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THE STATE OF WIRELESS TECHNOLOGIES IN CANADA A Comparison of Wireless Technologies in Canada and the United States of America

Contributors:

August Ankum, Ph.D.
Olesya Denney, Ph.D.
Warren Fischer, C.P.A.
Stephanie Goldman, C.F.A.
Timothy Gates
Dima Leshchinskii, Ph.D.
Sidney Morrison
Patrick Phipps



Contact Information

2977 Highway K
Box #304
O'Fallon, MO 63366-7862
www.qsiconsulting.com

NOTE

This report was prepared on behalf of Bell Canada Enterprises. Nevertheless, the views expressed in this report are those of QSI Consulting, Inc. and, as such, they are not intended to and nor do they necessarily reflect the view of Bell Canada Enterprises.

QSI Consulting, Inc. is a consulting firm specializing in traditional and non-traditional utility industries, econometric analysis, convergence of network technologies and computer-aided modeling. QSI's experienced consultants provide services to a wide array of clients, including multi-billion dollar telecommunications firms, small start-up companies, state legislatures and regulatory agencies.

QSI Consulting, Inc.
O'Fallon, Missouri USA

Contacts:

Tim Gates	Phone: 303.424.4433	E-mail: tgates@qsiconsulting.com
Warren Fischer	Phone: 303.722.2684	E-mail: wfischer@qsiconsulting.com

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ATTACHMENTS

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Deployment and Innovation for the Major Canadian and US
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CONCLUSIONS

The Canadian mobile wireless industry is keeping pace with the United States (hereafter “US”) mobile wireless industry in terms of deployment of next generation mobile wireless technology and services, and leads the US in certain respects. The major mobile wireless carriers in both Canada and the US have deployed 2.5G and 3G mobile wireless technologies and have introduced services and handsets that take advantage of the higher speeds and capabilities that 3G technologies provide.

Canada is on par with the US in adoption of new handsets, and in some cases, such as the adoption of BlackBerry® platform products, Canada leads the US. For instance, for handsets, Canadian GSM carriers introduce handsets at approximately the same time as US GSM carriers and Canadian CDMA carriers introduce handsets at approximately the same time as CDMA carriers in the US.

Entertainment and multimedia services delivered via mobile wireless handsets is an area where Canada appears to be leading the US. For instance, video calling is available in Canada but not in the US, as is the commercial availability of full-length movies.

Canada has also led the US in introducing inter-carrier agreements that increase convenience and ubiquity of wireless service, such as the SMS agreement (later adopted by the US) and Wi-Fi roaming agreement.

In terms of wireless coverage as a percent of population, Canada compares favorably to the US, and both countries have access to CDMA- and GSM-based technologies, with CDMA being the more prevalent technology in both Canada and the US.

In relative terms, Canadian penetration is approximately 71% of the US penetration (calculated as Canadian penetration of 56% divided by the US penetration of 78%). The difference in penetration rates is due in large part to the differences in disposable income between Canada and the US, the US’ 18-month head start in the industry and the relative size and economies of scale of the two countries. Given these key differences in the markets and the risk associated with being first to market, Canada is exceeding expectations in terms of deployment of mobile wireless technology and services.

EXECUTIVE SUMMARY

In February of 2007, Bell Canada Enterprises contracted with QSI Consulting to conduct a study to compare the wireless technology in Canada with that in the US. A number of studies assessing Canada’s wireless industry have been published over the years. A report issued in March of 2006 by the Federal Telecommunications Policy Review Panel (“TPR Report”) recommended a variety of changes to wireless policy, and painted the sector as

uncompetitive, lagging in technology deployment and high priced. The purpose of this study is to determine whether there is any basis for the recent concerns raised about the deployment of technology in the Canadian wireless industry.

The study focused on wireless technology and services in the two countries. The key issues addressed include:

- A review of the technologies and services deployed by major providers in both Canada and the US, focusing on technology and innovation
- Case studies on wireless devices and next generation services
- Merits of quick adopter approach to innovation
- The structure and current status of the wireless industries in Canada and the US
- Penetration and coverage of wireless services

The findings on each of these key points are summarized below.

Technology Deployment:

Technology, from a consumer perspective, is reflected in the services available for purchase from the major wireless providers. This study addresses the mobile wireless technologies deployed by each provider and the services associated with each technology. In terms of innovation, which for the consumer is represented by services and handset features, the study provides evidence showing that Canadian consumers enjoy features and capabilities not available in the US, and have not been denied any benefits of new mobile wireless technologies or features.

In terms of technology, as of the third quarter of 2006, about 6.5 million Canadian subscribers were served by GSM/UMTS/WCDMA (35% of total), about 11 million subscribers were served by CDMA (59% of total), about 0.3 million subscribers were served by TDMA (2% of total), and about 0.7 million were served by other technology (4% of total).

In the US as of the third quarter of 2006, about 80.3 million subscribers were served by GSM/UMTS/WCDMA (36% of total), about 109.1 million subscribers were served by CDMA (49% of total), about 5.6 million subscribers were served by TDMA (3% of total), and about 29.2 million were served by other technology (12% of total). The Canadian and US technology percentages compare to the international average of 80% on GSM/UMTS/WCDMA, 14% on CDMA, and 2% on TDMA.

The table below summarizes the technologies and the percentage of subscribers on each for Canada, the US and the rest of the world:

The State of Wireless Technologies In Canada

Table. Subscribers by Technology in Canada, US and World*

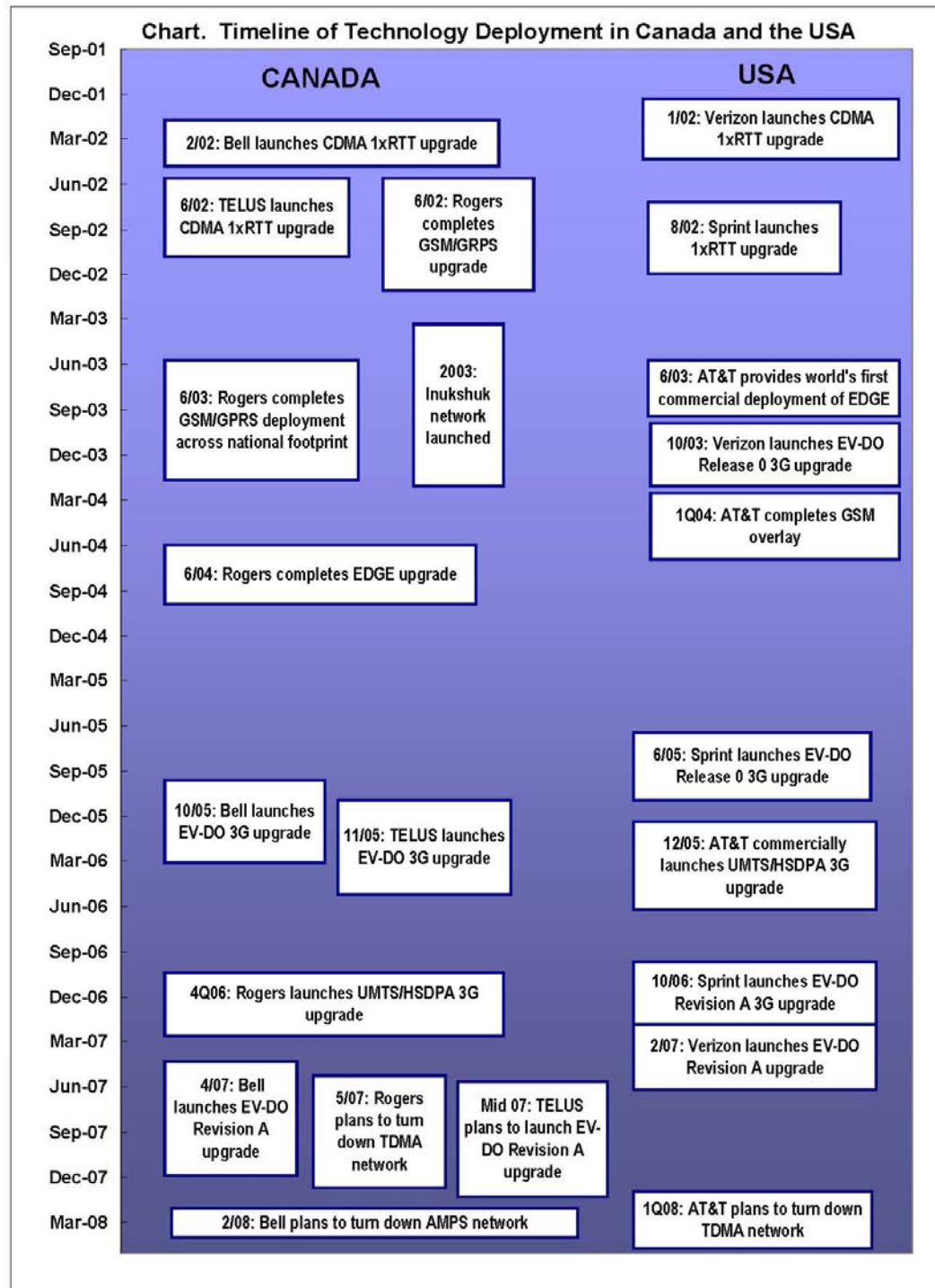
Country	Metrics	GSM/ UMTS/ WCDMA	CDMA	TDMA	OTHER	TOTAL
Canada	Total Subscribers (M)	6.5	11.0	0.3	0.7**	18.4
	% Subscribers	35%	59%	2%	4%	100%
	Major Carriers	<i>Rogers</i>	<i>Bell Canada, TELUS</i>	<i>Rogers</i>	<i>TELUS</i>	
US	Total Subscribers (M)	80.3	109.1	5.6	29.2	224.2
	% Subscribers	36%	49%	3%	12%	100%
	Major Carriers	<i>AT&T, T-Mobile</i>	<i>Verizon, Sprint</i>	<i>AT&T</i>	<i>Sprint</i>	
All Countries	Total Subscribers (M)	1,851.2	320.4	47.4	85.5	2,304.6
	% Subscribers	80%	14%	2%	4%	100%

* -- Canada data based on CWTA company-level 4Q2006 subscribers. TDMA (Rogers) subscribers estimated from www.angustel.ca/update/up578.html. US and All Countries data based on Merrill Lynch Telecom Services Research Interactive Global Wireless Matrix, January 2007 (data for 3Q 2006). Note that the Merrill Lynch estimate for Canadian TDMA (2 million in 3Q2006, which is also in the 2004 edition of Merrill Lynch Matrix) appears to be too high.

** -- An estimate for TELUS "Other" (Mike) subscribers based on EOY 2000 share of Clearnet (Mike) subscribers in total TELUS subscribers. Note that for category "Other" Merrill Lynch reports an estimate of 3.7 million subscribers in Canada, which appears to be too high.

The following table summarizes the technology and innovations deployed over time by the various major carriers in Canada and the US:

The State of Wireless Technologies In Canada



As the data in the study show and as the table above portrays visually, Canada has not lagged behind the US in any significant manner regarding the deployment of available technology. While there are instances where providers in the US were first to market with some technologies, Canada has always been quick to adopt that technology – frequently deploying the technologies within days or months of deployment in the US. As this study discusses, such a “quick adopter” approach is what one would expect given that the US mobile wireless market is 9 times larger than the Canadian market in terms of population (potential market). Despite the smaller size of the Canada mobile wireless market as compared to the US, the Canadian wireless industry has led the US in technology, innovation or service deployment in some areas.

The following is a sample of “firsts” in North America or Canada, which show that Canada either leads or is generally on par with the US in terms of general wireless technology/service innovation:

- 05/1998: Bell Mobility first in world to provide Tri-mode phones (AMPS/CDMA 850/1900).
- 07/1998: Bell Mobility is first North American wireless company to introduce switchless, trunkless pre-paid service.
- 05/24/00: Bell Mobility provides North America’s first Instant Message service on Digital PCS phones.
- 12/20/00: Bell Mobility announces first color display mobile phone in Canada. The first color display was introduced in the US by Verizon on 11/29/00, less than one month earlier.
- 05/03: Bell Mobility provides world’s first location based service “Mr. Rescue”.
- 11/30/04: TELUS introduces Fastap™, the world’s first wireless phone that integrates text keys around a standard numeric phone keypad – making it easier to send text messages and enter contacts in contact list.
- 10/14/04: TELUS introduces first 1.3MP wireless phone camera in Canada. By comparison, Sprint announced the introduction of its first 1.3MP camera on July 8, 2004 – three months earlier than TELUS’ introduction.
- 05/09/05: Rogers provides North America’s first full music download to a wireless device.
- 02/01/06: Rogers launches North America’s first Podcast Service over mobile phones. By comparison, AT&T announced mobile podcast capability in October 2006, eight months after Rogers’ launch.
- 06/06/06: Rogers provides first Name Display service – allowing a customer to see the name and number of the party calling even if not in contacts list – in North America.
- 02/15/07: Bell Mobility provides first Canadian full length pay per view movie service. By comparison, Sprint announced on 12/12/05 the availability of the first mobile entertainment with full length films in the US (MSpot), but the services is not commercially available from Sprint at this time.

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- 04/02/07: Rogers announces North America's first video calling service. By comparison, AT&T made the first US video share call on 1/5/07 at a trade show in demo mode, but has not yet made it commercially available.

Wireless Devices:

From the standpoint of consumers, phones, smartphones and other mobile handheld devices such as Personal Digital Assistants ("PDAs") constitute the "face" of technological developments. Therefore, the availability and the speed of adoption of these devices by mobile carriers present useful measures of technological deployment and innovations. What follows are two summary tables from case studies on wireless devices deployed by Canadian and US providers:

Table. Adoption Dates of Currently Offered BlackBerry® Devices*

					
Introduced by	8800 Series	Pearl	8700 Series	7200 Series	7130 Series
AT&T	2/12/2007	11/30/2006	11/1/2005	9/28/2004	6/8/2006
Rogers	2/12/2007	9/7/2006	11/9/2005	10/22/2004	
T-Mobile	4/20/2007	9/7/2006	4/18/2006	3/11/2005	
Bell Canada	4/25/2007	not available	9/2006**	2/16/2005	11/2005**
Sprint	not available	not available	9/20/2006	6/22/2005***	5/31/2006****
TELUS	not available	not available	11/29/2006	3/2/2005	12/15/2005
Verizon	4/25/2007	not available	9/12/2006	2/7/2005	11/21/2005

* -- Press Release dates. Source: RIM Press Release Archives (<http://www.rim.net/news/press/index.shtml>).

Device images taken from RIM Image Gallery at <http://www.rim.com/newsroom/media/gallery/index.shtml>

Availability based on company web sites as of May 5, 2007.

T-Mobile also offers 7105t; Sprint offers 7100i (introduced on 10/14/05) for Nextel customers and 7520.

** -- Dates provided by company to QSI.

*** -- Not listed as current offer on Sprint web site.

**** -- Based on Sprint Press Release.

Table. Adoption Dates of Motorola RAZR™ Handset*

Availability	Carrier Network Standard	Date
AT&T (Cingular)	GSM	Nov-04
Rogers	GSM	Feb-05
T-Mobile	GSM	Jun-05
Verizon	CDMA	Dec-05
Bell Canada	CDMA	Feb-06
TELUS	CDMA/iDEN	Feb-06
Sprint	CDMA/iDEN	Oct-06

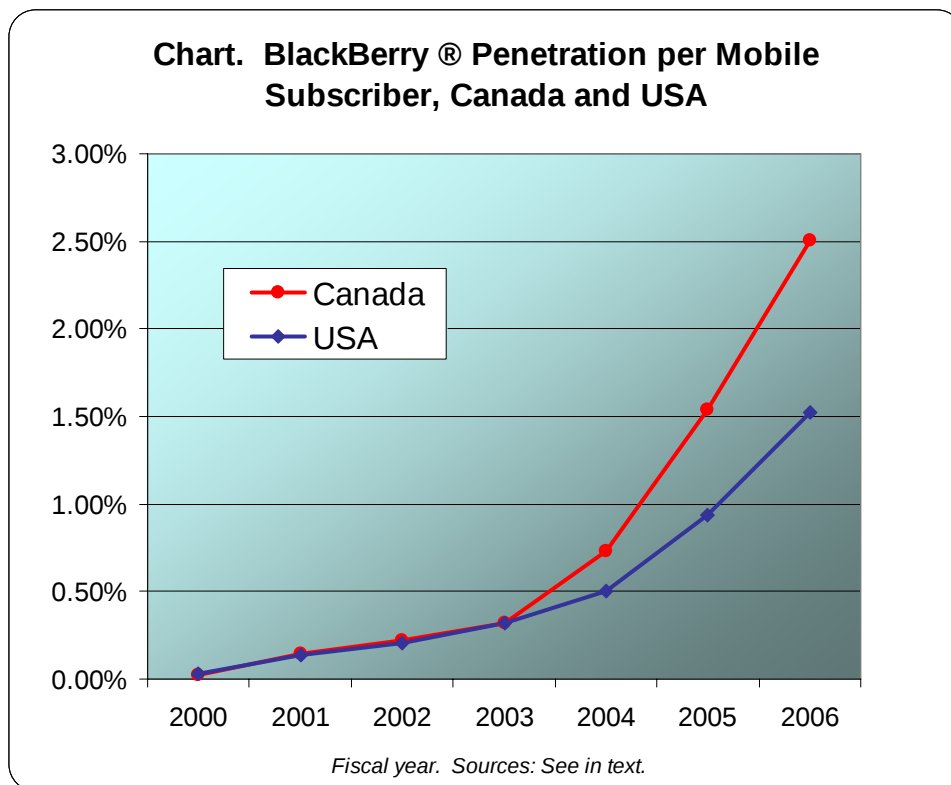
* -- Announcement dates. Based on Motorola News Releases available at

<http://www.motorola.com/mediacenter/news/archive.jsp>.

Source for Bell Canada: <http://www.bce.ca/en/news/releases/bm/2006/01/24/73285.html>.

Source for TELUS: http://en.wikipedia.org/wiki/Razr#_note-2#_note-2.

In addition to availability of BlackBerry® handheld devices, it is useful to look at the “penetration” (or, equivalently, subscribership) of BlackBerry® products in both countries. Using information in RIM annual reports, we estimated subscribership to the BlackBerry® wireless platform by country. Next, we calculated penetration of BlackBerry® platform in both countries on a per wireless subscriber basis. The Chart below depicts BlackBerry® penetration as a share of total mobile wireless subscribers.



As seen in the chart above, although, early on, the Canadian and US BlackBerry® penetration rates were very close, Canada has exceeded the US penetration rates for the BlackBerry® wireless platform in recent years, and Canada's lead over the US is increasing. In terms of BlackBerry® penetration per mobile wireless subscriber, Canada (with 2.5% rate) exceeds the US (with 1.5%) by one percentage point.

To summarize, the analysis shows that Canada leads the US in terms of BlackBerry® wireless platform penetration despite lagging the US in terms of "mass market" mobile voice penetration. This finding corroborates the analysis showing that Canada leads the US in terms of high-end/value added services.

Entertainment and Multi-Media Services:

The following table summarizes the entertainment and multi-media services provided by the major wireless carriers in Canada and the US. Note that areas shaded in green indicate that a service is being offered by a carrier:

The State of Wireless Technologies In Canada

Table. Entertainment and Multimedia Product Offerings by Carrier*

Services & Features	Canada			USA			
	Bell Mobility	Rogers Wireless	TELUS Mobility	AT&T	Verizon Wireless	Sprint	T-Mobile
Full-Length Movies							
Real-Time TV							
Download Full-Length Songs							
Streaming Radio							
Video Calling							
Text Messaging							
Picture Messaging							
Video Messaging							
International Messaging							
Instant Messaging							
Download & Play Games**							
Interactive Games/Multiplayer							
Download video clips							
Download Ring Tones							
Download Wallpaper/Screensavers							
Caller Ring Tunes***							
Mobile Web Access							
Voice SMS							

* -- Color shading indicates service availability. Does not include offerings offered by MVNOs and regional wireless providers.

** -- Both Bell Mobility and Verizon offer 3D games, according to their websites.

*** -- Caller Ring Tunes allows the caller to hear a song instead of the traditional ring. Each carrier has a unique name for this service.

The table above shows that currently Canada leads the US in terms of next-generation services/features roll-out, and at worst, is on par with the US in this regard. According to the companies' websites, Rogers Wireless (Canada) is the only mobile wireless carrier studied that provides video calling – the ability to hear *and* see the person on the other end of a phone call. One of the most advanced entertainment capabilities – the ability to watch full-length movies on a mobile phone – is exclusively available in Canada through Bell Mobility. Sprint announced the availability of a service providing full-length movie streaming to mobile phones in the US called Mspot Movies,¹ but Sprint is not advertising this offering on its website and it does not appear to be commercially available at this time. Therefore, the table above does not show Sprint offering full-length movies.

Quick Adopter Behavior:

Based on a review of the operation of the Canadian and US wireless markets over the last five years, the Canadian wireless industry is not lagging behind the US. While the US wireless providers introduce certain technologies before their Canadian counterparts, this trend is reflective of the relative size differences of the two countries. And though handset manufacturers may cater to the larger US market, it appears that the Canadian

¹ "Sprint and MSpot Roll Out Red Carpet with Streaming Movie Service for Mobile Phones." Sprint Press Release. 12/12/05. Sprint announced that MSpot Movies marks the first time full-length feature films are streamed to mobile phones in the United States.



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wireless industry has been able to introduce next-generation handsets and services at approximately the same time as the US despite a modest lag in deployment of the technology that makes next-generation handsets and services a reality.

Structure of Wireless Industries:

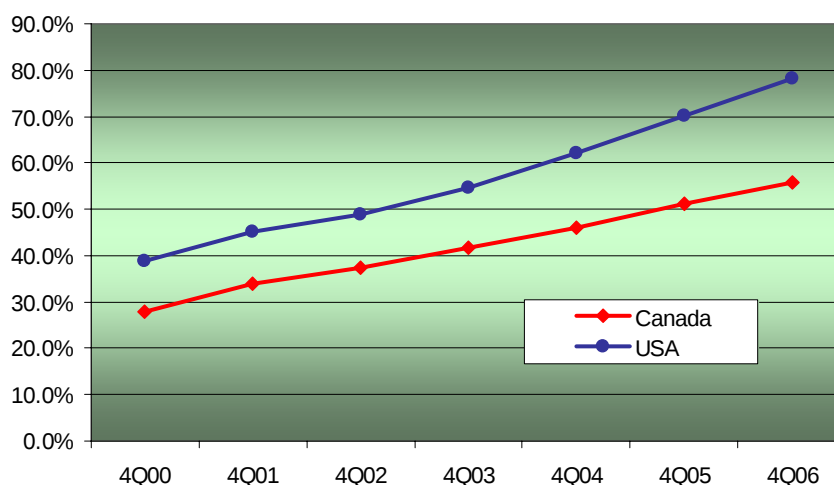
The wireless industries in Canada and the US reflect the differences in the size and economic profiles of the two countries. As compared to the US, Canada has 11 percent of the population and the wireless industry metrics reflect similar differences in magnitude. Both countries have three to four major providers. As the wireless industry begins to mature, we see consolidation in both countries and an increase in market concentration. This is to be expected and reflects the rational move to increase efficiencies. The size of the overall market generally dictates the number of major providers that can efficiently provide service. It is not surprising that the US would have more large providers given the size of that market in terms of geography and potential revenues.

Penetration and Coverage:

At the end of 2006, which is the most recent data available, Canadian penetration of mobile wireless service (measured as subscribers per capita) was estimated at 56%. By comparison, in the US, per capita mobile wireless penetration was 78% for the same time period. Based on the data reviewed, disposable net income differences between the two countries may account for a significant portion of the differences in penetration and coverage.

The following chart compares mobile wireless penetration in both countries over time:

Wireless Penetration Rates (Subscribers per Capita): Canada and USA



Sources: CWTA (Canada Subscribers); FCC 11th Report of Wireless Competition, Table 1 (US Subscribers 2000-2005), CTIA Semi-Annual Survey December 2006 (US Subscribers 2006); US Census Bureau, International Database (Population)

The gap between the US and Canadian wireless penetration rates is typically attributed to the fact that the US wireless industry had an 18-month head start based on the first wave of wireless spectrum auctions in both countries. The proportionate difference in penetration rates between the two countries over time indicates that Canada remained on par with the US in terms of penetration given the head start enjoyed by the US.

Geographically disaggregated country-level data suggest that income is an important driver of wireless penetration rates. Therefore, it is reasonable to expect that differences in income levels between the two countries may explain some of the differences in penetration rates. A comparison of different income measures in both countries shows that Canada has lower per capita income than the US. Canada lags the US in various measures of income, including personal disposable income – an income measure that is particularly relevant to consumption decisions such as whether or not to purchase mobile wireless services and devices.

