However, there has always been an effort on the part of government to ensure land-line communications in these areas particularly through subsidies. For the market driven mobile sector the large rural areas pose a unique problem because of infrastructure costs, low returns and also operators have limited number of vendors who are able to access remote areas. Thus while such areas are the least likely to be serviced by the market because of such difficulties they also stand to benefit enormously from access to mobile phones.

We can also identify certain impacts based on the level poverty across groups. Canada does not have a poverty line typically used in other countries. Approximately 10.8% of Canadians lived in a family whose income fell below the government defined low-income level in 2005⁸. Four main groups have been identified as being more likely to be poor: the disabled, Aboriginal groups, immigrants and visible minorities (OECD, 2006, Canadian Council on Social Development, 2007).

For rural Aboriginal groups, one immediate benefit is the promotion of safety and security. For example, people in rural Aboriginal communities are most often concerned with the range of any communication system. This is important for groups traveling to and from uninhabited areas. Another benefit is that mobile phones along with other ICTs in general can promote the continued use of local languages something that is of concern to Aboriginal community leaders. Thus for example, the greater diffusion of mobile phones in these communities can facilitate communication between community members and families of the same language group particularly those separated by long distances. At the same time, others fear that a greater diffusion of these technologies can threaten local languages and practices.

In order to realize these and other benefits in large rural areas, the government faces the challenge of balancing the goals of market liberalization and universal access. A solution is the use of local community based networks that facilitate the development of ICTs (Ramírez, 2001). One example of this is K-Net or Kuhkenah Network⁹ which is part of the Keewaytinook Okimakanak (KO). The KO is an organization directed by First Nation community leaders from communities in Northern Ontario that supports socio-economic development throughout its member communities. In this regard K-Net provides support for a variety of ICT initiatives in these rural communities. One recent project is designed to provide improved mobile phone services to this area. Most communities are only served by one or two telecoms providers. In some of the more far flung communities there is no access to mobile service as most service is centered on the larger urban areas

⁸ <http://www40.statcan.ca/101/cst01/famil19a.htm> (Retrieved 4/2/08)

⁹ <http://knet.ca>

of Sioux Lookout, Thunderbay, etc. K-Net was able to lease spectrum (which was effectively donated by Rogers Communications) for use in a mobile phone network to serve these communities. In addition, they acquired funding from the Northern Ontario Heritage fund to help build the infrastructure. Also, given concerns about the range of service mentioned earlier they plan to erect taller towers to increase the service radius to around 30km instead of the original 10km. It should be noted that the business model here is non-profit. This follows K-Net's general approach to provide infrastructure and allow local communities develop their own business solutions. While K-Net has received much attention nationally and internationally for these and other initiatives and even provides support to other groups, there are few other First Nation groups that have similar experiences.

Another group which also benefits from mobile phones is immigrants. This is not necessarily unique to Canada as mobile phones enable communications with relative and friends in other countries. In a study on Canadian immigrants, Chinese and Sudanese groups (among others) were found to be heavy users of mobile phones. (Castells et al., 2007).

One economic consequence of the mobile phones is that as it becomes more and more important in the daily lives of Canadian, we can observe an increase in spending on this technology. Thus from 1997 to 2004, household expenditure on mobile phones increased by 253%, while in 2004, 0.5% of total household expenditure was allocated for mobile phones and pagers (Statistics Canada, 2007a). Unfortunately, we do not yet have data on how households in different income brackets or groups accrue these expenses. However, writing in 2003, Rideout (2003), noted that low-income groups paid on average 81% more for their local telephone (fixed-line) service than they did in 1992. She argues this is the result of the overall trend in telecoms policy that defines consumers in terms of economic criteria (level of consumption). This leads to a ranking of importance of consumers in these terms. At the top we will have large business customers in the mobile phone market, high-income individuals, etc. These customers are better able to take advantage of bulk rates, long-distance discount rates, new technologies and upgrades and more cost-effective packages, leaving low-income person at a disadvantage.