In relative terms, Canadian personal disposable income is approximately 70% of the US personal disposable income. On the nationwide level, Canadian mobile wireless penetration rates constitute approximately 70-75% of the US penetration. Although it would be too simplistic to suggest a proportional relationship between penetration and income, the fact that the difference in magnitudes between these two measures is approximately the same for Canada and the US is telling. Other demographic metrics such as age and education of consumers in Canada and the US show only minor



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differences between the two and do not appear to explain the differences in penetration and coverage.

Wall Communications, Inc., compiled national and provincial-level mobile wireless coverage estimates by aggregating company-level coverage data. According to the *Wall Report*, digital mobile wireless services cover 97% of population in Canada. For comparison, the most recent US digital wireless coverage is estimated by the FCC as approaching 100% of population.² QSI investigated the premise that urban areas would have better coverage than rural areas, but based on the available data, we cannot conclude that urbanization is a factor in the difference between the two countries in wireless penetration and coverage.

² As discussed in its report, the FCC notes that this number is likely overstated due to the FCC's coverage calculation methodology. The FCC aggregates coverage data on a county-basis, and counts as covered by wireless any county that has a wireless offering in it, though not all of the population in that county would be covered by that wireless offering.

I. INTRODUCTION AND BACKGROUND

Recent reports have made statements claiming that the Canadian wireless industry is not sufficiently competitive, and that high prices for wireless service and a lack of innovation has resulted. Certain parties have suggested that additional providers might stimulate the Canadian wireless industry. For instance, in the Telecom Policy Review (“TPR”) report it states:

The smaller number of mobile providers in Canada – and the fact that all three national wireless service providers are also owned by large telecommunications service providers that also provide wireline services – may mean that there is less competition in the Canadian wireless market than in the US market, which consequently has resulted in higher prices, less innovation, lower uptake and lower rates of usage”. (TPR, p. 1-21)

The March 2006 report by the Federal Telecommunications Policy Review Panel recommended a variety of changes to wireless policy, and painted the Canadian wireless industry as uncompetitive, lagging in technology deployment and relatively high priced as compared to the US. Other reports include the July 2005 report by the SeaBoard Group on wireless pricing, and the report published by Wall Communications Inc., commissioned by the Canadian Wireless Telecommunications Association (“CWTA”), which assessed various dimensions of the industry, including coverage and penetration, the financial state of the industry, the status of competition, pricing and other market performance parameters.

Bell Canada has asked QSI Consulting, Inc. (“QSI”) to conduct a study on wireless technology, focusing on a comparison of the innovations, technologies and services of the major wireless providers in Canada, with those in the US. Unlike the abovementioned studies, many of which make international comparisons, this report selects the US as the sole source for comparison. This provides a controlled comparison due to the similarity between the two countries in such areas as wireless network standards, data collection, demographics, regulation, and availability of landline services permit meaningful comparisons. In contrast, the differences between Canada and other countries often undermine the value of international comparisons. For example, the *SeaBoard Report* compares Canadian wireless penetration and pricing to those in Russia, noting that Russia has higher wireless penetration rates than Canada.³ The *SeaBoard Report* does mention a number of country-specific factors that may affect relatively high wireless penetration rates in Russia, namely the inadequacy of landline service (a substitute of wireless service), which has extremely high installation intervals (up to six months) and very high long-distance tariffs. At the same time, the *SeaBoard Report* fails to mention that the inadequacy of Russian landline service translates into very low penetration rates of

³ SeaBoard Report, *Wireless Pricing: A Cross-National Survey: Canada, US. and Europe*, July 2005, p. 23.

Russian landline service, estimated at approximately 28% per capita, which is in stark contrast with Canada's 65% per capita landline penetration rate.⁴ Clearly, because of the significant differences in the quality of landline services between Canada and Russia, comparing their wireless penetration rates, as the *SeaBoard Report* does, is suspect.

II. OVERVIEW OF WIRELESS TECHNOLOGY

A. NETWORK STANDARDS

An important factor affecting the development of the mobile wireless industry throughout its history is the existence of multiple standards, which are not compatible with each other. Currently there are four major network standards in North America, which are Code Division Multiple Access ("CDMA"), Global System for Mobile communications ("GSM"), Time Division Multiple Access ("TDMA"), and Integrated Digital Enhanced Network ("iDEN").

CDMA is a technology that divides up a radio channel not by time (as TDMA), but instead, by using different pseudo-random code sequences for each user. CDMA subscribers represent approximately 14% of the world's wireless market. CDMA technology is used by Bell Mobility in Canada, and by Verizon Wireless and Sprint Nextel (Sprint customers) in the US.

TDMA is a technology that multiplexes (divides) the signal into different timeslots. TDMA is currently being phased out in North America by the major wireless providers. Rogers in Canada and AT&T in the US have either completely phased out TDMA or are scheduled to phase out TDMA in the near future.

GSM is a digital wireless technology originally developed by the European operator community and later adopted by operators around the world to become the world's most dominant wireless technology. GSM is used to serve more than 1.8 billion users and accounts for 80% of the world's wireless market. GSM technology is used by Rogers in Canada and by AT&T and T-Mobile in the US.

iDEN is a mobile telecommunications technology, developed by Motorola, which provides its users the benefits of a walkie-talkie functionality (trunked radio) as well as a cellular phone. In Canada, iDEN is used by TELUS' Mike network, and in the US, it serves Sprint Nextel (Nextel) customers.

TDMA, GSM and iDEN technologies work by dividing a single radio frequency into multiple time slots so they can support multiple calls. TDMA allows for up to three calls

⁴ Russian and Canadian landline penetration rates are based on Merrill Lynch Global Wireless Matrix, 4Q2006, Table 1.

per frequency (30 kilohertz (kHz) of spectrum), iDEN allows up to six, and GSM allows for up to eight (200 kHz of spectrum).

B. TECHNOLOGY GENERATIONS

1G

This is a first-generation wireless technology based on an analog cellular standard introduced in the 1980s that was replaced by the 2G standard.

2G

This is a second-generation wireless technology introduced in 1990s. The main difference between two succeeding 1G and 2G mobile telephone systems is that the radio signals in a 1G network are analog, while the radio signal in a 2G network is digital.

2G technologies can be divided into TDMA- and CDMA-based standards depending on the type of multiplexing (signal compression) used. Specifically, GSM is a 2G TDMA-based standard, as is iDEN, while IS-95 is the CDMA 2G standard used in North America.

2.5G

This is a “second and a half generation” – a term used to describe 2G-systems that have implemented a packet switched domain in addition to the circuit switched domain. 2.5G provides some of the benefits of 3G (e.g., it is packet-switched) and can use some of the existing 2G infrastructure in CDMA and GSM networks. For GSM operators, a 2.5 technology example includes the hardware and software enhancements utilizing General Packet Radio Service (“GPRS”) or Enhanced Data Rates for Global Evolution (“EDGE”) technology, which allows higher speed packet data communications. Some protocols, such as EDGE for GSM and CDMA2000 1x-RTT for CDMA, can qualify as “3G” services because they have a data rate of above 144 kbps, but are typically considered 2.5G.

3G

This is a third-generation technology with speeds that provide the ability to transfer simultaneously both voice data (a telephone call) and non-voice data. It is based on the International Telecommunication Union (“ITU”) family of standards under the International Mobile Telecommunications program (“IMT-2000”). For GSM operators in Canada and the US (Rogers, AT&T and T-Mobile), the names for the 3G technology interface are Universal Mobile Telecommunications System (“UMTS”), High-Speed Downlink Packet Access (“HSDPA”) and Wideband Code Division Multiple Access

(“WCDMA”). Though WCDMA is the fundamental 3G technology, it is more commonly referred to in public press releases and in this report as HSDPA. The two terms are used interchangeably to refer to the 3G technology for GSM-based carriers. For CDMA-based operators (Bell Mobility, TELUS Mobility, Verizon Wireless, and Sprint Nextel), the name of the 3G technology is Evolution-Data Optimized (“EV-DO”) technology, specifically its original Release 0 and a more recent successor Revision A.

III. ANALYSIS OF THE CANADIAN AND US WIRELESS INDUSTRIES

A. COMPANY-LEVEL OVERVIEW

In this section, we compare the Canadian and US wireless industries in terms of technology and innovation. The mobile wireless network technologies are compared by country and by company, including a description of the network technology deployed in each country by the major wireless companies, the date of the introduction of these technologies, the data speeds made available by these technologies and the innovations and services made available over the technology. The coverage of these networks and technology are also analyzed in terms of population counts for both Canada and the US.

1. Canada Mobile Wireless Industry

Overall, the Canadian wireless market comprises less than one percent (0.8%) of the total global wireless market in terms of subscribers.⁵ As of fourth quarter of 2006, the current wireless penetration rate per capita in Canada was 57.5% (or over 18.5 million subscribers), 23% of which are prepaid subscribers.⁶ Bell Mobility, Rogers Wireless and TELUS Mobility represent 96% of the Canadian wireless market in terms of subscribers and 96% of the Canadian wireless market in terms of wireless services revenue.⁷ In terms of technology, at the end of 2006, about 6.5 million Canadian subscribers were served by GSM/UMTS/WCDMA⁸ (35% of total), about 11 million subscribers were served by CDMA⁹ (59% of total), about 0.3 million subscribers were served by TDMA¹⁰

⁵ Merrill Lynch Global Wireless Matrix, 4Q06 (“ML GWM 4Q06”), Table 20, March 28, 2007.

⁶ ML GWM 4Q06, Tables 1 & 51.

⁷ ML GWM 4Q06, Tables 51 and 52, Subscriber Market Share (Canada): Rogers (37.2%), Bell Mobility (31.6%), TELUS (27.2%); Wireless Services Market Share (Canada): Rogers (36.7%), Bell Mobility (29.3%), TELUS (30.1%).

⁸ GSM (Global System for Mobile Communications), UMTS (Universal Mobile Telecommunications System), WCDMA (Wideband Code Division Multiple Access).

⁹ CDMA or Code Division Multiple Access.

¹⁰ TDMA (Time Division Multiple Access).

(2% of total), and about 0.7 million were served by other technology (4% of total).¹¹ This compares to the international average of 80% on GSM/UMTS/WCDMA, 14% on CDMA, and 2% on TDMA.¹²

a. Bell Mobility

Network Technology & Migration¹³

Bell Mobility (or its predecessors – the Bell Mobility companies) has operated in the Canadian mobile wireless market since its inception in 1985, and was licensed, along with three other wireless companies, to provide 2G¹⁴ digital PCS service in 1995.¹⁵ Bell Mobility's "core" technology standard is CDMA. Bell Mobility launched its (2.5G) 1xRTT¹⁶ network upgrade in February of 2002, providing typical data speeds of 120 Kbps up to 144 Kbps. Regarding 3G¹⁷ technology, on October 31, 2005, Bell Mobility launched Canada's first 3G Evolution Data Optimized ("EV-DO") wireless data network in Toronto and Montréal,¹⁸ which delivers average data download speeds of 400-700 kbps with peaks of up to 2.4 Mbps. On April 30, 2007, Bell Mobility announced the launch of EV-DO Revision A technology for laptop users, providing peak download speeds of 3.1 Mbps and peak upload speeds of 1.8Mbps. This offering is initially available in selected areas of Ontario, with plans for further deployment and speed enhancements throughout 2007.¹⁹

Bell Mobility reportedly plans to terminate its analog first generation (1G) AMPS²⁰ network services in February of 2008.²¹

¹¹ Merrill Lynch Global Interactive Global Wireless Matrix 3Q06 ("ML Interactive GWM 3Q06"). Merrill Lynch groups technology into four categories – (i) GSM/UMTS/WCDMA, (ii) CDMA, (iii) TDMA and (iv) "other."

¹² ML Interactive GWM 3Q06.

¹³ Bell Canada and Rogers have an equal partnership in Inukshuk Wireless, a Canada-wide fixed wireless network. Bell Mobility's mobile wireless technology is discussed here. Inukshuk is discussed in more detail below.

¹⁴ "2G" refers to second generation mobile wireless technology.

¹⁵ A Study on the Wireless Environment in Canada, Wall Communications, 9/29/06, p. 3.

¹⁶ 1xRTT (1 channel Radio Transmission Technology) is the first step in the evolution of CDMA 2000 to 3G which provides high data-rate services.

¹⁷ 3G refers to third generation mobile wireless technology.

¹⁸ Bell Canada 2006 Annual Report, p. 25.

¹⁹ "Bell Canada Enhances Mobile Data Network Access Speeds." Bell Mobility 4/30/07 Press Release.

²⁰ AMPS = Advanced Mobile Phone Service, and refers to an analog system.

²¹ Lojack Corp., 10-K Exhibit-10 (JJ) "Amendment to the Bell Mobility Contract," as of 3/15/05, for the period 12/31/04.

Network Coverage

Bell Mobility's CDMA mobile wireless network covers more than 97% of the total population of Canada.²² In 1Q 2007, the footprint of Bell Mobility's high-speed 3G EV-DO wireless data network covered 60% of the population of Canada,²³ and will cover 67% of the Canadian population by the end of 2Q07.

Innovative Services

Bell Mobility has a history of innovations in the mobile wireless industry. Attachment 2 to this report contains an archive of innovations and technology/services deployment for Bell Mobility over time. These include innovations in mobile phone design, features/services, and content. For example, Attachment 2 shows that Bell Mobility recently announced the exclusive availability of the thinnest phone in North America.²⁴ In addition, Bell Mobility recently announced "Mobile Movies," the first service in Canada providing full-length pay-per-view movies.²⁵ Other Bell Mobility innovations include: North America's first interoperable picture messaging service (with Sprint),²⁶ North America's first inter-carrier mobile text messaging (with Microcell and Rogers),²⁷ North America's first instant messaging service available on a digital PCS phone,²⁸ Canada's first phone to phone video messaging,²⁹ Canada's first music video ringtones,³⁰ Canada's first streaming video clip service,³¹ Canada's first mobile phone with built in FM transmitter,³² and Canada's first color display mobile phone.³³

²² Bell Response to QSI Consulting, Inc. Information Request. This is the coverage of the total Canadian population as of 1Q07.

²³ Bell Response to QSI Consulting, Inc. Information Request. See also Bell Canada 2007 Information Form (Dec 2006), p. 23 citing end of year 2006 coverage as 55%: "We continued to invest in our high-speed EV-DO wireless data network by expanding the footprint to a number of cities and towns in Ontario, Quebec, British Columbia and Alberta, bringing coverage to 55% of the Canadian population."

²⁴ Appendix 1, Bell Mobility 3/19/07 entry.

²⁵ Appendix 1, Bell Mobility 2/15/07 entry.

²⁶ Appendix 1, Bell Mobility 2/24/04 entry.

²⁷ Appendix 1, Bell Mobility 4/2/02 entry.

²⁸ Appendix 1, Bell Mobility 5/24/00 entry.

²⁹ Appendix 1, Bell Mobility 10/14/04 entry.

³⁰ Appendix 1, Bell Mobility 8/14/06 entry.

³¹ Appendix 1, Bell Mobility 11/14/05 entry.

³² Appendix 1, Bell Mobility 12/7/06 entry.

³³ Appendix 1, Bell Mobility 12/20/00 entry.

b. Rogers Wireless

Network Technology & Migration³⁴

Rogers Wireless (or its predecessor – Rogers Cantel) has operated in the Canadian mobile wireless market since its inception in 1985. In the early 1990's, Rogers deployed TDMA IS-136 technology to cover 83% of the Canadian population including all major urban areas.³⁵ Rogers was licensed to provide 2G digital PCS service in 1995.³⁶ Rogers is the only GSM³⁷/GPRS³⁸ provider in Canada, adding GSM/GPRS voice/data technology – allowing speeds up to 30kbps on the downlink – beginning in 2001.³⁹ Rogers began deployment of GSM/GPRS in 2001,⁴⁰ and in June 2002, Rogers completed the deployment of its digital wireless GSM/GPRS network overlay in the 1900 megahertz frequency,⁴¹ and in 2003, Rogers completed the deployment of GSM/GPRS operating in the 850Mhz spectrum across its national footprint.⁴² Rogers completed deployment of EDGE technology⁴³ across its national GSM/GPRS network in June 2004, which more than tripled the data transmission speeds available to Rogers customers⁴⁴ to average speeds of around 120 kbps⁴⁵ and bursts of up to 200 kbps.⁴⁶ Rogers substantially completed the integration of Microcell (which changed its name to Fido) networks in

³⁴ Rogers and Bell Canada have an equal partnership in Inukshuk Wireless, a Canada-wide fixed wireless network. Rogers' mobile wireless technology is discussed here. Inukshuk is discussed in more detail below.

³⁵ Rogers Wireless Responses to Wall Communications Information Requests, p. 2. Used with permission.

³⁶ A Study on the Wireless Environment in Canada, Wall Communications, 9/29/06, p. 3.

³⁷ GSM = Global System for Mobile Communications – standard wireless digital phone service (GSM is actually ETSI standard).

³⁸ GPRS = General Packet Radio Service – always on packet data service for GSM (115 Kbps) – primary feature of what is known as 2.5G.

³⁹ Rogers Wireless Responses to Wall Communications Information Requests, p. 3. Used with permission.

⁴⁰ Rogers Wireless Responses to QSI Consulting, p. 2.

⁴¹ Rogers 2004 Annual Report, p. 24.

⁴² Rogers 2004 Annual Report, p. 24.

⁴³ Rogers 2004 Annual Report, p. 10.

⁴⁴ Rogers 2004 Annual Report, p. 24.

⁴⁵ “Rogers Unveils New Wireless Network – High Speed Downlink Packet Access.” Asterisk VoIP News. Available at:
www.asteriskvoipnews.com/wifi_wireless/rogers_unveils_new_wireless_network_high_speed_downlink_packet_access.html

⁴⁶ Rogers Wireless Responses to Wall Communications Information Requests, p. 3. Used with permission.

2005 that it acquired in late 2004,⁴⁷ and integrated Call-Net Enterprises in 2005 which it acquired on July 1, 2005.⁴⁸

Regarding 3G technology, in December 2005, Rogers began testing UMTS/HSDPA 3G technology in the downtown core of Toronto,⁴⁹ and in November 2006, Rogers launched its UMTS/HSDPA⁵⁰ network with speeds of between 800 Kbps and 1.1 Mbps.⁵¹ This technology supports 14.4 Mbps downlink speeds and Rogers plans to support devices capable of 1.8Mbps and 3.6Mbps in the near term.⁵²

Rogers plans to turn down its TDMA⁵³ and analog (AMPS) networks (that were substituted by its GSM overbuild) effective May 31, 2007.⁵⁴

Network Coverage

Rogers' GSM/GPRS/EDGE network provides coverage to approximately 94% of Canada's population⁵⁵ and is located in all 10 provinces.⁵⁶ Rogers reports that by year end 2007, Rogers' HSDPA 3G technology will cover 60% of the Canadian population.

Innovative Services

Rogers Wireless has a history of innovations in the mobile wireless industry. Attachment 2 to this report contains an archive of innovations and technology/services deployment for Rogers over time. These include innovations in mobile phone technology, features/services, and content. For instance, Rogers recently announced that it was the first and only carrier in North America to offer video calling (i.e., face to face video calling in real-time),⁵⁷ and also recently announced the availability of a "talking cellphone," with screen reading software for customers with vision loss.⁵⁸ Rogers was

⁴⁷ Rogers 2005 Annual Report, p. 10. Fido network acquired by Rogers is GSM as well.

⁴⁸ Rogers 2005 Annual Report, p. 10.

⁴⁹ Rogers 2005 Annual Report, p. 23.

⁵⁰ High-Speed Downlink Packet Access (sometimes known as High-Speed Downlink Protocol Access) is a [3G mobile telephony protocol](#) in the High-Speed Packet Access ([HSPA](#)) family, which provides a roadmap for [UMTS](#)-based networks to increase their data transfer speeds and capacity. Universal Mobile Telecommunications System (UMTS) is one of the third-generation ([3G](#)) [mobile phone](#) technologies

⁵¹ Rogers 4Q06 Earnings Press Release, pp. 1-2, 14.

⁵² Rogers Wireless Responses to Wall Communications Information Requests, p. 3. Used with permission.

⁵³ TDMA = Time Division Multiple Access – allocates discrete amounts of bandwidth to each user in order to permit many simultaneous conversations. Packetizes data and uses spectrum more efficiently.

⁵⁴ Rogers 4Q06 Earnings Press Release, pp. 1-2, 14.

⁵⁵ Rogers 2005 Annual Report.

⁵⁶ Rogers 2005 Form 20-F, p. 10.

⁵⁷ Appendix 1, Rogers 4/2/07 entry.

⁵⁸ Appendix 1 Rogers 5/8/07 entry.

also the first carrier in North America to debut HSDPA high speed data mobile wireless technology.⁵⁹ Other Rogers-related innovations include: first carrier in North America to implement downloadable music to a cellphone,⁶⁰ first carrier in North America to offer Name Display feature,⁶¹ first in North America to provide a mobile podcast service,⁶² first carrier in North America to implement a commercial digital wireless service,⁶³ and first Canadian provider to provide access to BlackBerry® Connect™ (allowing access to BlackBerry wireless services through Nokia phones).⁶⁴

c. TELUS Mobility

Network Technology & Migration

Up until 2000, TELUS and its predecessors – AGT and B.C. Tel – were partners with seven other Canadian telephone companies in the Stentor Alliance (f/k/a Telecom Canada and Trans-Canada Telephone System). In 2000, TELUS began to compete with Bell Canada and the Stentor Alliance dissolved, and later in 2000, TELUS acquired Clearnet Communications – another mobile wireless provider in Canada – to create a wireless provider with a national scope. TELUS' core network standard is CDMA, and it also operates the “Mike” network - the only iDEN network in Canada featuring push to talk (“PTT”) Direct Connect capability.⁶⁵ TELUS also uses legacy AMPS (analog) wireless technology. TELUS launched its 1x wireless network in June of 2002, providing network speeds of 40-60 kilobits per second.⁶⁶ In November 2005, TELUS launched its EV-DO 3G wireless high speed network in 19 centres,⁶⁷ with typical download speeds of between 400-700 kbps. This EV-DO launch covered 5 cities, including Vancouver, Calgary, Edmonton, Toronto and Montreal, enabling data speeds 6 times faster than previous TELUS service.⁶⁸

⁵⁹ Appendix 1, Rogers 11/2/06 entry.

⁶⁰ Appendix 1, Rogers 2005 and 5/9/05 entries.

⁶¹ Appendix 1, Rogers 6/6/06 entry. Name Display allows viewing the calling party's name even if the person is not in the contact list.

⁶² Appendix 1, Rogers 2/1/06 entry.

⁶³ Appendix 1, Rogers 1992 entry.

⁶⁴ Appendix 1, Rogers 12/13/06 entry.

⁶⁵ TELUS 2002 Annual Report, p. 6.

⁶⁶ TELUS 2002 Annual Report, p. 20. TELUS' 1X network provides the always-on Internet access at speeds of 40-60 kilobits per second, which are comparable to wireline dial-up technology. (See <http://www.telusmobility.com/bc/1X/index.shtml>).

⁶⁷ 2Q06 TELUS release.

⁶⁸ TELUS 2005 Annual Report business review, p. 5.

Network Coverage

As of second quarter of 2006, TELUS' CDMA network reached approximately 95% of the Canadian population.⁶⁹ In December 2006, TELUS also extended service to more than 230 US cities. TELUS launched its EV-DO 3G technology in November 2005,⁷⁰ and as of 2Q07, TELUS' EV-DO 3G network covered about 65% of the Canadian population.

Regarding TELUS' iDEN ("Mike") network, in 2003, the Mike network covered 5,000 kilometers from Vancouver Island to Eastern Quebec, and was expanded to rural and remote regions of Alberta and B.C., Manitoba Ontario and Quebec, with service to the US through roaming agreements,⁷¹ and in 2004 the Mike network was expanded to Nova Scotia, allowing PTT from sea to sea.⁷²

Innovative Services

TELUS Mobility has a history of innovations in the mobile wireless industry. Attachment 2 to this report contains an archive of innovations and technology/services deployment for TELUS Mobility over time. These include innovations in mobile phone design, features/services, and content. For instance, TELUS introduced Fastap technology, the world's first wireless phone that integrates text keys around a standard phone keypad.⁷³

Other innovations for TELUS Mobility include: first in Canada to offer real time streaming satellite radio,⁷⁴ first in Canada to offer a 1.3 MP camera phone,⁷⁵ first in Canada to provide the world's slimmest QWERTY device and smallest "Mike" phone,⁷⁶ and first in Canada to offer a Windows® based PDA camera phone.⁷⁷

⁶⁹ TELUS 2Q06 release.

⁷⁰ "TELUS Mobility Introduces National Wireless High Speed Network." TELUS Press Release. 11/14/05.

⁷¹ TELUS 2003 Annual Report, p. 21.

⁷² TELUS 2004 Annual Report, p. 19.

⁷³ Appendix 1, TELUS 11/30/04 entry.

⁷⁴ Appendix 1, TELUS 7/6/06 entry.

⁷⁵ Appendix 1, TELUS 10/14/04 entry.

⁷⁶ Appendix 1, TELUS 6/15/06, 6/13/06, and 6/10/04 entries.

⁷⁷ Appendix 1, TELUS 12/23/03 entry.

2. *US Mobile Wireless Industry*

Overall, the US wireless market comprises 9.5% of the total global wireless market in terms of subscribers.⁷⁸ As of the fourth quarter of 2006, the wireless penetration rate per capita in the US was 76.87% (or about 231.4 million subscribers), 14% of which are prepaid subscribers.⁷⁹ Verizon Wireless, AT&T, Sprint, and T-Mobile comprise 80.7% of the US mobile wireless market in terms of subscribers,⁸⁰ and over 99% combined market share in terms of services revenue.⁸¹ In terms of technology, as of the third quarter of 2006, 80.3 million subscribers were served by GSM/UMTS/WCDMA⁸² (36% of total), 109.1 million subscribers were served by CDMA (49% of total), 5.6 million subscribers were served by TDMA (3% of total), and 29.2 million are served by other technology (12% of total).⁸³ This compares to the international average of 80% on GSM/UMTS/WCDMA, 14% on CDMA, and 2% on TDMA.⁸⁴

a. AT&T

Network Technology & Migration

AT&T's "core" wireless technology is GSM/GPRS/EDGE.⁸⁵ Prior to 2002, AT&T's network consisted of both TDMA (approximately 70%) and GSM (approximately 30%) technologies. In late 2001, AT&T began to overlay GSM/ GPRS throughout its TDMA network and upgrade its data network to EDGE (which delivers 2 to 3 times higher data rates than GPRS technology).⁸⁶ AT&T's GSM overlay was completed in early 2004, and as of December 31, 2005, more than 86% of AT&T's subscriber base was GSM-equipped and 95% of its minutes were being carried by the GSM network.⁸⁷ AT&T was using TDMA in 2005 in some markets pending subscriber migration to GSM-

⁷⁸ ML GWM 4Q06, Table 1.

⁷⁹ ML GWM 4Q06, Table 1.

⁸⁰ AT&T (26.3%), Verizon Wireless (25.5%), Sprint (18.1%), and T Mobile (10.8%). ML GWM 4Q06.

⁸¹ ML GWM 4Q06, Table 140.

⁸² Merrill Lynch Global Wireless Matrix groups technology into four categories -- GSM/UMTS/WCDMA, CDMA, TDMA and "other."

⁸³ ML Interactive GWM 3Q06.

⁸⁴ ML Interactive GWM 3Q06.

⁸⁵ AT&T 2006 Annual Report, p. 2. 99% of AT&T's total usage, based on MOUs, is on the GSM network, p. 31. See, also, AT&T Annual Report, p. 31.

⁸⁶ AT&T 2005 10-k, pp. 8-9.

⁸⁷ AT&T 2005 10-k, pp. 8-9.

based technologies, and at last report, AT&T had migrated virtually all of its wireless traffic away from TDMA and onto GSM/GPRS/EDGE. AT&T's EDGE technology provides average data speeds of between 100 kbps and 130 kbps.⁸⁸

Regarding 3G technology, as of October 2004, AT&T had deployed UMTS systems in six markets which allowed user average data download speeds between 220–320 Kbps, and in January 2005, Cingular field tested an improved version of UMTS with HSDPA, which has average mobile data throughput speed in the 400–700 Kbps range.⁸⁹ Development and deployment of UMTS with HSDPA by AT&T continued throughout 2005, and in December 2005 Cingular commercially launched these 3G networks in Austin, Baltimore, Boston, Chicago, Dallas, Houston, Las Vegas, Phoenix, Portland, Salt Lake City, San Diego, San Francisco, San Jose, Seattle, Tacoma and Washington DC, which included replacement of the six UMTS systems which had been previously deployed by AT&T Wireless.⁹⁰ These UMTS/HSDPA services were branded as “BroadbandConnect,” providing average mobile data connection speeds from 400 to 700 kilobits per second (Kbps) on the downlink and bursts to more than three megabit per second.⁹¹

AT&T plans to cease operating its analog and TDMA networks in early 2008.⁹²

Network coverage

As of December 31, 2006, AT&T served approximately 61 million customers and had access to licenses to provide wireless communications services covering an aggregate population of 296 million, or approximately 99% of the US population, including most of the 100 largest US metropolitan areas.⁹³ In terms of the population coverage of its mobile wireless network, as of December 31, 2006, AT&T Wireless' GSM/GPRS network covered about 282 million Americans or about 94% of the US population.⁹⁴ As of December 2006, AT&T's EDGE network covered more than 270 million people, or 90% of the US population.⁹⁵ Coverage numbers for AT&T's HSDPA 3G network were not publicly available.

⁸⁸ “AT&T Wireless Lives on the EDGE.” PC World. November 18, 2003.

⁸⁹ AT&T 2005 10-K, pp. 8-9.

⁹⁰ AT&T 2005 10-K, pp. 8-9.

⁹¹ AT&T 2005 10-K, p. 5.

⁹² AT&T 2006 Annual Report, p. 26.

⁹³ AT&T 2006 Annual Report, p. 31.

⁹⁴ http://www.att.com/Investor/ATT_Annual/downloads/ATT_2006_Annual_Report.pdf US population is assumed to be 300.9 million as of 12/31/06. See, US Census Bureau press release, 12/28/06.

⁹⁵ “Cingular 3G Coverage in More Than 160 Markets.” AT&T Press Release. 12/20/06. US population assumed to be 300.9 million.

Innovative Services

A history of AT&T's (or its predecessors') innovations in the mobile wireless industry is summarized in Attachment 2. For instance, AT&T was the first carrier in the world to announce a commercial deployment of EDGE technology.⁹⁶ Other AT&T mobile wireless innovations include: first carrier in North America to offer a UMTS/HSDPA enabled PDA,⁹⁷ first carrier in North America to launch the BlackBerry® 8800 (the slimmest BlackBerry handset available),⁹⁸ first carrier in North America to provide commercially available HSDPA 3.6 Mbps network card,⁹⁹ first carrier in world to offer EDGE enabled BlackBerry® device,¹⁰⁰ first carrier in US to make wireless video share call (in demo mode),¹⁰¹ exclusive US carrier of the Apple iPhone,¹⁰² and first in US to offer smartphone with Microsoft Mobile 5.0 operating system.¹⁰³

b. VERIZON

Network Technology & Migration

Verizon Wireless's primary wireless technology platform is CDMA based on spread spectrum digital radio technology, 1xRTT (CMDA2000) that was launched in January 2002 and is now deployed in all cell sites,¹⁰⁴ and provides data speeds of between 120-144 kbps.

Regarding 3G technology, in October 2003, Verizon began deploying Evolution-Data Optimized (EV-DO) Release 0¹⁰⁵ branded as BroadbandAccess, giving customers wireless access to the Internet, intranets, e-mail and other applications at speeds of 300-500 kilobits per second.¹⁰⁶ In 2006, Verizon began deploying CDMA 1x EV-DO

⁹⁶ Appendix 1, AT&T 6/30/03 entry.

⁹⁷ Appendix 1, AT&T 11/6/06 entry.

⁹⁸ Appendix 1 AT&T 2/12/07 entry.

⁹⁹ Appendix 1 AT&T 9/12/06 entry.

¹⁰⁰ Appendix 1 AT&T 11/1/05 entry.

¹⁰¹ Appendix 1, AT&T 1/5/07 entry.

¹⁰² Appendix 1 AT&T 1/9/07 entry.

¹⁰³ Appendix 1 AT&T 1/18/06 entry.

¹⁰⁴ Verizon 2006 Annual Report, p. 19.

¹⁰⁵ EV-DO Release 0 is the first generation of mobile broadband technology for CDMA carriers providing speeds of up to 2.4 Mbps. EV-DO Revision A is the second generation upgrade to EV-DO technology providing peak data speeds of 3.1 Mbps upstream and 1.8 Mbps downstream. See www.cdg.org/technology/3g_1xEV-DO.asp#rev A

¹⁰⁶ Verizon 2003 Annual Report, pp. 4-9.

Revision A technology and in February 2007, launched its EV-DO (Rev. A) high-speed wireless broadband network with average download speeds of 450-800 kbps (peaks of 3.1Mbps)¹⁰⁷ and average upload speeds of 300-400 kbps (peaks of 1.8 Mbps).¹⁰⁸

Network Coverage

Verizon's CDMA based network covers approximately 85% of the US population.¹⁰⁹ As of the fourth quarter of 2006, Verizon's 3G EV-DO high speed data network reached more than 200 million Americans (about 67% of the US population) in 30 states.¹¹⁰ At the end of the fourth quarter of 2006, one-third of Verizon's retail customers – 18.8 million subscribers – had broadband-capable devices, including phones, PDAs, BlackBerrys and laptop PC cards.

Innovative Services

A summary of Verizon's innovations in the mobile wireless industry over time is provided in Attachment 2. Verizon's innovations are focused on deploying next generation technology and services for its CDMA/EV-DO mobile wireless network. For instance, Verizon was the first US carrier to launch a 3G multimedia service for mobile phones (V CAST).¹¹¹ Other Verizon innovations include being the first US carrier to offer Ringback tones,¹¹² and the first-ever carrier to offer color screen mobile phone.¹¹³ Verizon also provides unique content over mobile phones including TiVo® Mobile and YouTube.¹¹⁴

c SPRINT NEXTEL

Network Technology & Migration

¹⁰⁷ "Verizon Wireless Selects Lucent Technologies for CDMA2000 1xEV-DO Revision A Technology." Verizon Press Release. 6/27/06.

¹⁰⁸ "Verizon Wireless Rolls Out Faster EV-DO Revision A Wireless Broadband Network in Greater Chicago Area." Verizon Press Release. 2/2/07.

¹⁰⁹ Verizon's network reaches about 255 million Americans. Assumes 300.9 million US. population. http://aboutus.vzw.com/bestnetwork/network_facts.html

¹¹⁰ Verizon 10-K 2006, p. 14. Assumes 300 million US. population.

¹¹¹ Appendix 1 Verizon 1/7/05 entry.

¹¹² Appendix 1 Verizon 11/16/04 entry.

¹¹³ Appendix 1 Verizon 11/29/00.

¹¹⁴ Appendix 1, Verizon 3/14/07 and 11/28/06 entries.

SprintNextel uses CDMA and iDEN¹¹⁵ “core” technologies.¹¹⁶ Sprint launched in 3Q02 nationwide “PCS Vision,” with typical speeds of 50 to 70 Kbps with maximum speeds of 144 Kbps.¹¹⁷ SprintNextel first introduced 3G EV-DO commercially in the 2Q05 and has plans to continue to expand EV-DO – a technology providing average download speeds of 400-700 kbps and average upload speeds of 50-70 kbps.¹¹⁸ Sprint launched its EV-DO Revision A network in October 2006, providing average download speeds of 600 kbps – 1.4Mbps and average upload speeds of 350-500 kbps.¹¹⁹ SprintNextel plans to announce 4G technology soon.¹²⁰

Sprint will in the future use QUALCOMM Qchat technology to provide walkie talkie over CDMA and will increase the interoperability between CDMA and iDEN.¹²¹

Network Coverage

Sprint’s CDMA network covers over 300 metro markets, including 297 of the 300 largest US metro areas, with a footprint covering 262 million people (or about 87% of the US population).¹²² SprintNextel’s iDEN network covers 300 metro areas, including 293 of the 300 top US markets and 274 million people (representing about 91% of the US population).¹²³

Regarding 3G technology, as of December 31, 2006, Sprint’s EV-DO covered 209 million people (or about 70% of the US population) and serves over 219 communities with populations of at least 100,000.¹²⁴ Sprint has also begun the next generation EV-DO technology (EV-DO Rev A) that, which as of December 2006, covered 60 million Americans (or about 20% of the US population)¹²⁵ – and by the third quarter of 2007,

¹¹⁵ Motorola is Sprint’s sole source provider of iDEN technology, except Black Berries with are manufactured by RIM. Sprint 2005, 10-K.

¹¹⁶ Sprint 10-K 3-31-06.

¹¹⁷ Sprint 200310-KA.

¹¹⁸ “Sprint ‘Powers Up’ Largest Mobile Broadband Network with More Upgraded Markets, Faster Speeds, New Device and Integrated GPS Capabilities.” Sprint Press Release. 1/30/07.

¹¹⁹ “Sprint ‘Powers Up’ Largest Mobile Broadband Network with More Upgraded Markets, Faster Speeds, New Device and Integrated GPS Capabilities.” Sprint Press Release. 1/30/07.

¹²⁰ Sprint 2006 Q2P.

¹²¹ Sprint Nextel Form 10-K, filed March 1, 2007 (period: December 31, 2006), p. 4.

¹²² Sprint Nextel Form 10-K, filed March 1, 2007 (period: December 31, 2006), p. 7.

¹²³ Sprint Nextel Form 10-K, filed March 1, 2007 (period: December 31, 2006), p. 7.

¹²⁴ Sprint Nextel Form 10-K, filed March 1, 2007 (period: December 31, 2006), pp. 4, 7, 37. See also, Sprint 10/24/06 Press Release.

¹²⁵ Sprint Power Up Faster Mobile Broadband Network in 10 More markets, Upgraded Coverage Reaches 60 million People.” Sprint Press Release. 12/12/06.

Sprint's wireless broadband network is expected to be completely upgraded with the faster EV-DO (Rev A) technology.¹²⁶

Innovative Services

A history of Sprint's innovations in the mobile wireless industry is provided in Attachment 2. One such example is that Sprint was the first company in the US to launch EV-DO Revision A technology.¹²⁷ Other Sprint innovations include: first carrier in US to offer a EV-DO Rev. A capable device,¹²⁸ first carrier in US to stream full-length films to mobile phones,¹²⁹ first in US to offer 2 megapixel camera phone,¹³⁰ first in US to offer music video ringers,¹³¹ first in US to launch instant over the air music download service,¹³² first in US to launch streaming music clip subscription service,¹³³ and first in US to offer a phone with a built in camera.¹³⁴

d. T-MOBILE (USA)

Network Technology & Migration

T-Mobile's "core" wireless technology is GSM/GPRS/EDGE technologies.¹³⁵ T-Mobile USA plans to offer its first commercial services based on UMTS-HSDPA technology in the second half of 2007,¹³⁶ and commenced 3G deployment in November 2006.¹³⁷ T-

¹²⁶ "Sprint Launches Nation's First EV-DO Revision A Mobile Broadband Network." Sprint Press Release. 10/24/06. See also, Sprint 2006 10-K, p. 4.

¹²⁷ Appendix 1 Sprint 10/24/05 entry.

¹²⁸ Appendix 1 Sprint 8/29/06 entry.

¹²⁹ Appendix 1 Sprint 12/12/05 entry.

¹³⁰ Appendix 1 Sprint 5/12/05 entry. Sprint was also first in US. to offer 1.3 MP camera phone. See Appendix 1 Sprint 7/8/04 entry.

¹³¹ Appendix 1 Sprint 3/14/05 entry.

¹³² Appendix 1 Sprint 10/31/05 entry.

¹³³ Appendix 1 Sprint 1/8/03 entry.

¹³⁴ Appendix 1 Sprint 10/15/02 entry.

¹³⁵ T-Mobile 2006 Form 20-F, p. 18.

¹³⁶ T-Mobile 2006 Form 20-F, p. 18.

¹³⁷ T-Mobile 20F, p. 79.

Mobile's roll-out of 3G in the US has been limited by a lack of suitable spectrum,¹³⁸ until recently, when it acquired the necessary spectrum.¹³⁹

Network Coverage

T-Mobile's GSM/GPRS 1900 voice and data network reaches about 277 million people in the US, representing about 92% of the US population, when roaming agreements are included.¹⁴⁰ T-Mobile's 3G network is currently being deployed and is not commercially available. As of 12/31/06, T Mobile had about 37,000 base station cells in the US.¹⁴¹ T-Mobile also has the largest Wi-Fi WLAN in the US with 8200 public access locations across country.

Innovative Services

A history of T-Mobile's mobile wireless innovations is provided in Attachment 2. As this attachment shows, T-Mobile was the first in the US to offer ringback tone service.¹⁴² Other innovations for T-Mobile include offering the slimmest bar phone available in the US¹⁴³ and first in US to offer video messaging service.¹⁴⁴

B. TECHNOLOGY COMPARISON OF CANADIAN AND US MOBILE WIRELESS COMPANIES

1. Technology Standards

¹³⁸ The UMTS requirement for 5 MHz frequency slots, much larger than that required for existing networks, can create difficulty for US operators as many are only licensed for 5MHz in each direction in certain areas, and as such cannot run both their existing system and UMTS in the areas affected. (Source: <http://www.mobilecomms-technology.com/projects/tmobileusa/>).

¹³⁹ Until October 2006 the company was constrained by a severe shortage of wireless spectrum in the US, which meant inferior reception in many areas and many more network busy signals than its bigger rivals. In the latest Federal Communications Commission (FCC) spectrum auction (auction 66) T-Mobile USA bid \$4.2bn to ensure that it was the high bidder for 120 licenses in markets across the US and so would gain use of a usable range of AWS (advanced wireless services) spectrum in the 1.7GHz and 2.1GHz bands for data and voice services. T-Mobile USA has more than doubled its average frequency coverage in the top 100 US markets, from 25.9MHz to 52.2MHz. (Source: <http://www.mobilecomms-technology.com/projects/tmobileusa/>)

¹⁴⁰ "T-Mobile USA Exceeds 25 Million Customer Milestone and Reports Fourth Quarter and 2006 Results." T-Mobile 4th Quarter Press Release, 3/1/07.

¹⁴¹ T-Mobile 2006 Form 20-F, p. 77.

¹⁴² Appendix 1 T-Mobile 12/8/04 entry.

¹⁴³ Appendix 1 T-Mobile 9/12/06 entry. See also Sprint 5/2/06 entry.

¹⁴⁴ Appendix 1 T-Mobile 3/27/03 entry.

The State of Wireless Technologies In Canada

Table III.1 provides a summary of “core” (most prevalent standard) mobile technology adopted by Canadian and US national mobile carriers.

Table III.1. Subscribers by Technology in Canada, US and World*

Country	Metrics	GSM/ UMTS/ WCDMA	CDMA	TDMA	OTHER	TOTAL
Canada	Total Subscribers (M)	6.5	11.0	0.3	0.7**	18.4
	% Subscribers	35%	59%	2%	4%	100%
	Major Carriers	<i>Rogers</i>	<i>Bell Canada, TELUS</i>	<i>Rogers</i>	<i>TELUS</i>	
US	Total Subscribers (M)	80.3	109.1	5.6	29.2	224.2
	% Subscribers	36%	49%	3%	12%	100%
	Major Carriers	<i>AT&T, T-Mobile</i>	<i>Verizon, Sprint</i>	<i>AT&T</i>	<i>Sprint</i>	
All Countries	Total Subscribers (M)	1,851.2	320.4	47.4	85.5	2,304.6
	% Subscribers	80%	14%	2%	4%	100%

* -- Canada data based on CWTa company-level 4Q2006 subscribers. TDMA (Rogers) subscribers estimated from www.angustel.ca/update/up578.html. US and All Countries data based on Merrill Lynch Telecom Services Research Interactive Global Wireless Matrix, January 2007 (data for 3Q 2006). Note that the Merrill Lynch estimate for Canadian TDMA (2 million in 3Q2006, which is also in the 2004 edition of Merrill Lynch Matrix) appears to be too high.

** -- An estimate for TELUS "Other" (Mike) subscribers based on EOY 2000 share of Clearnet (Mike) subscribers in total TELUS subscribers. Note that for category "Other" Merrill Lynch reports an estimate of 3.7 million subscribers in Canada, which appears to be too high.

As seen from table III.1, the prevalent wireless standard in both Canada and the US is the digital CDMA standard (59% and 49% of total subscribers respectively) – the standard used by Bell Mobility and TELUS in Canada, and by Verizon and Sprint (non-Nextel customers) in the US. The second most prevalent standard in Canada and the US is GSM, comprising 35% of the total subscribers in Canada and 36% of the total subscribers in the US, which is used by Rogers in Canada and AT&T and T-Mobile in the US. Canada and US have a similar amount of TDMA in their networks (2% for Canada and 3% for the US), both of which are phasing out this technology. Rogers is turning down its TDMA networks at the end of May 2007, while AT&T is scheduled to turn down its TDMA network in early 2008.

The primary difference between the Canadian and US markets in terms of technology used by subscribers is the higher percentage of “other” wireless technologies – e.g., iDEN – used by subscribers in Canada (4% in Canada and 12% in US). Table III.1 above also shows that the makeup of the global wireless technology used is different than that found in Canada and the US, with a higher percentage (80%) of global wireless subscribers

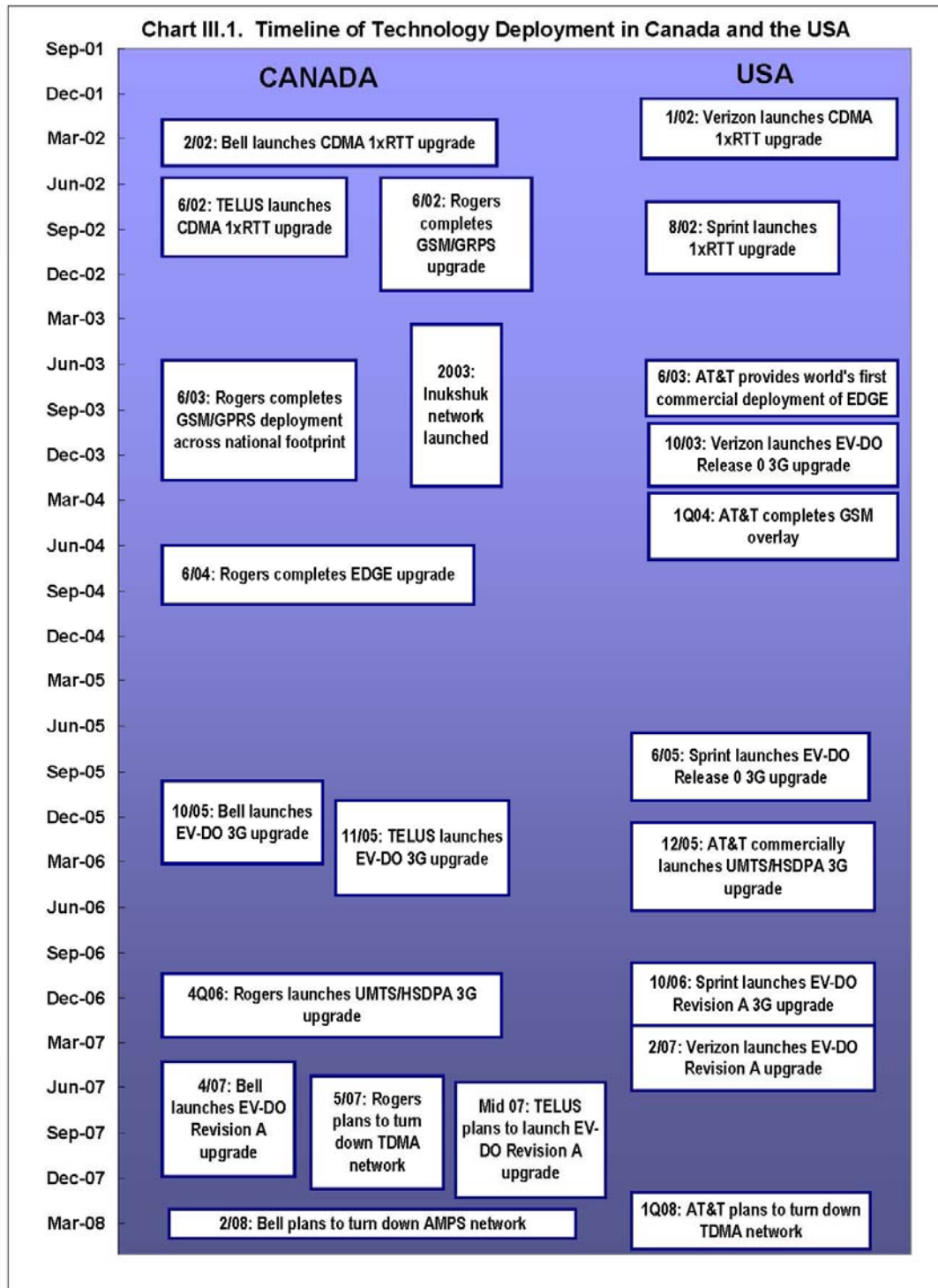
using the GSM standard and a lower 14% using CDMA technology. The amount of TDMA in the global wireless customers (2%) is similar to that in Canada and the US.