On a social level one of the consequences of note is that of privacy. While this is often not immediately relevant for contract based (post-paid) customers, it can be an issue for pre-paid customers. In 2006, the pre-paid market accounted for approximately 7.4% of total revenue or around 21% of all subscribers (CRTC, 2007). It is this 21% who typically don't have to register their personal details with an operator in order to get a mobile phone. Also, pre-paid users are often low-income, low-credit, young/teenagers, immigrant and/or minorities (Gow, 2006). Thus in this way, pre-paid users are able enjoy a greater level of privacy than post-paid users. It is debatable, however, whether this privacy is also beneficial to the wider society as a whole, as public safety groups in Canada have argued for greater information collection in the pre-paid market (Gow, 2006).

Finally, we can look at some of the political consequences of mobile phones in Canada. One typical example identified in several countries is the potential political voice that mobile phones can give especially to ordinary people. Thus mobile phones can be used as an effective tool for political communication outside elite networks. Castells et al.,(2007) use the examples of the dramatic elections results in Spain and Italy (2004) to illustrate mass political mobilization using mobile phones. In Canada however, there is little evidence of such activity, which could be the result of lower penetration rates. This implies that certain consequences really rely on the network effect of mobile phones and will be limited as long as penetration remains low. At the same time the policy debates around the (lack of competition in) telecoms industry have led to the mobilization of various public interest groups and coalitions. While some have colluded and others have worked independently, they all strive to represent public interests in CRTC hearings and other public consultations (Rideout, 2003).

Conclusions

One of the implications of the Canadian policy towards mobile phones is that while its approach was to limit regulation (regulatory forbearance) in order to develop competitive markets this did not necessarily occur. Policy intervention in this case was predicated on an assessment of the degree of competitiveness in the market. Thus an important factor in how policies can influence distributional consequences is the way in which competitiveness for the technology's market is perceived. The upcoming auction could improve the sector if new players are able to offer improved products and other services in addition to increased access, although the incumbents argue otherwise.

The lack of competition has affected Canadians in general. For example, even though almost all Canadians have access to land-line services, mobile phone penetration is still relatively low. Thus although some might argue that these and other persons still have access to some form of communication, access to mobile services is perhaps more important particularly where these services include data and other increasingly important advanced applications. In addition, the lack of effective competition can negatively impact the competitiveness of domestic businesses relative to foreign competitors.

As it is, access is influenced by age, income and education. Gender is also relevant particularly with the use of more advanced devices and services. The urban and rural divide is of concern particularly where remote communities can benefit from access to mobile phones. While it is encouraging to see local community groups taking up the challenge to provide such services, this is the exception rather than the norm. Although they are in the minority, many other rural communities have limited options when it comes to mobile phones.

Finally, policies can influence the distributional consequences of technologies beyond its diffusion and use. In the case examined here, some commentators have argued that innovation on the consumption side (among carriers) has been limited because of a lack of effective competition. Innovation on the production side (among mobile phone manufacturers) has however been significant. Prominent examples include Research in Motion (RIM) and Nokia's R&D site in Vancouver. Fostering innovation on both fronts

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is not just about competition but is often the result of an ideal combination of several policies and not just the existing telecommunications policy. Policy coherence is therefore an important factor. This is particularly true given technological convergence.