Also evident in the table above is the sheer difference in size of the mobile wireless markets in Canada versus the US. The US mobile wireless market (224.18 million subscribers) is more than 12 times the size of the Canadian market (18.43 million subscribers) in terms of subscribers, and the US mobile wireless market comprises 9.7% of the total global market (in subscribers) compared to Canada's 0.8% of the total.

2. Timing of Technology Innovations

The following Chart III.1 shows how the various carriers deployed technology over time in Canada and the US:

The State of Wireless Technologies In Canada



As seen on chart III.1, regarding 2.5 G technology for CDMA based carriers, Verizon and Bell Mobility launched their 1xRTT upgrades in the US and Canada, respectively, at approximately the same time in early 2002. TELUS launched its 1xRTT upgrade in Canada in June 2002 – five months after Verizon’s launch in the US and four months after Bell Mobility’s launch in Canada; and Sprint launched its 1xRTT upgrade in August 2002 – six months after Bell Canada’s launch, seven months after the US launch and two months after TELUS launches in Canada. Therefore, while a US carrier was first to launch 1xRTT, the first Canadian launch followed within 1 month of the US launch, and both of Canada’s CDMA based providers launched 1xRTT before Sprint – a major US carrier – launched. For GSM-based carriers, the first 2.5G upgrade – defined as upgrade from TDMA to GSM/GPRS and or EDGE – occurred in June 2002 when Rogers completed its GSM/GPRS overlay in the 1900 megahertz frequency¹⁴⁵ (Rogers completed the deployment of GSM/GPRS operating in the 850Mhz spectrum across its national footprint in 2003),¹⁴⁶ which predates AT&T’s completion of its GSM overlay which was completed in 1Q04. Though AT&T was the first to commercially *launch* EDGE technology in June 2003, Rogers *completed* its EDGE deployment within one year of AT&T’s launch (in June 2004).

Regarding 3G technology for CDMA based carriers, Verizon was the first to launch with its EV-DO Release 0 upgrade launched in October 2003 and significantly expanded in January 2004. Sprint was second to deploy its EV-DO technology Release 0 in July 2005, about 20 months after Verizon first launched EV-DO Release 0. Bell Mobility launched EV-DO Release 0 in Canada in October 2005 - 3 months after Sprint’s launch in the US, and TELUS launched EV-DO Release 0 in November 2005 – 4 months after Sprint’s launch. Besides Verizon, which deployed 3G EV-DO Release 0 twenty months before the second carrier deployed it, the remaining CDMA based carriers (Sprint, Bell Mobility and TELUS Mobility) all launched 3G Release 0 in a 4 – 5 month time period. Regarding EV-DO Revision A technology, Sprint was the first to launch in October 2006, followed by Verizon in February 2007, and most recently, by Bell Mobility on April 30, 2007. TELUS Mobility has plans to launch EV-DO Revision A later in 2007.

Regarding 3G deployment for GSM-based carriers, AT&T launched UMTS/HSDPA in December 2005 in the US, and Rogers launched UMTS/HSPDA in Canada in the 4Q06 – within one year of AT&T’s launch. T-Mobile began deploying 3G UMTS technology in November 2006, with most work to be done in 2007, and plans to start offering 3G services in several markets by mid-2007.

¹⁴⁵ Rogers 2004 Annual Report, p. 24.

¹⁴⁶ Rogers 2004 Annual Report, p. 24.

3. Carrier-Specific Coverage

The network coverage data discussed above for each wireless carrier was taken from company reports, as well as information provided by the companies themselves (in the case of the Canadian companies). For companies reporting network coverage in terms of people covered, assumptions were made regarding the population of the country to calculate coverage as a percent of total population. Best efforts have been made to ensure that this coverage data excludes coverage associated with resale and roaming agreements. In addition, mobile wireless network coverage is constantly evolving due to additional deployment and investment, so the date on which the coverage is measured provides only a snapshot in time of that coverage.

The data on coverage shows that as a percentage of total Canadian population, the digital networks of Bell Mobility, Rogers Wireless and TELUS Mobility cover 97%, 94% and 95%, respectively. In the US, the digital networks of AT&T, Sprint, and Verizon Wireless cover 94% (90% for EDGE), 87%, and 85% of the total US population, respectively. The GSM providers in the two countries compare very favorably, with Rogers' network covering 94% of the Canadian population and AT&T's network covering 94% of the US population. Bell Canada leads the CDMA providers with 97% coverage of the Canadian population, followed by TELUS (95% of the Canadian population), Sprint (87% of the US population), and Verizon (85% of US population).¹⁴⁷

Regarding coverage of 3G technology (EV-DO for CDMA carriers and HSDPA for GSM carriers) for Canada, Bell Mobility's EV-DO network will cover 67% of the Canadian population at the end of 2Q07,¹⁴⁸ Rogers HSPDA network will cover 60% of the Canadian population at year end 2007,¹⁴⁹ and TELUS' EV-DO network covers 65% of the Canadian population as of 2Q07. By comparison, in the US, Verizon's and Sprint's EV-DO networks covered 67% and 70% of the US population as of 4Q06. Coverage data for AT&T's HSDPA network are not publicly available. A comparison of the CDMA carriers shows that 3G coverage in Canada (around 65% coverage of the Canadian population for both Bell Mobility and TELUS) compares favorably to that in the US (around 70% of the US population for both Verizon and Sprint). A comparison of GSM 3G coverage between the two companies due to a lack of data for AT&T's 3G coverage in the US.

Also, as mentioned above, both Verizon and Sprint have deployed EV-DO Revision A technology. Sprint's EV-DO Revision A technology covers about 20% of the US

¹⁴⁷ Note: according to another source – www.cdg.org/worldwide/index.asp - Verizon has deployed EV-DO in all markets.

¹⁴⁸ This number is estimated. Bell Mobility's 3G network covered about 60% of the Canadian population in 1Q07.

¹⁴⁹ This is Rogers Wireless' estimated coverage for year end 2007.

population and there is not available data regarding Verizon's EV-DO Revision A coverage. Bell Mobility's EV-DO Revision A technology was just recently launched on April 30, 2007 and is, at this time, available in areas of Ontario, with plans for deployment to additional areas in 2007.

4. Canadian Innovations

Canada is responsible for many mobile wireless "firsts" in North America, demonstrating a commitment to innovation. One such example is inter-carrier messaging. On April 2, 2002, Canada announced North America's first inter-carrier text messaging network, allowing for the first time in North America real-time, two-way text messaging between 4 different companies.¹⁵⁰ Canada also led the US, in announcing the first inter-carrier multimedia messaging among carriers on June 29, 2005¹⁵¹ - the US made this announcement about a week after Canada.¹⁵² Canadian companies have also been active in cross-border text¹⁵³ and picture¹⁵⁴ and multimedia¹⁵⁵ messaging with US carriers. Other "firsts" in North America or Canada show that Canada either leads or is generally on par with the US in terms of general innovation.

- 05/1998: Bell Mobility first in world to provide Tri-mode phones (AMPS/CDMA 850/1900).
- 07/1998: Bell Mobility is first North American wireless company to introduce switchless trunkless Pre-paid.¹⁵⁶
- 05/24/00: Bell Mobility provides North America's first Instant Message service on Digital PCS phones.¹⁵⁷
- 12/20/00: Bell Mobility announces first color display mobile phone in Canada.¹⁵⁸ The first color display was introduced in the US by Verizon on 11/29/00,¹⁵⁹ less than one month earlier.
- 05/03: Bell Mobility provides world's first location based service Mr. Rescue.

¹⁵⁰ Bell Mobility 4/2/02 Press Release.

¹⁵¹ TELUS 6/29/05 Press Release.

¹⁵² AT&T, T-Mobile, and Sprint 7/7/05 Press Releases. T-Mobile 7/7/05 Press Release.

¹⁵³ Bell Mobility 1/23/03 Press Release.

¹⁵⁴ Bell Mobility 2/24/04 Press Release.

¹⁵⁵ TELUS 6/21/06 Press Release.

¹⁵⁶ Bell Mobility responses to QSI information requests, p. 2.

¹⁵⁷ Bell Mobility 5/24/00.

¹⁵⁸ Bell Mobility 12/20/00 Press Release.

¹⁵⁹ Verizon 11/29/00 Press Release.

- 11/30/04: TELUS introduces Fastap™, the world's first wireless phone that integrates text keys around a standard numeric phone keypad – making it easier to send text messages and enter contacts in contact list.
- 10/14/04: TELUS introduces first 1.3MP in Canada.¹⁶⁰ By comparison, Sprint announced the introduction of its first 1.3MP camera on July 8, 2004 – three months earlier than TELUS' introduction.
- 05/09/05: Rogers provides North America's first full music download.¹⁶¹
- 02/01/06: Rogers launches North America's first Podcast Service over mobile phones.¹⁶² By comparison, AT&T announced mobile podcast in October 2006,¹⁶³ eight months after Rogers' launch.
- 06/06/06: Rogers provides first Name Display service – allowing a customer to see the name and number of the party calling even if not in contacts list - in North America.¹⁶⁴
- 02/15/07: Bell Mobility provides first Canadian full length pay per view movie service.¹⁶⁵ By comparison, Sprint announced on 12/12/05 the availability of the first mobile entertainment with full length films (Mspot)¹⁶⁶ – about two months earlier.
- 04/02/07: Rogers announces North America's first video calling service.¹⁶⁷ AT&T demonstrated the first US video share call on 1/5/07 at a trade show.¹⁶⁸

C. CASE STUDIES

1. Phones and PDA Devices

a. Blackberry® Devices

From the standpoint of consumers, phones, smartphones and other mobile handheld devices such as Personal Digital Assistants (“PDAs”) constitute the “face” of technological developments. Therefore, the availability and the speed of adoption of

¹⁶⁰ TELUS 10/14/04 Press Release.

¹⁶¹ Rogers 5/9/05 Press Release.

¹⁶² Rogers 2/1/06 Press Release.

¹⁶³ AT&T 10/2/06 Press Release.

¹⁶⁴ Rogers 6/6/06 Press Release.

¹⁶⁵ Bell Mobility 2/15/07 Press Release.

¹⁶⁶ Sprint 12/12/05 Press Release.

¹⁶⁷ Rogers 4/2/07 Press Release.

¹⁶⁸ AT&T 1/5/07 Press Release.

these devices by mobile carriers provide useful measures of technological deployment and innovations. For mobile data services, one of the popular series of handheld mobile devices for business use is the BlackBerry® device that combines the usual PDA applications such as an address book and a calendar with telephone and e-mail capabilities. It typically features a full (“QWERTY”) keyboard and a scrolling wheel to facilitate data entry and navigation. BlackBerry® utilizes wireless data networks of mobile phone service companies to support e-mail, mobile telephone, text messaging, web browsing and other wireless information services.

Developed by the Canadian company Research In Motion (RIM),¹⁶⁹ BlackBerry® was first introduced in 1999 and first made headway in the marketplace by concentrating on e-mail for corporate employees on the move. Cingular was the first US mobile carrier to establish a wholesale relationship with RIM for the BlackBerry® platform (1999).¹⁷⁰ Rogers first signed a supply agreement for BlackBerry® handhelds in March 2000.¹⁷¹ Also dating back to 2000 are the wholesale relationships of RIM with Bell Canada¹⁷² and Microcell (later merged with Rogers).¹⁷³ The US member of T-Mobile group (now T-Mobile USA), VoiceStream, signed a supply agreements for BlackBerry® at the end of 2001,¹⁷⁴ followed by the joint announcement of Nextel (later merged with Sprint) and RIM to develop BlackBerry® for Nextel’s iDEN network.¹⁷⁵ AT&T Wireless (later merged with Cingular; now AT&T) signed an agreement for BlackBerry® at the beginning of 2002.¹⁷⁶

Currently BlackBerry® devices are offered to consumer and business markets by all major mobile carriers in Canada and the US. As explained above, three of the seven major Canadian and US mobile carriers operate on GSM network (Rogers, AT&T and T-Mobile), four carriers operate a CDMA network (Bell Mobility, TELUS Mobility, Verizon and Sprint (non-Nextel customers)), and two other carries operate the iDEN

¹⁶⁹ See <http://www.rim.net/index.shtml>.

¹⁷⁰ See http://www.rim.net/news/press/2004/pr-25_02_2004-01.shtml. Note that BlackBerry® products include not only the BlackBerry® handheld devices, but also special software, including the software necessary to integrate BlackBerry® devices into corporate e-mail systems and e-mail software that runs on non-BlackBerry® devices.

¹⁷¹ See http://www.rim.net/news/press/2000/pr-15_03_2000.shtml.

¹⁷² See http://www.rim.net/news/press/2000/pr-19_09_2000.shtml.

¹⁷³ In 2000 Microcell signed a supply agreement with RIM (see http://www.rim.net/news/press/2000/pr-14_12_2000.shtml), which was preceded by joint testing of high-speed mobile data services based on Microcell’s GSM General Packet Radio Services (GPRS) wireless technology. (See http://www.rim.net/news/press/2000/pr-04_05_2000.shtml).

¹⁷⁴ See http://www.rim.net/news/press/2001/pr-30_10_2001.shtml. Note that for its European operations, T-Mobile signed an agreement for BlackBerry® in early 2002 (see http://www.rim.net/news/press/2002/pr-19_02_2002.shtml).

¹⁷⁵ See http://www.rim.net/news/press/2001/pr-20_12_2001-02.shtml.

¹⁷⁶ See http://www.rim.net/news/press/2002/pr-29_01_2002-02.shtml.

network – Nextel (Sprint) in the US, and TELUS Mobility (“Mike’s” customers) in Canada. Because BlackBerry® devices rely on the networks of mobile carriers, adoption rates of specific BlackBerry® models by mobile carriers are influenced by the date when a particular device became available for a particular network standard. Two most recent BlackBerry® products, which are also RIM’s first two consumer-oriented devices, are the smallest and lightest full QWERTY BlackBerry® Curve™ and the compact BlackBerry® Pearl (featuring a reduced key keyboard). Specifically, the most recent BlackBerry® product, the Curve, though not yet currently¹⁷⁷ offered by any provider, is being announced as coming soon to AT&T and Rogers.¹⁷⁸ The other model, BlackBerry® Pearl, is currently available only from the GSM-based mobile carriers.

Table III.2 below provides a comprehensive listing and adoption dates of all BlackBerry® devices currently offered by the seven major Canadian and US mobile wireless carriers. (As noted above, BlackBerry® Curve, though introduced by RIM, is not yet available in retail stores).

Table III.2. Adoption Dates of Currently Offered BlackBerry ® Devices*

					
Introduced by	8800 Series	Pearl	8700 Series	7200 Series	7130 Series
AT&T	2/12/2007	11/30/2006	11/1/2005	9/28/2004	6/8/2006
Rogers	2/12/2007	9/7/2006	11/9/2005	10/22/2004	
T-Mobile	4/20/2007	9/7/2006	4/18/2006	3/11/2005	
Bell Canada	4/25/2007	not available	9/2006**	2/16/2005	11/2005**
Sprint	not available	not available	9/20/2006	6/22/2005***	5/31/2006****
TELUS	not available	not available	11/29/2006	3/2/2005	12/15/2005
Verizon	4/25/2007	not available	9/12/2006	2/7/2005	11/21/2005

* -- Press Release dates. Source: RIM Press Release Archives (<http://www.rim.net/news/press/index.shtml>).

Device images taken from RIM Image Gallery at <http://www.rim.com/newsroom/media/gallery/index.shtml>

Availability based on company web sites as of May 5, 2007.

T-Mobile also offers 7105t; Sprint offers 7100i (introduced on 10/14/05) for Nextel customers and 7520.

** -- Dates provided by company to QSI.

*** -- Not listed as current offer on Sprint web site.

**** -- Based on Sprint Press Release.

¹⁷⁷ As of May 5, 2007.

¹⁷⁸ See http://www.rim.net/news/press/2007/pr-04_05_2007-01.shtml and http://www.rim.net/news/press/2007/pr-03_05_2007-05.shtml.

As table III.2 shows, each carrier offers three to five BlackBerry® devices. GSM-based carriers are adopting the recent models of BlackBerry® devices soon after they become available from the developer, RIM, and close to each other. For example, BlackBerry® Pearl, which was introduced by RIM in September 2006, is currently offered by Rogers in Canada, and AT&T (Cingular) and T-Mobile in the US. Rogers and T-Mobile announced its availability to their customers on the same day – September 7, 2006 (available in stores on September 12, 2006 for T-Mobile, and October 2006, for Rogers).¹⁷⁹ AT&T (Cingular) followed two months later with a November 30, 2006 announcement.¹⁸⁰ These models are not yet available¹⁸¹ from carriers utilizing CDMA and iDEN-based networks. The BlackBerry® 7130, a non-QWERTY keyboard smartphone was first introduced for CDMA-based carriers. Verizon and Bell Canada introduced the BlackBerry® 7130e in the same month (November 2005), followed by TELUS' introduction the next month on December 15, 2005.¹⁸² Sprint launched the BlackBerry® 7130e in the US about six months after TELUS launched it in Canada.

Table III. 2 also refutes the notion that Canada lags the US in adopting new handsets and devices. Or, in other words, Canadian wireless companies introduce wireless handsets and devices at approximately the same time as the US companies. Take the BlackBerry® 7200 series, for example. The first GSM carrier to launch this device was AT&T in the US in September 2004, followed closely by Rogers in Canada the next month, followed, in turn, by T-Mobile in March 2005 (after some of the CDMA-based carriers). The first CDMA carrier to launch the BlackBerry® 7200 series was Verizon on February 7, 2005, followed closely by Bell Mobility on February 16, 2005 (9 days later) and TELUS Mobility on March 2, 2005 (less than a month after Verizon). Sprint launched this model in June 2005, more than 3 months after the last carrier launched it in Canada. The results of the BlackBerry® 8700 series is similar, with GSM-based AT&T launching this model on November 1, 2005, followed by Rogers about a week later (11/9/05), and T-Mobile about five months later in April 2006. CDMA-based carriers Bell Mobility (in Canada) and Verizon and Sprint (in the US) introduced the 8700 series in the same month (September 2006), followed by TELUS.

In addition to availability of BlackBerry® handheld devices, it is useful to look at the “penetration” (or, equivalently, subscribership) of BlackBerry® products in both countries. RIM annual reports contain information on total worldwide subscribership of BlackBerry® wireless platform, as well as the distribution of total revenues between countries.¹⁸³ Using these two data sets, we estimated subscribership to the BlackBerry®

¹⁷⁹ See http://www.rim.net/news/press/2006/pr-07_09_2006-02.shtml and http://www.rim.net/news/press/2006/pr-07_09_2006-01.shtml.

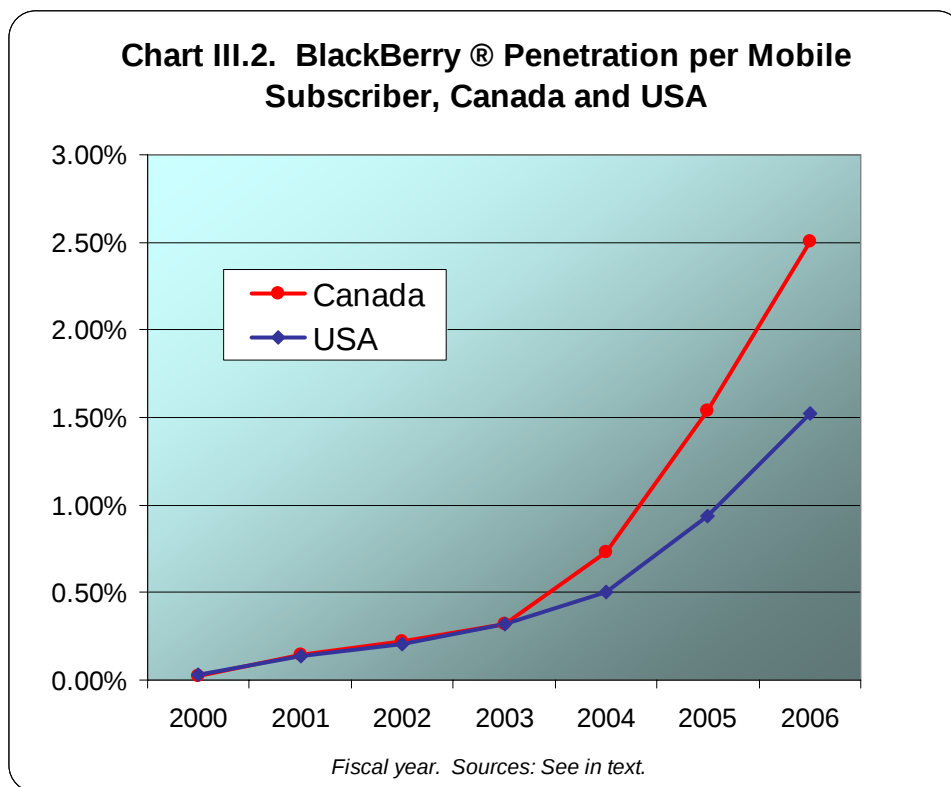
¹⁸⁰ See http://www.rim.net/news/press/2006/pr-30_11_2006-01.shtml.

¹⁸¹ As of April 4, 2007.

¹⁸² See, TELUS 12/8/05 press release.

¹⁸³ See, for example, RIM 2006 Annual Report, p. 4 (subscribership) and p. 74 (revenue by region/country).

wireless platform by country.¹⁸⁴ Next, we calculated penetration of BlackBerry® platform in both countries on a per wireless subscriber basis.¹⁸⁵ Chart III.2 below depicts BlackBerry® penetration as a share of total mobile wireless subscribers.



As seen in the chart above, although, early on, the Canadian and US BlackBerry® penetration rates were very close, in recent years Canada has exceeded the US penetration rates for the BlackBerry® wireless platform, and this lead over the US has increased over time. In terms of BlackBerry® penetration per mobile wireless subscriber, Canada (with 2.5% rate) currently exceeds the US (with 1.5%) by one percentage point.

¹⁸⁴ For example, Canadian subscribers are estimated as worldwide subscribers times the percent of Canada in total revenue. Note that this analysis assumes that revenues per subscriber are equal in both countries.

¹⁸⁵ Sources for mobile wireless subscribership: CWTA (Canada mobile wireless subscribers) and FCC 11th Report of Wireless Competition, Table 1 (US mobile wireless subscribers 2000-2005). Note that because RIM reports data for fiscal year (ending in Spring of each year with the specific ending date varying by year), and mobile wireless subscriber data are for end of calendar year, BlackBerry® penetration per mobile wireless subscriber was calculated for each year using mobile wireless subscribers for the preceding year.

To summarize, our analysis suggests that Canada is slightly ahead of the US in terms of BlackBerry® wireless platform penetration despite being behind the US in terms of “mass market” mobile voice penetration. This finding corroborates our analysis that Canada leads the US in terms of high-end/value added services.

b. Other Devices

Motorola RAZR™ is a camera phone best known for its distinctive fashionable look.¹⁸⁶ At the time of its introduction, it was the slimmest phone available, and its cumulative sales world wide made it the most popular phone in history.¹⁸⁷ Table III. 3 below provides the timeline of the mobile carriers’ offerings of this phone to their subscribers.

Table III.3. Adoption Dates of Motorola RAZR™ Handset*

Availability	Carrier Network Standard	Date
AT&T (Cingular)	GSM	Nov-04
Rogers	GSM	Feb-05
T-Mobile	GSM	Jun-05
Verizon	CDMA	Dec-05
Bell Canada	CDMA	Feb-06
TELUS	CDMA/iDEN	Feb-06
Sprint	CDMA/iDEN	Oct-06

* -- Announcement dates. Based on Motorola News Releases available at <http://www.motorola.com/mediacenter/news/archive.jsp>.

Source for Bell Canada: <http://www.bce.ca/en/news/releases/bm/2006/01/24/73285.html>.

Source for TELUS: http://en.wikipedia.org/wiki/Razr#_note-2#_note-2.

As seen from table III.3, Motorola RAZR™ was first adopted by GSM-based carriers. The US carrier Cingular (now AT&T) was the first to introduce this model in North America (in November 2004), followed by Rogers (February 2005) – the Canadian GSM-based carrier – and T-Mobile (March 2005) - the third GSM-based carrier.

¹⁸⁶ See, for example, a review of its appearances on popular US TV shows at http://en.wikipedia.org/wiki/Razr#_note-2#_note-2 and an introduction of special edition RAZR™ by high-end fashion designer Dolce and Gabbana in 2005 (<http://www.motorola.com/mediacenter/news/archive.jsp?globalObjectId=Q4-2005>).

¹⁸⁷ See for example, Motorola reporting the shipment of 50 millionth RAZR phone in July 2006 (http://www.motorola.com/mediacenter/news/detail.jsp?globalObjectId=7031_6980_23).

Canadian CDMA-based carriers, Bell Canada and TELUS, adopted Motorola RAZR™ in February 2006, 2 months from the date on which Verizon introduced this device on the CDMA network in the US. Sprint was a distant last, offering this phone seven months after it became available to Canadian CDMA-based subscribers.¹⁸⁸ Currently, this phone is offered by all seven major Canadian and US mobile carriers.

As with Blackberry® devices, Motorola RAZR™ was first developed for GSM networks. This is expected given the global nature of Motorola Corporation and the fact that the majority of world mobile phone subscribers are GSM-based. Recall, that 80% of world-wide mobile subscribers are served by GSM networks, compared to 36% of US and 35% of Canadian subscribers being served by GSM.¹⁸⁹

The information above shows two primary points. First, mobile wireless handset technology gets focused first by GSM technology, and second, there is not a significant lag in the introduction of wireless handsets and devices in Canada relative to the US. To the latter point, there are additional examples that show that adoption of wireless handsets in Canada does not lag to a significant degree the US, and in some instances, Canada leads the US in handset/device introduction. The following is a sample listing of some of these devices and introduction dates in Canada and the US:

- Motorola MOTO Q¹⁹⁰: TELUS launched this device in Canada on June 15, 2006¹⁹¹ and Verizon launched this device in the US on May 31, 2006¹⁹² - about two weeks before TELUS's launch.
- Treo 650¹⁹³: this device is one that was first introduced by a CDMA carrier. Sprint introduced this device in the US in October 2004.¹⁹⁴ The GSM carriers followed a few months later, with AT&T introducing this device in February 2005¹⁹⁵ and Rogers introducing it about one and a half months after AT&T, in

¹⁸⁸ As is evident from Sprint's press release (http://www2.sprint.com/mr/news_dtl.do?page=show&id=13840), Sprint Motorola RAZR™ came with distinctive features, including its association with the (PRODUCT) RED™ campaign, which is a global partnership aimed at raising money and awareness of AIDS in Africa.

¹⁸⁹ Merrill Lynch Telecom Services Research *Interactive Global Wireless Matrix, January 2007* (data for 3Q 2006).

¹⁹⁰ The MOTOQ by Motorola includes a QWERTY keyboard, 1.3MP camera, miniSD memory card, full-duplex speakerphone, powered by Microsoft Windows Mobile 5.0.

¹⁹¹ TELUS Press Release 6/15/06.

¹⁹² Verizon Press Release 5/22/06.

¹⁹³ The Treo™ 650 smartphone by palmOne includes 23MB storage, VGA 2x digital zoom camera, MP3 player, and QWERTY keyboard.

¹⁹⁴ Sprint Press Release 10/25/04.

¹⁹⁵ AT&T Press Release 2/2/05. First device to use AT&T's EDGE network.

- March 2005.¹⁹⁶ TELUS launched this device in November 2005, about nine months after the GSM carriers.¹⁹⁷
- Treo 680¹⁹⁸: this device is currently offered by GSM carriers AT&T and Rogers. AT&T launched this device on November 22, 2006,¹⁹⁹ while Rogers launched it about two weeks later on December 5, 2006.²⁰⁰
 - Nokia E62²⁰¹: this phone is provided by the GSM carriers AT&T and Rogers, both of which announced the availability of the device in September of 2006.²⁰² Rogers was the first carrier in North America to introduce this device.
 - HP iPAQ 6300 series²⁰³: this device, too, is provided by the GSM carriers AT&T and Rogers, both of which announced its availability in June 2005 (Rogers announced four days before AT&T).²⁰⁴
 - UTStarcom Pocket PC 6700 series²⁰⁵: this device is provided by CDMA carriers Verizon and TELUS Mobility (the first device in Canada with Windows Mobile 5.0). TELUS announced availability on November 18, 2005,²⁰⁶ while Verizon announced availability on January 4, 2006.²⁰⁷
 - Sierra Wireless AirCard 580: this network card was developed for the EV-DO 3G network. Sprint announced on March 3, 2005²⁰⁸ that this card would be available later in 2005 for its EV-DO network, while TELUS announced the availability of this card on May 4, 2005, two months after Sprint's announcement.²⁰⁹

¹⁹⁶ Rogers 3/14/05 Press Release.

¹⁹⁷ TELUS 11/11/05 Press Release.

¹⁹⁸ The Treo™ 680 smartphone includes internal antenna, QWERTY keyboard, MP3 player, integrated camera, video camera and video player.

¹⁹⁹ AT&T 11/22/06 Press Release.

²⁰⁰ Rogers 12/5/06 Press Release.

²⁰¹ The Nokia E62 includes push email capabilities, enhanced web browser capabilities, 2.8" display, and more.

²⁰² See, AT&T 9/12/06 Press Release, and Rogers 9/6/06 Press Release and 12/21/06 Press Release. Rogers made this device available to customers in December 2006.

²⁰³ The HP iPAQ h6320 (non-camera) and h6325 (built-in camera) offer global roaming capabilities, and the industry's first devices to provide 3-way integrated wireless voice and data capabilities over GSM/GPRS, WiFi, and Bluetooth™ technology.

²⁰⁴ See, Rogers 6/2/05 Press Release and AT&T 6/6/05 Press Release.

²⁰⁵ UTStarcom 6700 Pocket PC includes Windows Mobile® 5.0, Microsoft Office, QWERTY keyboard, 1.3MP camera and video camera with 8x digital zoom, built-in WiFi capability, Bluetooth for hands free capability, miniSD memory card, 2-way speakerphone.

²⁰⁶ TELUS 11/18/05 Press Release.

²⁰⁷ Verizon 1/4/06 Press Release.

²⁰⁸ Sprint 3/3/05 Press Release.

²⁰⁹ TELUS 5/4/05 Press Release.

- Motorola i580²¹⁰ and i880²¹¹ phones: these models are iDEN phones provided by the two iDEN carriers – TELUS Mobility and Sprint (Nextel). The i580 is a “rugged” iDEN phone and the i880 is the first iDEN phone with a 2.0 megapixel camera. Sprint (Nextel) and TELUS both announced the availability of the Motorola i580 in July 2006 (Sprint on July 6, 2006²¹² and TELUS on July 17, 2006)²¹³ and both announced the availability of the i880 iDEN picture phone in November 2006.²¹⁴

2. Next-Generation Mobile Wireless Services

The services available to any mobile wireless customer is a function of the network technology deployed and devices/handsets available. A comparison of the carriers’ network technology and available mobile wireless devices is provided above – this section compares the services that are available to customers. Multimedia and entertainment applications are the special focus of this analysis because these services reflect the “latest and greatest” services available over mobile wireless devices, and often are available from more recent handsets/devices. The services listed below are based on research of the companies’ websites and press releases, and availability varies by handset and geographic area.

- **Bell Mobility:** Bell Mobility’s entertainment packages include the following:
 - o Movies²¹⁵: allows customers to watch full-length feature films on the mobile phone.
 - o TV:²¹⁶ real-time TV on a mobile phone, currently about 30 channels, including the Shopping Network, TLC and the Weather Network. Also allows viewing of videos (1-4 minute clips) either by download or streaming.²¹⁷

²¹⁰ The Motorola i580 includes a 1.3MP camera phone, Bluetooth wireless technology for wireless data transfer of non-copyrighted material, optional microSD memory card, Push to Talk, Push To View, voice playback, MP3 player, and GPS capability.

²¹¹ The Motorola i880 includes a 2.0MP camera, walkie-talkie service, Java applications, GPS capabilities, picture caller ID, voice dialing, speakerphone, voice recorder.

²¹² Sprint 7/6/06 Press Release.

²¹³ TELUS 7/17/06 Press Release.

²¹⁴ Sprint 11/9/06 Press Release.

²¹⁵ Available on 6 different handsets available from Bell Mobility.

²¹⁶ Available on 7 different handsets available from Bell Mobility.

²¹⁷ Streaming video is available on 7 handsets available from Bell Mobility. Download clips on 3 handsets available from Bell Mobility.

- o Music (Full Track Music): allows download of over 1 million tracks to the mobile phone from the online music store and to transfer songs from a PC to a phone.
 - o Games: download and play games, including 3D games.
 - o Applications: allows downloading screensavers (from catalog or personalized), ringtones (TrueTones, VoiceTones, and video ringtones available), and caller ring tones (which allows callers to hear tunes instead of ringing when calling a Rung Tunes customer).
 - o Messaging: allows text messaging, picture messaging, video messaging, international messaging, Text for fun, and picture postcards. Also provides access to IM with Windows Live MSN Messenger.
- **Rogers Wireless**: Rogers offers Rogers VISION, which provides customers access to a number of entertainment and multimedia applications focused on use of Rogers' 3G HSDPA network.
 - o Video Calling (VISION): the only wireless carrier in North America to offer Video calling, which allows callers to hear and see the person they are talking to.
 - o Video on Demand (VISION): allows streaming 2-6 minute clips, including YouTube, Tonight Show, ET Canada and more.
 - o Radio on Demand (VISION): allows customers to listen to XM Satellite radio, including about 25 channels and 5 exclusive channels.
 - o Mobile TV (VISION): allows customers to watch real-time TV with more than 25 channels, including exclusive Toronto Blue Jays games, The Weather Network, CBC Newsworld.
 - o Mobile Music (VISION): allows download of hundreds of full length music videos and thousands of music tracks from Rogers MusicStore.
 - o Mobile Internet (VISION): high speed access to wireless Internet, email including Yahoo!® and Windows Live™ Mail.
 - o Applications: download games, ring tones, caller ring tones (Caller Ring Trax™) videos and more.
 - o Games: download games and play online with multiple players.
 - o Messaging: allows instant messaging (Yahoo!, AOL, MSN), Fun with TXT, international texting, picture messaging, and video messaging.
- **TELUS Mobility**: TELUS Mobility offers SPARK™, a package of entertainment and multimedia services. SPARK provides the following:
 - o Mobile TV:²¹⁸ real-time TV on a mobile phone, including YTV, CBC Newsworld, Bloomberg Television, and FOX.

²¹⁸ Available on 6 different handsets available from TELUS.

- o Mobile Music:²¹⁹ allows download of thousands of tracks to the mobile phone from the online music store and to download songs from a PC to a phone.
- o Mobile Radio:²²⁰ allows mobile customers to listen to XM Satellite Radio, commercial free music and other programming (20 channels to choose from at this time).
- o Games: allows web games (games that are accessed by the phone's browser), downloadable games (interactive, multi-media, arcade-style games with full sound and enhanced graphics) and multiplayer games.
- o Videos: allows downloads of latest movie trailers, music videos and TV clips to mobile phone.
- o Applications; download screensavers, images, and ringtones.
- o Messaging: allows text messaging, international text messaging, picture messaging, video messaging, and instant messaging (MSN Messenger).
- **Verizon Wireless:** Verizon Wireless offers V CAST which is a suite of entertainment and multimedia applications for Verizon's 3G EV-DO network.
 - o Mobile TV (V CAST): watch streaming real-time TV.
 - o Mobile Music (V CAST): download music to mobile phone and import from PC.
 - o Games: download and play games, including 3D games, on mobile phone.
 - o Mobile Web 2.0: provides access to MSN® Hotmail® and AOL®.
 - o Video clips: watch on-demand clips of sports, comedy, news, weather from major networks.
 - o Messaging: text messaging, picture messaging, video messaging, Mobile IM for AOL®, MSN®, and Yahoo!®, text alerts,
 - o Applications: allows download wallpaper, ringback tones (callers hear a song instead of a ring), and ringtones.
- **AT&T:** AT&T provides entertainment/multimedia packages that include the following:
 - o Mobile Music (Cingular Music): listen to streaming music stations (XM Radio Mobile), download music, download music videos.
 - o Mobile On-demand video (Cingular Video): Cingular Video allows viewing of clips from news (CNN, NBC), sports, HBOMobile(SM), music videos, etc.
 - o Mobile Email: access to AOL®, AIM, Yahoo!®, MSN® Hotmail, BellSouth and AT&T Yahoo! Mail.
 - o Games: download and play games from AT&T's Media™ Net, and some games available in a multi-player environment.

²¹⁹ Available on 5 different handsets available from TELUS.

²²⁰ Available on 5 different handsets available from TELUS.

- o Messaging: text messaging, international messaging, picture messaging, video messaging, and IM via AOL®, Yahoo!®, and Windows Live™ messenger services.
 - o Applications: download ringtones, graphics, Answer Tones (same as ringback tunes).
- **Sprint:** Sprint offers Power Vision(SM), which is a suite of entertainment and multimedia applications.
 - o Mspot: full-length streaming movies via Mspot.²²¹ Sprint has announced this offering (see Sprint 9/5/06 and 12/12/05 press releases), but Sprint does not currently make it available on its website.
 - o SprintTV(SM): watch TV channels including NFL Network, Fox Sports, E!, CNN and more on the mobile phone.
 - o Mobile Music: download full-length songs from Sprint's Music Store, listen to streaming music from SIRIUS music, and music videos.
 - o Games: download and play games on mobile phones or play real-time with others in remote locations.
 - o Mobile Web access: allows browsing and downloading of online content from MobiTV, CNNtoGO, Reuters, SI.com, The Weather Channel®, E!Online, CNN Money, Rand McNally, and more. Mobile email also available through Yahoo®!, MSN®, and AOL®.
 - o Messaging: text messaging, international messaging, voice SMS, picture messaging, video messaging, fun messaging, and IM (i.e., AOL™, MSN® and Yahoo®!).
 - o Applications: download screen savers, ring tones, call tones (same as ring back tunes), on-demand information updates, and graphics.
- **T-Mobile:** T-Mobile offers a suite of entertainment and multimedia services called t-zones.
 - o Mobile Web: wireless access to web content and email. Some of T-Mobile's devices/handsets are capable of downloading and playing full-length songs or video, but T-Mobile does not feature these services under the mobile wireless entertainment/multimedia services on its website.
 - o Messaging: text messaging, international text messaging, IM (via AOL®, icq, MSN®, and Yahoo!®), picture messaging, video messaging, and email.
 - o Games: download and play games on mobile phone.
 - o Applications: download wallpaper, on-demand information including movie listings, weather, sports scores, etc. download ringtones, caller ringtones, voice tones.

²²¹ See, Sprint 12/12/05 press release.

The State of Wireless Technologies In Canada

Table III.4 summarizes the entertainment and multi-media services provided by the major wireless carriers in Canada and the US. Note that shading indicates that a service is being offered by a carrier:

Table III.4. Entertainment and Multimedia Product Offerings by Carrier*

Services & Features	Canada			USA			
	Bell Mobility	Rogers Wireless	TELUS Mobility	AT&T	Verizon Wireless	Sprint	T-Mobile
Full-Length Movies							
Real-Time TV							
Download Full-Length Songs							
Streaming Radio							
Video Calling							
Text Messaging							
Picture Messaging							
Video Messaging							
International Messaging							
Instant Messaging							
Download & Play Games**							
Interactive Games/Multiplayer							
Download video clips							
Download Ring Tones							
Download Wallpaper/Screensavers							
Caller Ring Tunes***							
Mobile Web Access							
Voice SMS							

* -- Color shading indicates service availability. Does not include offerings offered by MVNOs and regional wireless providers.

** -- Both Bell Mobility and Verizon offer 3D games, according to their websites.

*** -- Caller Ring Tunes allows the caller to hear a song instead of the traditional ring. Each carrier has a unique name for this service.

Overall, table III.4 shows that currently Canada leads the US in terms of next-generation services/features roll-out, and at worst, is on par with the US in this regard. According to the companies' websites, Rogers Wireless (Canada) is the only mobile wireless carrier studied that provides video calling – the ability to hear *and see* the person on the other end of a phone call. Another advanced entertainment/multimedia capability – the ability to watch full-length movies on a mobile phone – is exclusively available in Canada through Bell Mobility.²²² Sprint announced the availability of a service providing full-length movie streaming to mobile phones in the US called Mspot Movies,²²³ but Sprint is not advertising this offering on its website and it does not appear to be commercially available at this time. Therefore, the table above does not show Sprint offering full-

²²² As of the writing of this report, Bell Canada offered movies, including *Spiderman 2*, *Men in Black 2* and *The Cable Guy*, for viewing over no fewer than 7 different handsets. See www.bell.ca/shopping/VasWlsMovie.details

²²³ "Sprint and MSpot Roll Out Red Carpet with Streaming Movie Service for Mobile Phones." Sprint Press Release. 12/12/05. Sprint announced that MSpot Movies marks the first time full-length feature films are streamed to mobile phones in the United States.

length movies.. Sprint (US) is the only carrier studied that advertises voice SMS²²⁴ on its website.

In terms of real-time television on a mobile phone, all three carriers in Canada provide this capability while Verizon and Sprint provide it in the US (AT&T and T-Mobile do not). Reports indicate that AT&T plans to roll-out mobile TV service in later in 2007.²²⁵ All carriers studied except T-Mobile (US) provide the capability to download full-length songs to a mobile phone, and customers in both Canada and US can transfer songs from a personal computer to a cellphone. More than one provider in each country – Rogers and TELUS in Canada and AT&T and Sprint in US – provides the capability to listen to streaming radio over a mobile phone from satellite radio providers for example.

Messaging capabilities are ubiquitous throughout all carriers in both countries. Every carrier provides the ability to send text messages, international text messages, picture messages, video messages, and instant messages. Regarding gaming, all carriers provide the ability to download and play games on a mobile phone, and 3-dimensional games are available in both Canada and the US (e.g., Bell Mobility and Verizon), as is the ability to play interactive games with multiple players in remote locations (Bell Mobility, Rogers and TELUS in Canada and AT&T and Sprint in the US). Mobile web access as well as personalization downloads (e.g., ringtones, caller ring tones, wallpaper) are ubiquitously available among carriers in both countries.

The availability of full-length movie viewing and video calling in Canada suggests that Canada is currently ahead of the US in terms of making available the newest entertainment/multimedia offerings and capabilities to customers. All other offerings (except voice SMS) can be obtained in both Canada and the US.

3. Wi-Fi Services

a. Hot Spots

Wi-Fi is a popular technology standard for Wireless Local Area Networks (“WLAN”) that provides users with laptops short-range wireless²²⁶ high-speed Internet connection at “hot-spots.” Wi-Fi operates in an unlicensed spectrum, has limited coverage and is often

²²⁴ According to Sprint’s website, voice SMS allows users to send voice messages to any phone or email address in seconds without dialing.

²²⁵ “Cingular Signs on for Qualcomm mobile TV.” *InfoWorld*. February 13, 2007 [“Starting in the fourth quarter, Cingular will offer multiple channels of live TV with the [Qualcomm MediaFLO] technology...”].

²²⁶ Several hundred feet from a wireless access point, which connects to the networks via landline facilities such as a T1.

provided by entities other than mobile carriers.²²⁷ However, mobile carriers have been active in this segment of the market, providing Internet connectivity as a supplement to voice services either via their own deployments or partnerships.

Public hot spots are typically located at airports, coffee shops, hotels and other public places, and are often provided for free. This service is particularly useful at airports (where it is more likely to be offered for a fee) because it provides e-mail and Internet access to travelers. To achieve ubiquity, which is important to a business traveler, companies enter into roaming agreements with Wi-Fi providers (which can be mobile carriers or other companies) in specific airports.

The Canadian approach to Wi-Fi Hot Spots is somewhat unique because instead of bilateral agreements, national mobile providers, in conjunction with the Canadian Wireless Telecommunications Association (“CWTA”), reached an agreement to provide inter-carrier Wi-Fi service.²²⁸ This agreement was made in May 2005 and is the broadest inter-carrier undertaking of its kind in North America, and allows for cross-Canada roaming between carrier-run hot spots. All public commercial hotspots operated by the participating carriers (which included Bell Canada, Rogers, TELUS and FIDO (now merged with Rogers)) are branded consistently with the common hotspot identifier. Similarly consistent is the browser-based login area of all branded hot spots. If user support is required, clients will continue to access their own carrier’s customer service. This initiative also simplifies payment options for customers, allowing them to charge Wi-Fi usage at any of the branded hotspots to their existing wireless carrier bills.

By contrast, in the US, for example, Sprint established a bilateral roaming agreement with Wayport when launching Wi-Fi in 2003, which at the time operated hot spots in 13 airports, as well as hotels and restaurants.²²⁹ In 2004 the US carrier AT&T Wireless (now AT&T) established a hot spot roaming agreement with T-Mobile allowing T-Mobile subscribers to use AT&T Wireless facilities in the Denver and Philadelphia airports, and utilizing T-Mobile Wi-Fi facilities in San Francisco airport to serve its own customers.²³⁰ Similarly, the same year AT&T Wireless and Sprint established a roaming agreement at Denver, Kansas City, Philadelphia, Raleigh-Durham and Salt Lake City Airports.²³¹

²²⁷ See the FCC 11th Report on Wireless Competition released on September 29, 2006, p. 91 footnote 574 explaining that services provided via WLAN are not commercial mobile radio services under the US federal rules.

²²⁸ See <http://www.canadianhotspot.ca/#>.

²²⁹ See <http://www.wi-fiplanet.com/news/article.php/3080181>.

²³⁰ See http://news.com.com/T-Mobile%2C+AT38T+Wireless+form+roaming+pact/2110-7351_3-5154711.html.

²³¹ See <http://news.com.com/2100-7351-5194443.html>.

Estimates on the number of public hot spots vary.²³² Critics of Wi-Fi also suggest that the initial expectations of demand for this service may have been overstated,²³³ and that mobile data (3G) services provide a better, more secure Internet connection that also allows true roaming. However, they acknowledge that Wi-Fi hot spots have their “place” at certain locations, such as airports.²³⁴ Therefore, airports present a good location type for international comparisons of hot spot proliferation not only because of their proven demand and viability of service, but also because data on airport hot spot locations is more manageable because of its limited scope.

Table III.5 compares hot spot counts in Canada and the US at commercial airports. As with any comparison between these two countries, the differences in population and geography affect interpretation of the data: Because Canada’s population is roughly 11% of the US population, it is expected that, other things being equal, all absolute metrics such as the airport counts and hot spot counts would be of similar proportions. The last column of the table provides similarly calculated percentages (percent of Canada count in the US count) for each absolute metric.

Table III.5. Comparison of Airport Wi-Fi Hot Spot Counts in the US and Canada*

Metrics	US	Canada	Canada as % US
Number of Airports with Hot Spots	166	24	14%
Total Airport Hot Spots	581	49	8%
including Airport Hot Spots by Wireless Companies:			
Absolute Count	157	20	13%
Percent	27%	41%	
Large and Medium Airports**	68	6	9%

* -- Based on MSN Wi Fi Hot Spot Locator (<http://hotspot.live.com/web/SearchView.aspx>)

** -- US classification as reported by the FAA

(http://www.faa.gov/airports_airtraffic/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2005) Canada: Airports with passenger enplanements exceeding US "Small" Airports. Canada 2004 enplanements based on Transport Canada (<http://www.tc.gc.ca/pol/en/Report/anre2005/add/aba917.htm>). US 2005 enplanements are estimated as total "deplanements and enplanements" divided by 2.

As seen from the last column of table III.5, the differences between Canadian and US airport hot spot counts, which range from 8 to 14% depending on the metrics, are roughly proportional to the differences in population. The most significant difference between the two countries is that a larger proportion of airport hot spots are operated by mobile

²³² See for example, the FCC 11th Report on Wireless Competition released on September 29, 2006, p. 92 citing various estimates of hot spot counts for the US.

²³³ See for example, a story of Verizon decommissioning its free Wi-Fi spots at payphones in New York City in 2005 (<http://www.pcworld.com/article/id,120753-page,1/article.html>).