References:

- BARRATT, N. & SHADE, L. (2007) Net Neutrality: Telecom Policy and the Public Interest. *Canadian Journal of Communication*, 32, 295-305.
- CANADIAN COUNCIL ON SOCIAL DEVELOPMENT (2007) Populations Vulnerable to Poverty: Urban Poverty in Canada, 2000. *Urban Poverty Project 2007*. Ottawa, Canadian Council on Social Development.
- CASTELLS, M., FERNÁNDEZ ARDÈVOL, M., QIU, J. & SEY, A. (2007) *Mobile Communication and Society - A Global Perspective*, Cambridge, The MIT Press.
- CBC (2007) The real cost of high prices. Toronto, Canadian Broadcasting Corporation.
- COZZENS, S., GATCHAIR, S., HARARI, E. & THAKUR, D. (2006) Distributional Assessment of Emerging Technologies: A framework for analysis. *Globelics 2006*. Kerala, India.
- CRTC (2005) Canadian Telecommunications Policy Review - Discussion Paper. Ottawa, Canadian Radio-Television and Telecommunications Commission.
- CRTC (2006) The Future Environment Facing the Canadian Broadcasting System. Ottawa, Canadian Radio-Television and Telecommunications Commission.
- CRTC (2007) Telecommunications Monitoring Report - Status of Competition in Canadian Telecommunications Markets. Ottawa, Canadian Radio-Television and Telecommunications Commission.
- CWTA (2008) Wireless phone subscribers in Canada. Ottawa, Canadian Wireless Telecommunications Association.
- DECIMA RESEARCH (2006) Usage of Wireless Communications in Canada. Toronto, Canadian Wireless Telecommunications Association.
- GOVERNMENT OF CANADA (1993) Telecommunications Act 1993. Ottawa, Government of Canada.
- GOW, G. (2006) Privacy Rights and Prepaid Communication Services. Vancouver, Centre For Policy Research On Science And Technology, Simon Fraser University.
- INDUSTRY CANADA (2006) Telecommunications Policy Review Panel - Final Report. Ottawa, Industry Canada.
- INDUSTRY CANADA (2007a) Consultation on a Framework to Auction Spectrum in the 2 GHz Range including Advanced Wireless Services. Ottawa, Industry Canada.
- INDUSTRY CANADA (2007b) Telecommunications Equipment Value Chain Study - Final Report. Ottawa, Industry Canada.
- IPSOS (2007) Analyzing the Return On Investment of a BlackBerry Deployment, 2007. Waterloo, Research in Motion.
- ITU (2007) World Telecommunication/ICT Indicators Database. Geneva, International Telecommunications Union.
- LOWE, B. (2003) Nokia Mobile Phones: a Vision for Vancouver. *B.C.'s Wireless Industry - Are Entrepreneurs Ready to Ride the Next Wave?* Vancouver, British Columbia, Vancouver Enterprise Forum.
- OECD (2002) Regulatory Reform In Canada - From Transition To New Regulation Challenges. *OECD Reviews for Regulatory Reform*. Paris, Organization for Economic Cooperation and Development.

- OECD (2006) Economic Survey of Canada, 2006. *Policy Brief*. Paris, Organization for Economic Cooperation and Development.
- OECD (2007) Science, Technology and Industry Scoreboard 2007. Paris, Organization for Economic Cooperation and Development.
- RAMÍREZ, R. (2001) A model for rural and remote information and communication technologies: a Canadian exploration. *Telecommunications Policy*, 25, 315-330.
- RIDEOUT, V. (2003) *Continentalizing Canadian Telecommunications - The Politics of Regulatory Reform*, Montreal, McGill-Queens University Press.
- RIM (2007) Research In Motion 2007 Annual Report. Waterloo, Research In Motion.
- STATISTICS CANADA (2007a) Are cell phones replacing traditional home phones? *Innovation and Analysis Bulletin*, 8, 12-13.
- STATISTICS CANADA (2007b) Broadcasting and Telecommunications. *Service Bulletin*. Ottawa, Statistics Canada.
- TUREL, O. & SERENKO, A. (2006) Satisfaction with mobile services in Canada: An empirical investigation. *Telecommunications Policy*, 30, 314-331.
- VAN HASSELT, C. (2007) *High Wire Act - Ted Rogers and the Empire that Debt Built*, Mississauga, John Wiley and Sons Canada Ltd.