²³⁴ See <http://www.pcworld.com/article/id,120753-page,1/article.html>.

carriers in Canada (41%) than in the US (27%).²³⁵ On a more granular level, Canada has slightly better representation than the US in terms of the number of airports with Wi-Fi access (at 14% of the US). In terms of total hot spot count, Canada has relatively less hot spots than the US (at 8% of the US), which is driven by the fact that Canada has less (relatively speaking, 9% of the US count) large airports, which tend to have multiple hot spots. For example, the largest US airport in terms of passenger counts,²³⁶ Atlanta, has 30 hot spots, while the largest Canadian airport, Toronto (which is much smaller than Atlanta in terms of passenger counts²³⁷), has 5 hot spots.²³⁸ In other words, while the US has relatively more airport hot spots, it has relatively less distinctive airports with hot spots than Canada. It should be noted that these relative differences are not large differences.

b. Inukshuk Network

Canada has also deployed (and is in the process of expanding) a Canada-wide fixed wireless network called Inukshuk (or Inukshuk Wireless). Inukshuk is a joint venture between Bell Canada and Rogers, designed to build and manage a Canada-wide wireless broadband network licensed by Industry Canada.²³⁹ This next-generation Internet protocol ("IP") wireless network, based on pre-WiMax standards, is a fixed wireless (as opposed to mobile wireless technology discussed above) non-line-of-sight technology²⁴⁰ that allows subscribers, including subscribers in rural and under-served areas, to access the Internet and other applications such as VoIP and video streaming.²⁴¹ Inukshuk was launched in 2003 to provide wireless high-speed Internet access across Canada using spectrum in the 2.5 GHz range,²⁴² and provides data speeds of between 512 kbps and 3Mbps.²⁴³ In 2006, the initial phase of Inukshuk was completed, bringing Inukshuk to five million households representing 40% of the population in 20 urban centres across

²³⁵ As shown in row 5 of the table, 40% of Canadian airport hot spots are operated by mobile carriers, compared to 27% in the US. Note that for Canada this percentage includes one Toronto airport hot spot served by a non-Canadian (T-Mobile) carrier. Exclusion of this hot spot brings the percentage to 39%.

²³⁶ According to the US FAA, it had 42,402,653 revenue passenger enplanements in 2005 (see http://www.faa.gov/airports/airtraffic/airports/planning_capacity/passenger_allcargo_stats/passenger/ind ex.cfm?year=2005).

²³⁷ According to *Transport Canada*, Toronto had 26,830,507 passenger enplanements and deplanements in 2004 (see <http://www.tc.gc.ca/pol/en/Report/anre2005/add/aba917.htm>).

²³⁸ Hot spot counts as listed by MSN Wi Fi Hot Spot Locator: <http://hotspot.live.com/web/SearchView.aspx>.

²³⁹ www.inukshuk.ca/anglais/nous.html

²⁴⁰ www.inukshuk.ca/anglais/offre.html

²⁴¹ www.inukshuk.ca/anglais/offre.html

²⁴² Bell Canada 2007 Information Form (Dec 2006), p. 25.

²⁴³ Montreal Tech Watch, 3/30/07, available at: www.montrealtechwatch.com/2007/03/inukshuk-extends-its-wireless-coverage.html See also, Bell Mobility's responses to QSI information requests, p. 6.

Canada.²⁴⁴ In the first quarter of 2007, Inukshuk was expanded to cover about 100 urban and rural areas in Canada, bringing Inukshuk to over 6.5 Canadian households.²⁴⁵ By the end of 2008, Inukshuk's wireless footprint is expected to cover 45 cities and approximately 100 un-served rural and underserved communities across Canada, for a total of 145 urban and rural areas, covering almost 7 million Canadian households.²⁴⁶ Inukshuk is licensed to provide service in 10 service areas covering approximately 30 million Canadians (or about 91% of Canada's population).²⁴⁷ According to Bell Canada, Inukshuk is the largest deployment of pre-WiMAX technology, as a function of population served, of any country in the developed and the developing world.²⁴⁸

In addition to the objective of serving rural un-served and underserved communities, Inukshuk has committed to fulfill a Learning Plan, in which Inukshuk Wireless works with regional advisory committees to evaluate and fund projects to advance the needs of Canada's learning community.²⁴⁹ These projects are based on three C's: "Connectedness" (accelerate deployment and coverage of the network), Content (multi-media-rich content to foster on-line learning) and Continuity (establishment and continuation of a relationship between Inukshuk Wireless and Canada's learning community).²⁵⁰ One example of a Inukshuk project is "PocketSnips"²⁵¹ – a project done with the Northern Ontario School of Medicine in which a library of micro-videos will be created to provide open access multimedia medical education materials to a variety of learning communities including medical students, health professionals and patients.²⁵²

IV. PENETRATION AND COVERAGE: CANADA VERSUS THE US

A. NATIONWIDE PENETRATION RATES

²⁴⁴ Bell Canada 2007 Information Form (Dec 2006), p. 23.

²⁴⁵ Inukshuk Wireless deployment schedule, 2006-2008 (4/26/07). Inukshuk Wireless Coverage Area Expanded, Digital Home, 4/2/07, www.digitalhome.ca/content/view/1778/206/

²⁴⁶ Inukshuk Wireless deployment schedule, 2006-2008 (4/26/07).

²⁴⁷ Canada's population is assumed to be 30.8 million. See, <http://www.statcan.ca/english/edu/clock/population.htm>

²⁴⁸ Bell Mobility responses to QSI information requests, p. 4.

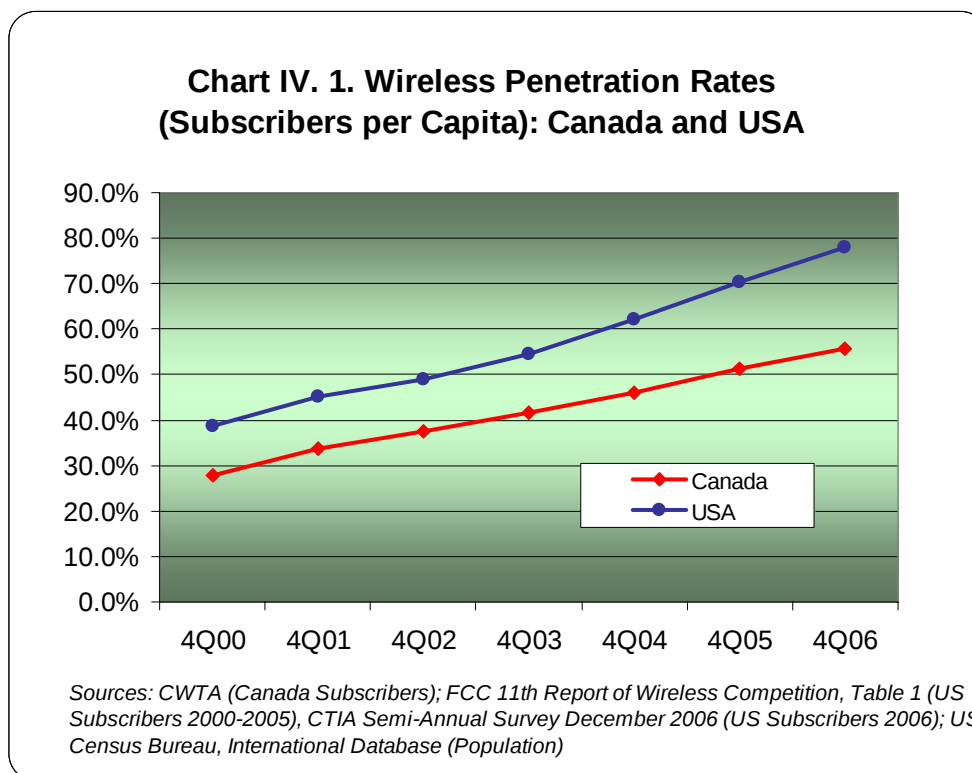
²⁴⁹ www.inukshuk.ca/anglais/education.html

²⁵⁰ www.inukshuk.ca/anglais/education.html

²⁵¹ www.normed.ca/pocketsnips/

²⁵² www.inukshuk.ca/anglais/funded_on.html

At the end of 2006, which is the most recent data available, Canadian penetration of mobile wireless service (measured as subscribers per capita)²⁵³ was estimated at 55.7%.²⁵⁴ By comparison, the US per capita mobile wireless penetration was 78.1% for the same time period.²⁵⁵ Chart IV.1 below compares mobile wireless penetration in both countries over time:



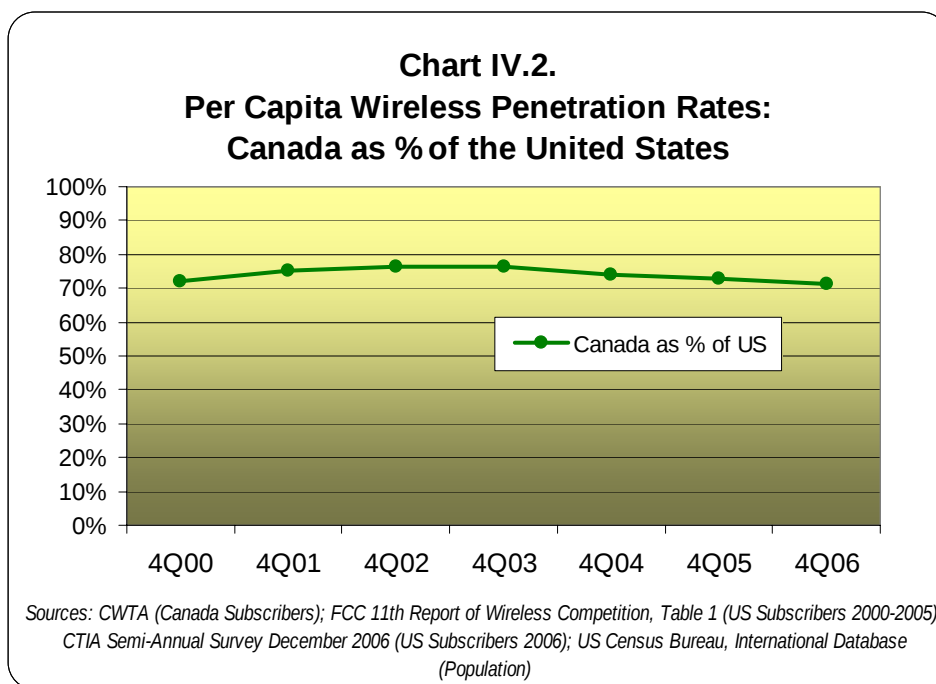
As shown in chart IV.1, Canadian wireless penetration, though lower than penetration in the US, is growing along a similarly sloped – almost linear – curve, and follows the general dynamics of the US penetration. In general, Canadian penetration constitutes approximately 70-75% of penetration in the US (measured as the ratio of penetration

²⁵³ Note that sometimes penetration is measured in terms of 100 households. See, for example, CRTC 2006 Monitoring Report, Table 2.3.1 and the *Decima Study* discussed below.

²⁵⁴ Derived from subscribership and population counts (sources: CWTA (Subscribers) available at <http://www.cwta.ca/CWTASite/english/industryfacts.html>; US Census Bureau, International Database available at <http://www.census.gov/cgi-bin/ipc/idbagg> (Population)).

²⁵⁵ Derived from subscribership and population counts (sources: CTIA Semi-Annual Survey December 2006 available at <http://www.ctia.org/advocacy/research/index.cfm/AID/10316>; US Census Bureau, International Database available at <http://www.census.gov/cgi-bin/ipc/idbagg> (Population)).

rates in Canada and the US).²⁵⁶ The following chart IV.2 provides additional details on the dynamics of relative penetration rates in the two countries:



As seen from chart IV.2, Canadian wireless penetration relative to the US is somewhat stable, approaching 80% in 2002 and 2003, and being approximately 75% in 2006.

Conclusion: The difference between the US and Canadian wireless penetration rates can be attributed to the fact that the US wireless industry had an 18-month head start based on the first wave of wireless spectrum auctions in both countries. The difference in penetration rates – which has remained relatively stable over time – indicates that Canada’s penetration growth is roughly equal to that of the US.

²⁵⁶ Note that the above comparison of the US and Canada wireless penetration is based on the data from industry associations in both countries (CWTA in Canada, and CTIA in the US). Other sources report somewhat different estimates of subscribership. For example, in addition to the CTIA data, the US FCC lists its own estimate of subscribership, which is lower than the CTIA estimates. (The FCC-own and CTIA estimates are contained in Tables 2 and 1 (respectively) of the FCC 11th Report on Wireless Competition.)

B. REGIONAL DIFFERENCES IN PENETRATION

Wireless penetration varies by region. Specifically, table IV.1 presents mobile wireless per capita penetration by province based on the data from Statistics Canada.²⁵⁷ Provinces are listed in this table in descending order in terms of mobile wireless penetration:

Table IV.1. Canadian Mobile Wireless Per Capita Penetration by Province (2004)*

Geographic Area	Penetration	Population
Alberta	58.3%	3,215,869
Ontario	51.8%	12,454,171
British Columbia	48.0%	4,215,695
Saskatchewan	42.9%	995,351
Manitoba	41.2%	1,173,358
Québec	36.0%	7,566,136
Atlantic Provinces	35.4%	2,346,008
Territories	NA	103,411
Canada Total	46.4%	32,069,999

* -- Calculated from source: Statistics Canada, Catalogue 56-001, Table 7 (Mobile Telephony subscribers only; excluded "Paging" and "Other" subscribers).

As seen from table IV.1, Alberta has the highest mobile penetration at 58.3% of population, and the Atlantic Provinces have the lowest penetration at 35.4%. Within the Atlantic provinces, Newfoundland and Labrador (not separately listed in the table) had the lowest penetration at 30%.²⁵⁸ The data presented in table IV.1 are consistent with a more recent study by *Decima Research*,²⁵⁹ whose survey-based method estimated that in 2006 Alberta had the highest provincial wireless penetration rate (which the study measures as penetration per household rather than population), followed by Ontario.

²⁵⁷ Statistics Canada Catalogue 56-001, Vol. 36 No. 1 (released in July 25, 2006) available at <http://www.statcan.ca/bsolc/english/bsolc?catno=56-001-X&CHROPG=1>.

²⁵⁸ Calculated from data in Table 7 of Statistics Canada Catalogue 56-001, Vol. 36 No. 1 (released in July 25, 2006) available at <http://www.statcan.ca/bsolc/english/bsolc?catno=56-001-X&CHROPG=1>.

²⁵⁹ See p. 9, Decima Research, Usage of Wireless Communications in Canada, Final Report, April 2006 available at <http://www.cwta.ca/CWTASite/english/industryfacts.html> ("Decima Study").

Similarly, *Decima Study* found that Quebec and Atlantic provinces are the bottom two areas in terms of mobile wireless penetration.²⁶⁰

US wireless penetration similarly varies by region. The FCC reports penetration by economic area. The most recent data show that per capita penetration was as high as 95% in *Fort Myers-Cape Coral, Florida* economic area, and as low as 41% in *Northern Michigan*, economic area.²⁶¹ Note that an economic area is a smaller geographical unit than a province or state, and is more comparable to a metropolitan area.²⁶² Because of its smaller size, the variation of observed penetration rates in economic areas is expected to be larger than in broader geographical units such as a province. In other words, the highs and lows in the US economic area-level data are expected to be more extreme than the province-level Canadian penetration data presented in table above.

Income Effect

The above mentioned *Decima Study* estimated wireless penetration in different population groups. According to the results, income was the most significant factor that affects penetration.²⁶³ This result is consistent with QSI's cross-regional comparisons of penetration and income based on publicly available data from Statistics Canada. Specifically, table IV.2 lists provincial penetration estimates and median family income data.²⁶⁴

²⁶⁰ According to *Decima study*, Quebec was below the Atlantic province in terms of household wireless penetration.

²⁶¹ The FCC *11th Report* on Wireless Competition, released on September 29, 2006, Table 3.

²⁶² For example, the *Northern Michigan* economic area had population of 269,986 (2000 census; see the FCC *11th Report* on Wireless Competition, released on September 29, 2006, Table 3) .

²⁶³ For example, at p. 9 of the *Decima Study* reports that in the income group \$60K+ penetration was 82% of households, while in the income group, \$30K penetration was only 36%. (Decima Research, Usage of Wireless Communications in Canada, Final Report, April 2006 available at <http://www.cwta.ca/CWTASite/english/industryfacts.html>.)

²⁶⁴ Income data are from Statistics Canada CANSIM Table 111-0009 available at <http://www40.statcan.ca/101/cst01/famil108a.htm>.

Table IV.2. Canadian Mobile Wireless Per Capita Penetration and Median Family Income by Province (2004)*

Geographic Area	Penetration	Median Family Income
Alberta	58.3%	\$ 66,400
Ontario	51.8%	\$ 62,500
British Columbia	48.0%	\$ 55,900
Saskatchewan	42.9%	\$ 53,500
Manitoba	41.2%	\$ 54,100
Québec	36.0%	\$ 54,400
Atlantic Provinces	35.4%	\$ 49,729
Correlation Coefficient	0.93	

* -- Source: Statistics Canada, Catalogue 56-001, Table 7 (basis for penetration) and CANSIM Table 111-0009 (income).

Table IV.2 shows that provinces with relatively high family incomes tend to have high mobile penetration rates, and provinces with relatively low family incomes tend to have low mobile penetration rates. For example, the first three provinces in terms of penetration are also the first three provinces in terms of median family income. These three provinces are provinces with above average penetration rate (which is 46.4% as listed in the previous table). For these three provinces the average median family income is \$61,600,²⁶⁵ while the average median family income for provinces with below average penetration (the remaining provinces) is \$52,932. In relative terms, income in provinces with below-average wireless penetration rates is 16%²⁶⁶ less than income in provinces with above average penetration. Incidentally, the province with the lowest median family income is Newfoundland and Labrador at \$46,100 annually (this province is not separately listed in the above table, but aggregated within the “Atlantic provinces”). As discussed above, Newfoundland and Labrador have the lowest mobile penetration out of all provinces²⁶⁷ at 30%. Finally, table IV.2 contains the correlation coefficient between income and penetration, which is a statistical measure of the degree of relationship between the two variables (income and penetration). The value of the correlation

²⁶⁵ Simple average of the median family incomes of the top three provinces as listed in the table.

²⁶⁶ Calculated as $[(\$61,600 / \$52,932) - 1]$.

²⁶⁷ Excluding territories for which data are not available.

coefficient is 0.93, indicating a very strong positive relationship between income and penetration.²⁶⁸

The US penetration data for economic areas exhibit a similar positive relationship between income and penetration. For example, average²⁶⁹ personal income in economic areas with above average penetration rates is CAD\$37,189, while average personal income in economic areas with below average penetration rates is CAD\$32,610.²⁷⁰ In relative terms, the average personal income in economic areas with above-average penetration exceeds average personal income in economic areas with below-average penetration by 14%.²⁷¹

Conclusion: geographically disaggregated country-level data suggest that income is an important driver of wireless penetration rates. Therefore, it is reasonable to expect that differences in income levels between the two countries may explain, at least in part, the differences in penetration rates between the two countries. A comparison of different income measures in both countries shows that Canada has lower per capita income than the US. Table IV.3 below, compiled from a larger dataset of the Canadian Centre for the Study of Living Standards, contains different measures of relative income.

²⁶⁸ Correlation coefficient is a statistical measure of linear relationship between two data sets. It is bounded between -1 and +1. Values close to zero indicate weak relationship; values close to 1 indicate strong positive relationship, and values close to -1 indicate strong negative relationship.

²⁶⁹ Un-weighted average of income in economic areas.

²⁷⁰ In US dollars, these numbers are \$31,498 and \$27,620 correspondingly. These numbers are calculated by using the 2005 *penetration* data from the FCC 11th Report on Wireless Competition, released on September 29, 2006 (Table 3 and Table 5), as well as the 2004 *personal per capita income* data by economic area reported by the US Bureau of Economic Analysis (available at <http://www.bea.gov/regional/reis/scb.cfm?areatype=econ>). For currency conversion, a rate of 0.85 was used. This is the 2004 *Individual Consumption PPP exchange rate, US\$/CAD\$* used by Statistics Canada in income comparisons between the US and Canada (See *Centre for the Study of Living Standards, Aggregate Income and Productivity Trends, Canada vs US*, Table 3 available at <http://www.csls.ca/data/ipt1.asp>).

²⁷¹ Calculated as [(CAD\$ 37,189 / CAD\$ 32,610) -1].

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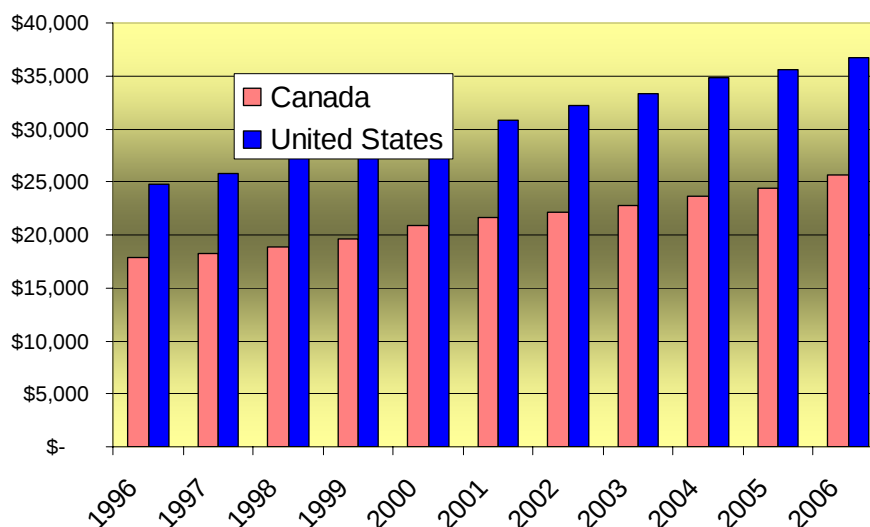
**Table IV.3. Comparison of Per Capita GDP, Personal Income and Personal Disposable Income
(Canada and United States, CAD\$)***

Year	Canada			United States			Canada as % of United States		
	GDP	Personal Income	Personal Disposable Income	GDP	Personal Income	Personal Disposable Income	GDP	Personal Income	Personal Disposable Income
1996	\$ 28,301	\$ 23,239	\$ 17,848	\$ 34,503	\$ 28,442	\$ 24,813	82%	82%	72%
1997	\$ 29,554	\$ 23,955	\$ 18,286	\$ 36,218	\$ 29,805	\$ 25,812	82%	80%	71%
1998	\$ 30,372	\$ 24,840	\$ 18,880	\$ 36,831	\$ 31,623	\$ 27,248	82%	79%	69%
1999	\$ 32,350	\$ 25,784	\$ 19,632	\$ 39,037	\$ 32,862	\$ 28,198	83%	78%	70%
2000	\$ 35,124	\$ 27,418	\$ 20,866	\$ 41,400	\$ 35,132	\$ 29,982	85%	78%	70%
2001	\$ 35,773	\$ 28,297	\$ 21,605	\$ 41,772	\$ 35,981	\$ 30,878	86%	79%	70%
2002	\$ 36,807	\$ 28,696	\$ 22,157	\$ 42,463	\$ 36,496	\$ 32,175	87%	79%	69%
2003	\$ 38,359	\$ 29,478	\$ 22,821	\$ 44,574	\$ 37,484	\$ 33,389	86%	79%	68%
2004	\$ 40,404	\$ 30,645	\$ 23,662	\$ 47,238	\$ 39,124	\$ 34,903	86%	78%	68%
2005	\$ 42,514	\$ 31,860	\$ 24,413	\$ 49,846	\$ 40,288	\$ 35,554	85%	79%	69%
2006	\$ 44,175	\$ 33,388	\$ 25,657	\$ 52,086	\$ 41,924	\$ 36,682	85%	80%	70%

* -- Source: Centre for the Study of Living Standards, *Aggregate Income and Productivity Trends, Canada vs United States*, Table 3 (<http://www.csls.ca/data/ipt1.asp>).

As seen from table IV.3, Canada lags the US in terms of various measures of income, and most of all in terms of personal disposable income – an income measure that is particularly relevant to consumption decisions such as a purchase of mobile wireless service and devices. Chart IV.3, which is based on the data from table IV.3, further shows the persistence and magnitude of this gap:

Chart IV.3. Per Capita Disposable Income, Canada and United States (CAD\$)*



* -- Source: Centre for the Study of Living Standards, Aggregate Income and Productivity Trends, Canada vs United States, Table 3 (<http://www.csls.ca/data/ipt1.asp>).

Conclusion: in relative terms, Canadian personal disposable income is approximately 70% of the US personal disposable income.²⁷² Recall from our earlier discussion that on the nationwide level, Canadian mobile wireless penetration rates constitute approximately 70-75% of the US penetration. Although it would be too simplistic to suggest a proportional relationship between penetration and income, the fact that the magnitude of the differences in both measures is approximately the same is telling.

Other Population Characteristics

The *Decima Study* reported two other population characteristics (in addition to income) for which wireless penetration rates were noticeably different, age and education.²⁷³

Specifically, the *Decima Study* found that younger people (people in age groups 18-34 and 34-55) were 1.5 times more likely to use a wireless phone than older people (over 55 years).²⁷⁴ Similarly, the study found that people with university degrees were approximately 1.7 times more likely to use a wireless phone than people with some high school education but without a high school degree.

²⁷² Last column in Table above, or, equivalently, the ratio of Canada and US personal disposable income amounts in chart above.

²⁷³ See p. 9, Decima Research, Usage of Wireless Communications in Canada, Final Report, April 2006.

²⁷⁴ *Id.*

A comparison of age and education characteristics of the Canadian and US population shows only minor differences between the two. Specifically, Canadian population may be somewhat older than the US population as measured by median population age: According to the US Census Bureau International Database,²⁷⁵ in 2006 median age was 38.9 years in Canada, and 36.5 in the US. The fact that Canadian population appears to be somewhat older than the US population may be contributing to the gap between wireless penetration in the two countries. Educational comparison is not as straightforward because of the differences in the “definitions” of the statistical data in the two countries, but it appears that both countries have similar percentages of people with college and university degrees.²⁷⁶

Coverage

Wall Communications, Inc. compiled national and provincial-level mobile wireless coverage estimates by aggregating company-level coverage data.²⁷⁷ According to the *Wall Report*, digital mobile wireless services in Canada cover 97% of population, and 14% of land mass.²⁷⁸ For comparison, the most recent US digital wireless coverage is estimated by the FCC as approaching 100% of population, and 100% of land, though the FCC points out to the fact that its county-level method of estimating coverage (under which a county with partial coverage is classified as covered) tends to overstate coverage.²⁷⁹

Coverage, being a measure of availability and quality of mobile wireless services, is expected to affect penetration. This expectation is supported by Canadian provincial data. Table IV.4 lists penetration and coverage data by province:

²⁷⁵ Available at <http://www.census.gov/cgi-bin/ipc/idbagg>.

²⁷⁶ According to the US Census Bureau, Current Population Survey, 2006 Annual Social and Economic Supplement (available at <http://www.census.gov/population/socdemo/education/cps2006/tab01-01.xls>) 32% of people 15 years of age and older had some college degree (including associate, professional, Bachelors’ and advanced degrees). According to Statistics Canada 2001 Census data, 33% of labor force had some college or university degree (available at <http://www12.statcan.ca/english/census01/products/standard/themes/RetrieveProductTable.cfm?Temporal=2001&PID=55498&APATH=3&GID=431515&METH=1&PTYPE=55496&THEME=51&FOCUS=0&AID=0&PLACENAME=0&PROVINCE=0&SEARCH=0&GC=0&GK=0&VID=0&VNAMEE=&VNAMEF=&FL=0&RL=0&FREE=0>).

²⁷⁷ Wall Communications, “A Study on the Wireless Environment in Canada,” September 2006 (“*Wall Report*”).

²⁷⁸ *Id.*, tables 3.4 and 3.5.

²⁷⁹ FCC 11th Report on Wireless Competition, released on September 28, 2006 (Table 7). Footnote 80 of the Report says “we found that less than one-tenth of one percent of the US population lacked cellular coverage.” The FCC also notes that these data may overstate the true coverage because “to be considered as “covering” a county, an operator need only be offering any service in a portion of that county.” (See p. 10).

Table IV.4. Canadian Per Capita Mobile Wireless Penetration and Coverage by Province*

Geographic Area	Penetration	Digital Coverage	
		% Population	% Land
Alberta	58%	100%	63%
Ontario	52%	98%	14%
British Columbia	48%	98%	11%
Saskatchewan	43%	95%	34%
Manitoba	41%	97%	20%
Québec	36%	94%	7%
Atlantic Provinces	35%	96%	23%
Territories	NA	57%	0%
Canada	46%	97%	14%

* -- Sources: Penetration: Statistics Canada, Catalogue 56-001, Table 7 (2004 data). Coverage: Wall Communications Report, September 2006 (tables 3.4 and 3.5).

As seen from table IV.4, Alberta, which is the province with the highest wireless per capita penetration (58%), is also a province with the highest coverage, both in terms of population (100%) and land (63%). Ontario and British Columbia – second and third in terms of penetration, are also second and third in terms of population coverage (but not in terms of land). In general, the relationship between penetration and land coverage is not as pronounced as the relationship between population coverage and penetration: For example, Atlantic Provinces, which are last²⁸⁰ in terms of penetration, are third best in terms of land coverage after Alberta and Saskatchewan. The weak relationship between land coverage and penetration is expected because the land area does not capture uneven distribution of population across geographical areas.

Provincial-level coverage and penetration data also provide an insight into urban/rural differences in mobile wireless services. The following table IV.5 supplements the penetration and coverage data with the data on the degree of urbanization (measured as the percent of urban²⁸¹ population). Provinces in this table are listed in descending order in terms of urbanization.

²⁸⁰ Last if excluding the Territories, for which Statistics Canada does not report subscribership (from which our estimated of penetration are derived).

²⁸¹ The distinction between urban and rural population is by Statistics Canada, which defines rural population as “persons living outside centres with a population of 1,000 AND outside areas with 400 persons per square kilometer” (see <http://www40.statcan.ca/l01/cst01/demo62a.htm>).

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Table IV.5. Canadian Per Capita Mobile Wireless Penetration, Coverage and Urban Population by Province*

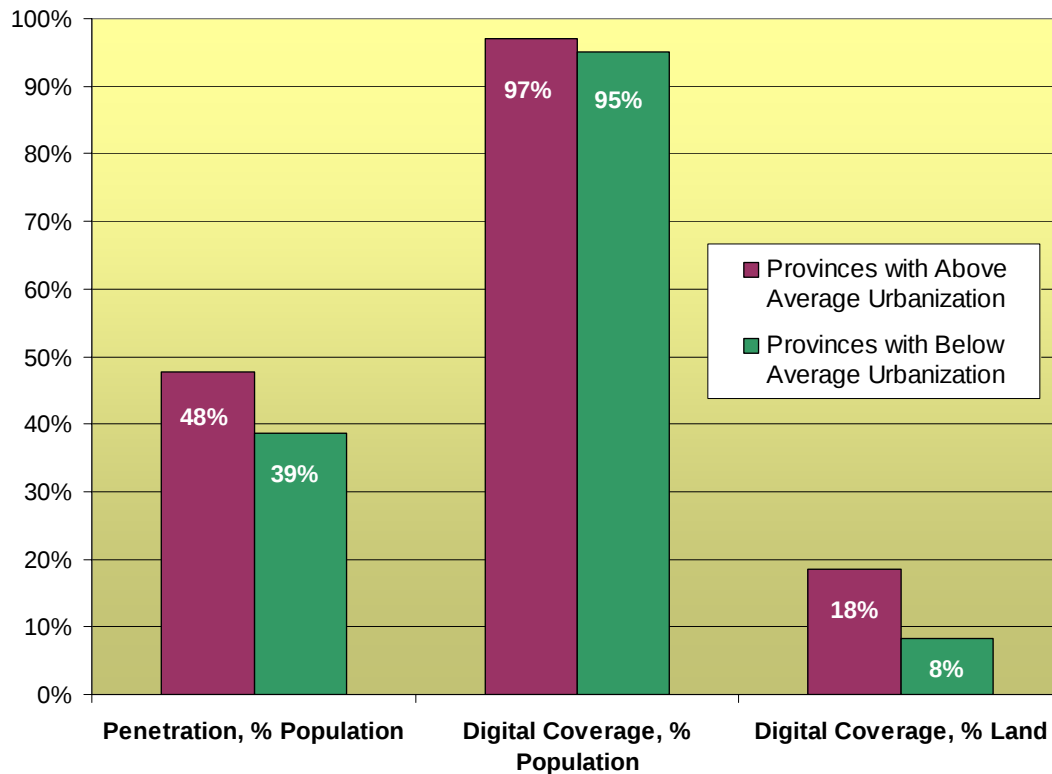
Geographic Area	Penetration	Digital Coverage		% Urban Population
		% Population	% Land	
Ontario	52%	98%	14%	85%
British Columbia	48%	98%	11%	85%
Alberta	58%	100%	63%	81%
Québec	36%	94%	7%	80%
Manitoba	41%	97%	20%	72%
Saskatchewan	43%	95%	34%	64%
Atlantic Provinces	35%	96%	23%	54%
Territories	NA	57%	0%	51%
Canada	46%	97%	14%	80%

* -- Sources: Penetration: Statistics Canada, Catalogue 56-001, Table 7 (2004 data). Coverage: Wall Report, September 2006 (tables 3.4 and 3.5). Urban Population: Statistics Canada, Census of Population (2001 data).

As shown in table IV.5, the top three provinces in terms of the share of urban population (Ontario, British Columbia and Alberta) are also the top three provinces in terms of wireless per capita penetration and population coverage (though not in the same order). Note that the double-border in the table subdivides provinces into two groups – areas with above average urbanization in relation to the national average of 80% (the first four provinces) and areas with below average urbanization (the remaining four areas). The table suggests that more urbanized areas tend to have higher mobile wireless penetration and coverage, while less urbanized areas tend to have lower mobile wireless penetration and coverage. The following chart III.4 summarizes urban/rural differences captured in the above table IV.5 by aggregating the data in the table into two groups – “provinces with above average” and “provinces with below average urbanization.”²⁸²

²⁸² Note that penetration and coverage percentages for these two groups in the chart are calculated as weighted averages of the provincial-level data. Specifically, per capita penetration and population coverage are weighted by total population, while land coverage is weighted by land area.

Chart IV.4.
**Urban/Rural Differences in Canadian Provincial Mobile Wireless
Per Capita Penetration and Coverage**



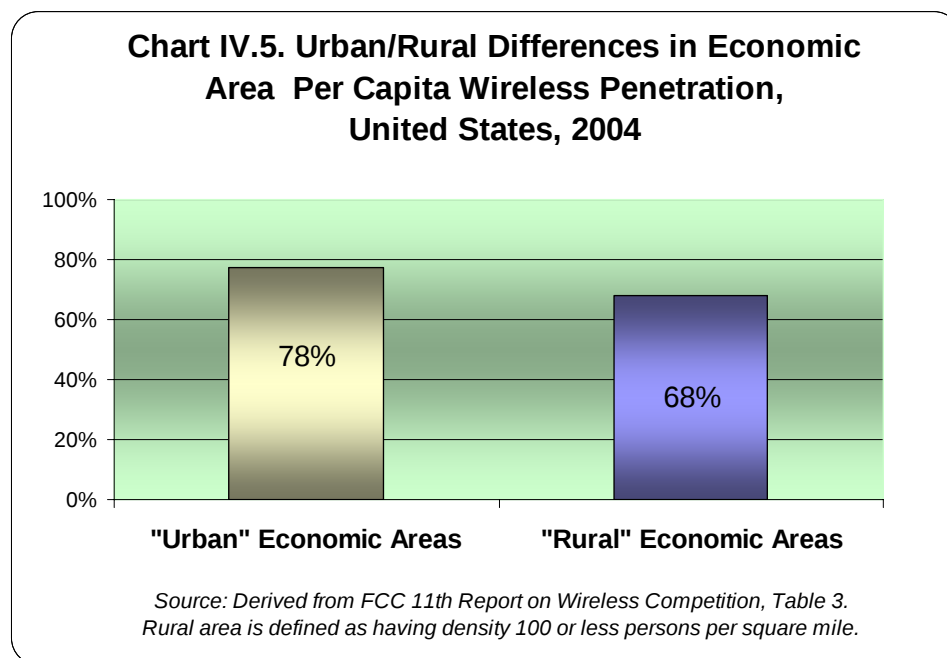
Based on sources: Penetration: Statistics Canada, Catalogue 56-001, Table 7 (2004 data). Coverage: Wall Report, September 2006 (tables 3.4 and 3.5). Urban Population: Statistics Canada, Census of Population (2001 data).

As seen from chart IV.4, the difference between mobile wireless per capita penetration in more and less urbanized provinces is significant – 48% and 39% correspondingly. This result may be driven by the differences in urban and rural lifestyles and availability of wireless services, but it may also be a result of income effects: As discussed above, provinces with relatively high median family incomes tend to have high penetration rates, and more urbanized provinces tend to have relatively high income.

At the same time the difference in population coverage is relatively small at 97% for “more urban” and 95% for “less urban” areas. This result is a reflection of the fact that all provinces with exception of the Territories have very high 2G digital coverage rates. Note that this conclusion of only minor differences in population coverage between urban and rural areas would likely not stand if the analysis is applied to 3G coverage. As discussed in detail in Section III of this report, 3G services are being rolled out in urban areas first. This observation applied equally to Canada and the US.

Finally, chart IV.4 shows that the relative difference between more and less urbanized areas in terms of land coverage is most significant – 18% and 8% correspondingly, or, equivalently, land coverage is more than 2 times higher in more urbanized areas compared to less urbanized areas.

The lag in rural wireless penetration in comparison to urban areas is also seen in the US: For example, the following chart IV.5 compares penetration in “rural” and “urban” economic areas using the FCC definition of rural areas as counties with population density of 100 persons per mile²⁸³ or less.²⁸⁴



As seen in chart IV.5, urban areas (areas with density of 100 persons or more per square mile) have an average²⁸⁵ penetration rate of 78%, while rural areas have an average penetration rate of 68%. The observation that penetration decreases with population density is also present at a more granular level (not depicted on the chart): for example, average penetration for economic areas with population density below 50 persons per square mile is 65%.

The analyses above suggest that urbanization may be a factor that drives differences in mobile wireless penetration between Canada and the US. On the nationwide level 80%

²⁸³ This translates into 39 persons per square kilometer.

²⁸⁴ See, for example, the FCC 11th report of Wireless Competition, released on September 28, 2006, p. 39.

²⁸⁵ Calculated as weighted average over population.

of the Canadian population lives in urban areas. The US Census estimates that 79% of the US population lives in urban areas.²⁸⁶ In other words, on the surface it appears that despite differences in geography, both countries are approximately equally urbanized. When interpreting these data, however, it is important to keep in mind that the two countries use different definitions of “urban” and “rural” areas. Specifically, as quoted above, Statistics Canada defines rural areas as “persons living outside centres with a population of 1,000 AND outside areas with 400 persons per square kilometer.”²⁸⁷ In contrast, the US Census Bureau defines urban areas as all urbanized areas (over 50,000 population) and urban clusters (2,500 to 49,999 population), which include “core census block groups or blocks that have a population density of at least 1,000 people per square mile and surrounding census blocks that have an overall density of at least 500 people per square mile.”²⁸⁸ The definitions of urban and rural areas are different in the two countries. On the one hand, the Canadian definition includes in the urban count smaller population clusters than the US definition (such as centers with population over 1,000 people – centers that would not meet the US criterion for urban clusters as having 2,500 people or more). On the other hand, the US definition includes in urban count less dense areas than the Canadian definition (specifically, areas with density over 500 people per square mile (or equivalently 193 people per square kilometer), which is a lower density than the Canadian criterion of 400 persons per square kilometer)). These differences do not necessarily mean that one definition is broader than the other, meaning that we cannot conclude from the data that one country is more urbanized than another.

Conclusion: We cannot conclude from the data that urbanization is a factor in the differences in wireless penetration between Canada and the US.

V. OVERVIEW OF MOBILE WIRELESS COMMUNICATIONS INDUSTRY: CANADA AND THE US.

A. INDUSTRY AT A GLANCE

The following table provides the basic statistics of Canadian and US wireless industries. The first two “data” columns of this table contain absolute measures, while the last column contain relative measures, calculated as a ratio of the respective Canadian and US absolute statistics.

²⁸⁶ 2000 Census. See <http://www.fhwa.dot.gov/planning/census/cps2k.htm>.

²⁸⁷ See <http://www40.statcan.ca/101/cst01/demo62a.htm>.

²⁸⁸ See http://www.census.gov/geo/www/ua/ua_2k.html. Note that density of 500 persons per square mile translates into density of 193 persons per square kilometer.

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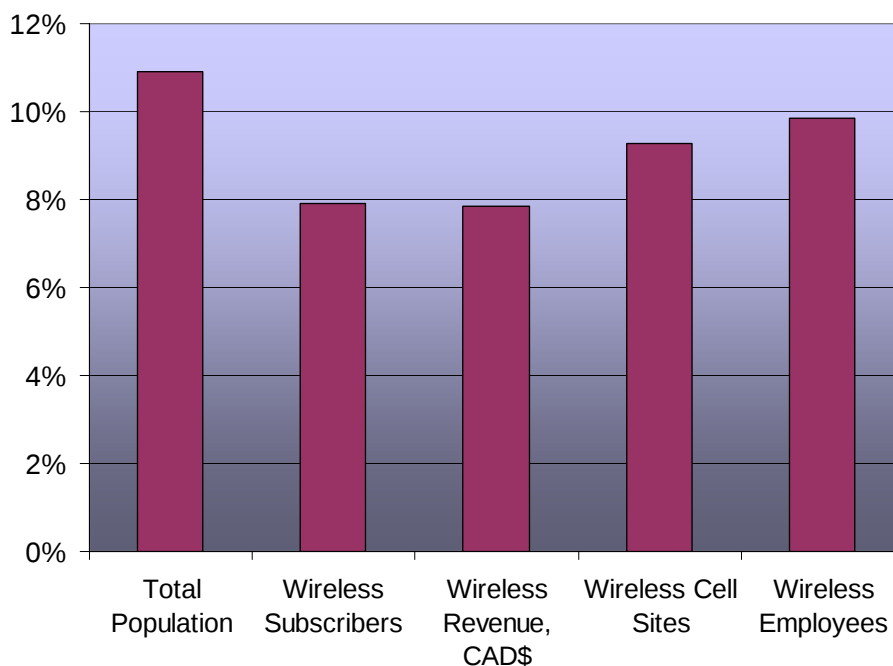
Table V. 1. Mobile Wireless Industry at a Glance -- Canada and United States*

Measure	Canada	United States	Canada as % of the US
Total Population	32,898,551	301,756,938	11%
Wireless Subscribers	18,425,194	233,040,781	8%
Wireless Revenue, CAD\$	\$9,478,099	\$120,955,369	8%
Wireless Cell Sites	16,305	175,725	9%
Wireless Employees	25,000	253,793	10%

* -- Sources and vintage dates: Statistics Canada (Canada Population Clock (May 2007), Revenue (2004), Cell Sites (2004)); US Census Bureau (US Population Clock (May 2007)); CWTa (EOY 2006 Canada Subscribers and current Employees), CTIA (EOY 2006 US Subscribers, Revenue and Employees). Currency conversion based on GDP PPP exchange rate for 2004 (0.85\$CAD/US\$).

As seen from table V.1, the Canadian wireless market is by a magnitude smaller than the US wireless market. Specifically, the Canadian market, measured as total country population, is approximately 11% of the US market. In terms of the realized market size, measured by subscriber counts and total revenue, Canada constitutes 8% of the US market. The differences in mobile wireless penetration rates in the two countries are discussed in detail later in this report. The Canadian wireless industry employs approximately 25,000 people which represent about 9% of the US wireless labor force. The Canadian cell sites represent about 10% of the US count of cell sites. Chart V.1 provides a graphical representation of these relationships:

**Chart V.1. Mobile Wireless Industry at a Glance:
 Canada as % of United States**



Sources: See table II.1 above

These metrics on the relative size of the industries in the two countries are helpful in understanding the various incentives of the companies with respect to the deployment of technology.

B. COMPANY MARKET SHARES

Canada

Canada has three major mobile wireless providers – Bell Canada (Bell Mobility), Rogers (Rogers Wireless) and TELUS (TELUS Mobility), whose combined market share is currently estimated as 96% of subscribers.²⁸⁹ The following chart (Chart V.2) depicts the relative shares of Canadian wireless companies, where category “other” includes MTS Mobility and SaskTel.

²⁸⁹ CWTA EOY 2006 data available at <http://www.cwta.ca/CWTASite/english/industryfacts.html>. Note that Bell Canada subscriber counts include Aliant.

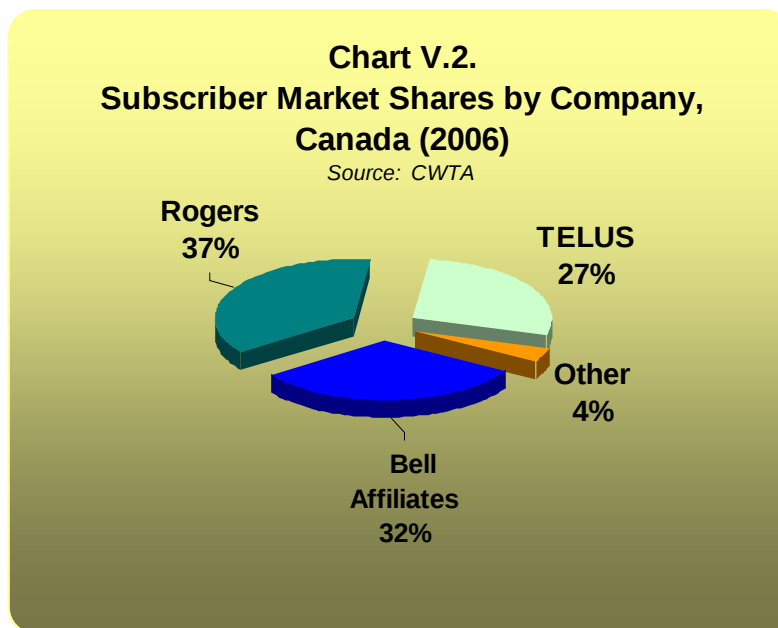
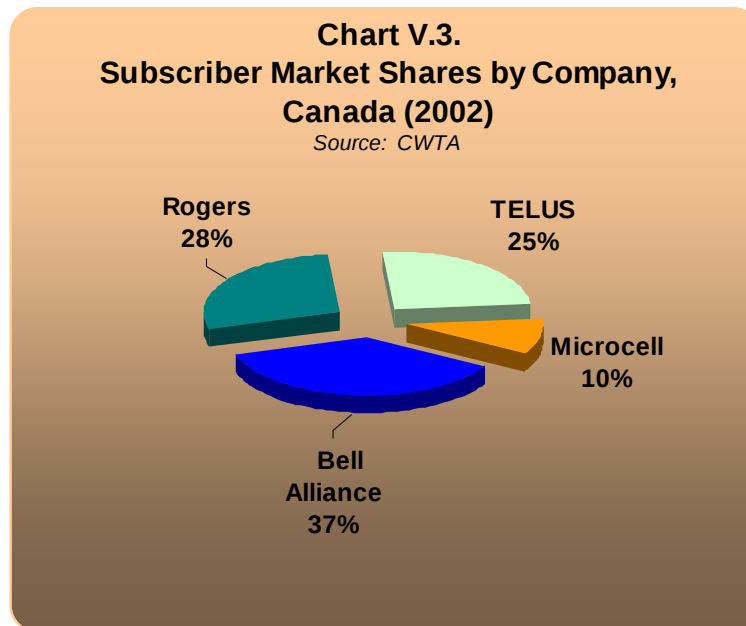


Chart V.3 (below) depicts historical relative shares of Canadian wireless companies. The biggest difference compared to the current market shares is the presence of Microcell (10% market share in 2002), which is now part of Rogers. In addition, Bell's market share in 2002 includes all Bell Wireless Alliance companies, including SaskTel and MTS,²⁹⁰ which are included in category "other" in 2006.

²⁹⁰ Bell Wireless Alliance in 2002 also included Bell Mobility, Aliant Telecom, Northwestel Mobility Inc., T  l  bec Mobilit   and NorTel (Northern) Mobility.



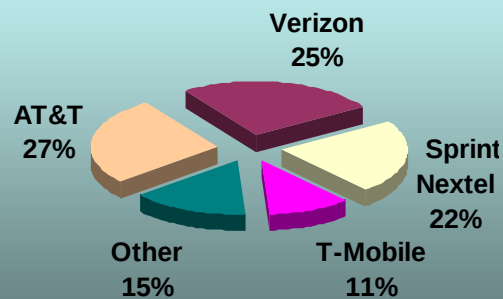
A comparison of charts V.2 and V.3 shows that apart from the above described structural changes, companies market shares did not change significantly.

United States

The US currently has four national companies – AT&T (formerly Cingular), Verizon Wireless, Sprint Nextel and T-Mobile. Chart V.4 depicts relative market shares of the US wireless providers derived from the subscribership data reported by the FCC. Note that category “other” includes 21 carriers, with the largest being Alltel -- a carrier that is considered to be a regional carrier because of its geographically limited coverage -- with 5% of subscribers.

Chart V.4.
Subscriber Market Shares by Company,
United States (2005)

Source: FCC 11th Report on Wireless Competition

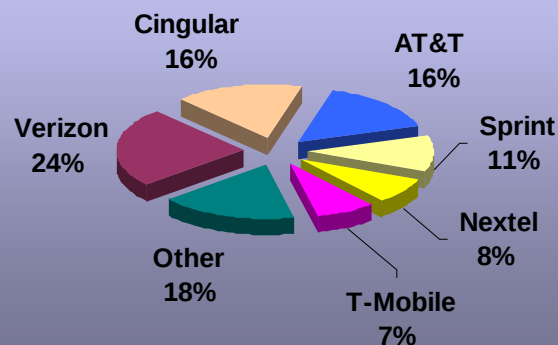


As seen from chart V.4, the four national US mobile carriers serve 85% of the US subscribers.

The US wireless industry experienced some consolidation in recent years, specifically, a merger of Sprint and Nextel (now Sprint Nextel), as well as the merger of AT&T Wireless and Cingular (now AT&T). The following chart V.5 depicts the US wireless companies' market shares in 2002 (before the above described mergers):

Chart V.5.
Subscriber Market Shares by Company,
United States (2002)

Source: FCC 8th Report on Wireless Competition



The comparison of the US current (2005) and historical (2002) market share charts (charts V.4 and V.5) shows an increase in market concentration. This is evident not only in the fact that the number of national wireless carriers decreased from six in 2002 to four in 2005, but also in the fact that the market share of “other” carriers went down by three percentage points (from 18% in 2002 to 15% in 2005).

Conclusion: Three to four major wireless facilities-based carriers in both countries serve the majority of subscribers. As the wireless industry begins to mature, we see consolidation in both countries and an increase in market concentration. This is to be expected and reflects the rational move to increase efficiencies and utilize scale economies. The size of the overall market generally dictates the number of major providers that can efficiently provide service. It is not surprising that the US would have more large providers given the size of that market in terms of geography and potential revenues.

VI. QUICK ADOPTER APPROACH TO INNOVATIONS

Business success is attributed to pioneers of technological innovation. However, despite this stereotype, empirical evidence augmented by theoretical models shows that being a technological pioneer is neither necessary, nor sufficient for achievement of business success, customer satisfaction and public policy goals of affordable telephone and development of advanced telecommunications service.

A. TYPES OF INNOVATIONS

When discussing innovations, it is useful to distinguish two types of innovations – technological innovations and commercial (business) innovations. This distinction becomes particularly important for network industries such as mobile telecommunications because fundamental technological innovations such as network upgrades require exerting of a lot of effort and capital expenses, while its outcome is very uncertain. Even if technology works, it does not guarantee business success, because real costs can exceed expected demand, thus making the business model unprofitable. A classical example is the story of *Iridium* consortium, a satellite telephony provider, when disappointingly low demand forced it into bankruptcy.²⁹¹

In mid-1998, Iridium was one of the darlings of Wall Street having more than tripled in stock price in less than a year. Armed with expertise and over 1,000 patents, the company seemed poised to capture first-mover advantage in providing global telephony via a network of low-Earth-

²⁹¹ Iridium LLC Chapter 11 Filing, Case No. 99-45005-CB, US Bankruptcy Court, Southern District of New York.

orbiting satellites. Additionally, Iridium appeared to have identified an attractive target segment after having screened over 200,000 people, interviewed 23,000 people from 42 countries, and surveyed over 3,000 corporations.²⁹² To provide high-quality global communication the company successfully deployed 66 satellites in low-earth orbit with a total system cost of \$5.7 billion.²⁹³ In order to break-even, the company needed 500,000 to 600,000 subscribers **worldwide**. In March 2000, with only **50,000** subscribers 15 months after the beginning of operations, the company had decided to terminate the service. In December 2000 the assets of the bankrupt company were acquired by Iridium Satellite LLC at a price of \$25 million (approximately \$6.5 million in cash and an unsecured note in the approximate amount of \$18.5 million). As of December 31, 2006 the system has 175,000 subscribers.²⁹⁴

The example of *Iridium* teaches us that technological success does not guarantee financial success. While the company successfully overcame formidable *technological* challenges – it deployed in low-Earth orbit 66 satellites using launchers from three different countries without exceeding original budget and practically on schedule – the project became operational with only a two months delay, it failed to achieve its *financial* goals, because the actual demand did not meet initial forecasts. One of the reasons of miscalculating demand was that the business concept developed in late 1980s-early 1990s failed to predict that competing technology (wireless innovations, networks and handsets) would develop and improve so fast that it would erode much of the demand for *Iridium*'s satellite service.

Another reason why an innovation that is sound in terms of technology may fail financially (or, at least, not realize its potential in full) is the “standards wars” and the presence of multiple technology standards. For example, as discussed in this report, both Canada and US have multiple wireless standards, with the CDMA standard serving over 45% of subscribers in each country (59% in Canada and 49% in US). At the same time the standard that dominates the world market (and particularly, Europe) is the GSM standard. Also discussed in this report (see section on handheld devices) is the fact that equipment manufacturers often develop a new device for GMS networks.

A subclass of technology innovations relevant to mobile wireless industry is technology-based product innovations (as opposed to innovations in the underlying networks), such as introductions of new products or applications to be used with an existing technology. Quite often these applications emerge as byproducts of new capabilities fortuitously

²⁹² This description of Iridium is taken from Finkelstein, Sydney, and Shade H. Sanford. 2000. "Learning From Corporate Mistakes: The Rise and Fall of Iridium." *Organizational Dynamics* 29:138-148.

²⁹³ All numbers quoted are from Lutz, E., M. Werner, and A. Jahn. 2000. *Satellite Systems for Personal and Broadband Communications*. Berlin: Springer-Verlag. Currency is US dollars.

²⁹⁴ Lutz, E., M. Werner, and A. Jahn. 2000. *Satellite Systems for Personal and Broadband Communications*. Berlin: Springer-Verlag. Currency is US dollars.

made available by a new technology. For example, digital cell phone systems (2G) were developed to use digital signals primarily in voice communications, as a means of achieving higher capacity and lower noise level. Secondary to these improvements was the fact that digital signal allowed transferring other types of data (non-voice signals), thus creating market for such applications as SMS,²⁹⁵ ringtones, music downloading etc., which now have become significant source of revenues for wireless companies, especially in Europe and Asia. According to Portio Research estimates, by 2012 the worldwide revenues from SMS will reach US\$67 billion.²⁹⁶ Standard & Poor's forecast predicts that mobile music downloads will generate more than US\$14 billion in global revenues by 2011.²⁹⁷ Another example of product innovation that utilizes digital networks is Canada's own BlackBerry® handset and service discussed as a case study of handheld devices in this report.

The investment and R&D costs of product innovation are usually lower than in the case of technology innovation, because the underlying technology already exists. Innovators still face uncertainty of demand for new products and services, and some risk of technological fit. For example, while WAP²⁹⁸ browser intended to enable 2G phones to surf the Internet starting in 1997, Internet surfing using WAP has not become a major revenue generator, because its consumer performance (in terms of speed, ease of use, appearance, and interoperability), as well as availability of content were inadequate until recently. Internet browsing over mobile handheld devices is becoming more popular in recent years as mobile carriers offer supplemental innovations, such as downloadable content (for example, ringtones) and applications designed to ease use of WAP browsing, such as TELUS' FastTap keypad – a keypad that makes text entry on a mobile phone faster by adding a key for each letter around the traditional numeric keyboard.

Another caveat is the difference in technology adoption rate in different parts of the world. A product's success in one geographic region does not guarantee its replication in other countries. For example, in Canada and the US the usage of SMS service is well behind Europe and Asia, which industry analysts attribute to a number of factors. Among these factors are the popularity of substitutes such as BlackBerry® e-mail service, availability of push-to-talk service, generous calling plans such as free mobile-to-mobile calls, practice of charging for both sent and received SMS, and the presence of multiple wireless standards that slowed down original availability of SMS messaging between different providers.

²⁹⁵ Aldiscon – an Irish company -- introduced SMS in June 1991. See Hidding, Gezinus J., and Jeffrey R. Williams. 2003. "Are there First-Mover Advantages in B2B eCommerce Technologies?" in *36th Hawaii International Conference on System Sciences*. Hawaii.

²⁹⁶ *Total Telecom Online*, Feb 20, 2007. <http://www.totaltele.com/>.

²⁹⁷ Standard & Poor's. 2006. "Industry Surveys. Telecommunications: Wireless." p. 3.

²⁹⁸ Wireless Application Protocol. It is an open international standard for applications that use wireless communication. Its principal application is to enable access to the Internet from a mobile phone or PDA.

Commercial (business) innovations is another class of innovations (as opposed to technological innovations) -- a process in which an innovative pricing scheme or service plan attracts new customers ideally without negatively affecting revenues from incumbent customers, thus making profits' to increase. For example, by offering prepaid (rather than postpaid) service plans -- plans under which customers buy minutes that they can use over a limited time in advance) -- wireless companies can attract low-usage and/or low-income customers who do not want to subscribe to plans with monthly payments and mandatory contract terms of service. Carefully designed variety of service plans allow companies to increase their customer base and maximize companies' profits.²⁹⁹ Referring to this particular example of commercial innovation, Canada leads the US in terms of the relative portion of pre-paid subscribers in the total number of subscribers. As of 3Q 2006 the share of prepaid subscribers was 22% in Canada, and 13% in the US.³⁰⁰ In the US, the number of prepaid subscribers has more than doubled to 28.9 million between 2002 and 2005.³⁰¹ The Telecommunication Industry Association (TIA) predicts that prepaid revenues will grow from US\$13.8 billion in 2006 to US\$22.2 billion in 2009.³⁰² In Canada, Virgin Mobile (a joint venture between Virgin and Bell Canada) expected to have 400,000 prepaid subscribers by the end of 2007. While prepaid customers have much lower ARPU (in case of Bell Mobility – CAD\$14 per month³⁰³), these are the customers, who might not use wireless service otherwise, thus, offering prepaid plans allows carriers to capture this segment of the market.

Another way to innovate commercially is to offer a menu of options – whether to buy services separately, or as a bundle in which different services (voice communications, internet access and SMS) are offered as a package.

If designed and implemented properly, commercial innovation increases welfare by increasing adoption (penetration) rate of an offered product without commanding huge capital expenditures.

B. ECONOMICS OF TECHNOLOGICAL INNOVATION IN THE WIRELESS PHONE INDUSTRY

The distinction between technological, product and commercial innovation in the wireless phone industry is important when analyzing the economics of innovations.

²⁹⁹ Economists refer to this method as “price discrimination,” when customers pay for the service a price which is close to their reservation price (or maximum willingness to pay).

³⁰⁰ Merrill Lynch Global Wireless Matrix, January 2007 (data for 3Q 2006).

³⁰¹ This number was expected to be 34.7 million by the end of 2006. Standard&Poor's. 2006. "Industry Surveys. Telecommunications: Wireless." p. 10.

³⁰² Standard & Poor's. 2006. "Industry Surveys. Telecommunications: Wireless." p. 10.

³⁰³ Bell Canada Enterprises 2006 Annual Report, p. 29.

Technological innovation is the most *risky* innovation, especially when considering the underlying networks because of high capital expenditures and the sunk nature of investments in fixed assets in a networking industry. An additional challenge faced by the mobile wireless industry is the “war of standards,” or the absence of one single standard. As discussed above, this is a specific problem of both the Canadian and US wireless industry. The GSM standard dominates the world markets with 80% of world subscribers, and CDMA being the most common standard in both Canada and the US. Because many popular handheld devices such as Motorola RAZR™ or RIM’s BlackBerry® were first developed for GSM-based carriers, CDMA carriers face a certain disadvantage. At the same time there is high uncertainty about the true costs to develop the innovation and usually quite a high probability that technology will not work as expected, at least initially (WAP and early attempts of using videos in wireless phones discussed below are examples of such initial false starts), then there is high uncertainty regarding the implementation costs (capital expenditures) and future demand.

A good illustration of the uncertainty regarding future demand is the history of mobile TV. Early product offerings in this field, such as Sony’s *Watchman* (a portable handheld TV, designed to be analogous to Sony’s success with *Walkman*), offered as early as the 1980s, did not gain much popularity, suggesting that there was not much demand for mobile TV services. However, more recently some mobile telecommunications companies started offering mobile TV over TV-capable cellular phones. In the US, Sprint was first to offer this service in late 2003. According to industry analysts, “That service is powered by MobiTV Inc., whose live simulcast of cable TV channels has improved markedly over the years, but remains more akin to live radio played against a jittery slideshow rather than normal full-motion video.”³⁰⁴ In Canada, mobile TV is offered by all major mobile carriers. As put by AT&T’s chief operating officer Randall Stephenson, “I don’t know if people will want to watch it, but every time I say one of these ‘I don’t knows,’ [referring to the growth in text messaging despite the inconvenience of numerical keypad and a surprising demand for ringtones] it goes beyond my wildest imagination.”³⁰⁵

In fact, future *demand is a double-edged sword*. If demand for the new technology is low, then the innovator will end up losing money (see the *Iridium* example above); but even high demand does not guarantee high profits, because without high barriers to entry, it will attract competitors and competition can erode the first mover’s profit margins. Commercial innovations, which often do not require significant additional cost or license (such as on offering of prepaid plan) can typically be easily copied, thus quickly erasing the first mover’s advantage.

The story of mobile TV provides another twist on the point that demand is a double-edged sword: Originally, mobile carriers offered this service over their 3G networks.

³⁰⁴ Minneapolis Star Tribune, April 1, 2007. “Squint TV” by Bruce Meyerson, Associated Press.

³⁰⁵ Quoted from Minneapolis Star Tribune, April 1, 2007. “Squint TV” by Bruce Meyerson, Associated Press.

Because these networks are not engineered to handle a stream of live TV, growing demand for this service means that networks may eventually become bogged down, deteriorating the quality of TV signal. This is exactly what happened in South Korea when the network became congested with video traffic within eight to nine months after this service was launched. A South Korean company, SK Telecom quickly realized that a new approach was necessary, and it built a separate satellite network to broadcast its mobile TV service.³⁰⁶ In other words, the experience of early providers of mobile TV service exposed the deficiency inherent in standard cellular technology. Its *unicast* principle (signal is transmitted to each phone individually) means that if there is more than one user tuning to a specific live TV broadcast in the same cell, the same signal is transmitted many times. Early leaders such as SK Telecom found that building a separate TV broadcasting network where the signal broadcasts at once to all mobile TV users in the area (like traditional broadcast TV) preserves the quality of signal as the demand for mobile TV grows.³⁰⁷ Learning from these experiences, two US mobile carriers – Verizon and AT&T – are launching in 2007 a new version of mobile TV over cellular phones, the version that uses Qualcomm's *MediaFlo* network, which is a dedicated network that broadcasts video to all viewers at once, just as a traditional broadcast television network operates.³⁰⁸

Threat of further competition such as *government intentions to ease spectrum regulation* may slow down innovations. For example, an academic paper by Hazlett³⁰⁹ showed that removing license restrictions on usage of spectrum in Australia and Latin American countries decreased spectrum license bids (indicating lower expected profits) in anticipation of higher competition. In these countries these licenses had so-called “expansive spectrum property rights”, which allowed license buyers to resell unused parts of the spectrum to others. Although the most immediate effect of such ease in regulations would be increased revenues to license holders, expansive spectrum property rights essentially lower entry barriers for competition in these countries, thus reducing anticipated profits (the source and driving force of innovations) of the bidders. Indeed, the study showed that participants in auctions for expansive spectrum property rights bid on average 38% less than bidders in other countries, with more restrictive licenses.

Another important economic phenomenon that affects innovations in the wireless communication industry is the fact that it is experiencing *positive network externalities* – the more people are connected, the more valuable the network is for users. A classical academic paper studying technological adoption in the network with positive externalities

³⁰⁶ See http://news.com.com/Tight+squeeze+for+mobile+TV/2100-1039_3-5886537.html.

³⁰⁷ See http://news.com.com/Tight+squeeze+for+mobile+TV/2100-1039_3-5886537.html and http://news.com.com/ATT+taps+MediaFlo+for+mobile+TV/2100-1039_3-6158544.html.

³⁰⁸ Verizon launched this service in January 2007, and AT&T plans to launch it later in 2007. See Minneapolis Star Tribune, April 1, 2007. “Squint TV” by Bruce Meyerson, Associated Press.

³⁰⁹ Hazlett, Thomas W. 2004. “Property Rights and Wireless License Values.” AEI-Brookings Joint Center Working Paper No. 04-08. Also in SSRN *eLibrary*: SSRN 10.2139/ssrn.519602.

is by Katz and Shapiro³¹⁰. They show two important results: 1) In the absence of barriers to entry competitive equilibrium will lead to an inefficient result, specifically, an *underinvestment* in technology and products; and, 2) With two or more promoters of incompatible technologies (standards), the advantage will go to the latest mover.

The intuition behind the first result is derived as follows. A company has to invest a significant amount of money in the network deployment. Without barriers to entry, later entrants will drive the price down to marginal cost, without allowing the incumbent to recuperate this initial investment, which has become a sunk cost. Therefore, the companies will be reluctant to invest in the network in the first place, because they rationally anticipate that they will not be able to recover this investment later. It means that barriers to entry (for example, in the form of restricted use licenses) are necessary. Analysis shows that “a cartel of producers may be socially desirable to the extent that it allows them to set later prices above marginal costs and thus generate incentives to invest in a new technology in the presence of network externalities. Pricing at the marginal cost of production in each period may not be socially optimal.”³¹¹

In the case of two competing technologies a second-mover advantage arises, because the second mover can implement a more recent technology, and technology that will be superior tomorrow has a strategic advantage. In other words, a late comer can see which standard (technology) is winning and choose the winning (more widely adopted) technology, because he is not locked-in with another technology. One illustration of this theoretical result is the world history of wireless communications, where late comers such as the countries of the former Soviet block were able to *leapfrog* ahead by starting with “next generation” networks and typically networks of the now-prevalent GSM standard.

In other words, a company does not have to be a pioneer and innovation leader in order to reach financial success. Similarly, Hidding and Williams³¹² in their empirical study of financial success in 27 eCommerce sectors found that current leaders typically arrive 2-4 years later than innovators, with half of the current leaders being the fast followers. In at least 22 (out of 27) eCommerce technology product categories there was no sustained first-mover advantage. Often, current leaders are large companies who acquired pioneers (typically smaller companies) after witnessing their financial success. In essence, these companies utilized the smart follower strategy by waiting and allowing the market to reveal (select) winning technological or business innovations. Examples of such acquisitions include AT&T’s purchase of the US cellular pioneer McCaw Cellular, Rogers’ purchase of Microcell (FIDO), the first Canadian GSM network provider, and

³¹⁰ Katz, Michael L., and Carl Shapiro. 1986. "Technology Adoption in the Presence of Network Externalities." *The Journal of Political Economy* 94:822-841.

³¹¹ Katz, Michael L., and Carl Shapiro. 1986. "Technology Adoption in the Presence of Network Externalities." *The Journal of Political Economy* 94:822-841, p. 840.

³¹² Hidding, Gezinus J., and Jeffrey R. Williams. 2003. "Are there First-Mover Advantages in B2B eCommerce Technologies?" in *36th Hawaii International Conference on System Sciences*. Hawaii.

UK's *Logica's* (current leader in provisioning SMS centers) purchase of the above mentioned Irish *Aldiscon*, a pioneer of SMS services.

In summary, there exist a number of first mover disadvantages and smart follower advantages.³¹³

- Resolution of technological uncertainty by the time the fast followers move in, i.e., emergence of a “dominant design.” For example, in the case of a standards war, followers enter by the time a dominant standard emerges. Delayed entry allows followers to reap the benefits of picking up the winner.
- Smart follower leapfrogs over older technologies or rejected standards. For example, transitional economies (Eastern Europe) and Asia developed their wireless networks by starting from 2G networks, thus avoiding investment in 1G. Delayed entry allows followers to avoid investment in outdated networks, while the leaders may have to continue using the outdated network because it represents sunk cost and continues generating revenues.
- Market uncertainty that innovator faces – whether there will be enough demand for a new service or product such as mobile TV or the high-priced Apple iPhone. As discussed above, sometimes a new service fails to succeed, as illustrated by the *Iridium* fiasco and Sony's *Watchman*. The story now repeats itself with mobile TV via cellular phones. Even a few years after introduction of the first video-capable phones, the business model and future demand for this product remains unclear.
- Free-rider effects – when later entrants can imitate the innovator's success at lower cost/higher quality and avoid his mistakes.
- Learning-based productivity improvement. For example, as discussed above, carriers that were first to offer mobile TV over the phone, such as South Korean SK Telecom, learned that cellular 3G networks were inadequate for supporting increasing demand for live TV broadcasts, and that alternative broadcasting principles (as opposed to cellular unicast) must be utilized.
- Attracting skilled labor. Such free-rider effects may be enhanced by complementary assets of an imitator.
- Followers use the experience of leaders as a low-cost method of revealing consumer preferences. By the time the followers enter they have a better understanding regarding consumer demand and they can offer more fine-tuned deals than the pioneers were offering initially.
- Technology or customer needs shift, which is difficult for incumbents to discern and/or react to, because they are already locked-in with a technology or product

³¹³ Based on Hidding, Gezinus J., and Jeffrey R. Williams. 2003. "Are there First-Mover Advantages in B2B eCommerce Technologies?" in *36th Hawaii International Conference on System Sciences*. Hawaii.

they have chosen. For example, in 1980s, French communications company Poste, Téléphone et Télécommunications (now France Telecom) launched an online service called *Minitel* - a simple-to-use, low cost and low speed digital network designed for text-based information exchanges implemented on the telephone network.³¹⁴ This service is considered the world's most successful pre-World Wide Web online service.³¹⁵ While it "conditioned" (psychologically prepared) French consumers for adoption of the Internet and Internet-based e-commerce, it hindered the actual adoption of the Internet in France because French consumers were locked-in with Minitel. Consequently, this delayed the adoption of a better and more advanced technology.³¹⁶

- Organizational inertia, due to:
 - Dedicated fixed assets (particularly if they have not been fully depreciated such as older-generation wireless networks).
 - Long-term contracts with equipment manufacturers.
 - End-user term contracts. For example, in the US and Canada handsets are typically tied to carrier plans. High-end handsets are typically subsidies through a term contract. In order to subscribe to a new service such as Mobile TV, a customer may have to buy a new handset.
 - Reluctance to cannibalize existing popular products (mobile companies typically offer a limited number of handsets simultaneously), reluctance to antagonize existing sales channels.
 - Extra cost of adding new products. For example, an introduction of a new handset or value-added service requires training sales representatives and technical support.

What determines who will become an innovator or who will be the follower? A concept of lead-lag countries is described in a paper by Beise.³¹⁷ This article suggests that specialization of countries in international trade is determined by the lead-lag market pattern of national markets. Many internationally successful innovations have been adopted first in one country while other countries initially either preferred other designs or an established product. Home market, rather than technological knowledge, determines lead countries.

³¹⁴ Brosseau, Eric, 2003, "E-Commerce in France: Did Early Adoption Prevent the Development? *The Information Society* 19(1).

³¹⁵ In North America, Bell Canada and US West were offering this service for a brief time in 1990s.

³¹⁶ See for example, <http://wired-vig.wired.com/science/discoveries/news/2001/04/42943> and See http://www.forbes.com/2003/07/14/cx_al_0714tentech.html?partner=newscom.

³¹⁷ Beise, Marian. 2005. "Lead Markets, Innovation Differentials and Growth." *International Economics and Economic Policy* 1:305-28.

Size of the market makes research and development more profitable in larger countries. For example, it can make more sense for Canadian (smaller) wireless providers to follow US network innovations than trying to develop their own and face the risk of bearing high conversion costs (to the US standard) in case of failure.

Academic research attempted to quantify the advantage of the smart-follower's strategy in deployment of 3G wireless networks through a real options analysis.³¹⁸ The real options approach calculates the value of flexibility in making managerial decisions. One such decision is delay in investment. Due to the high volatility of estimates of future revenues, such *delay can bring value* to the company in the form of avoided risk, because it *preserves the option* of canceling the project, if revised demand forecasts will not be high enough. The cost of delay is equal to foregone revenues from the years when the system is not deployed due to the delay. The authors show that the value of this option depends on a number of factors, with *market size* being the most important one. They also show that while it may be optimal to invest in 3G for larger markets, it may be more efficient for small markets to wait. Because the Canadian market is much smaller than the US market, this qualitative conclusion should be kept in mind when comparing the scale and timeline of actual deployments of "next generation" wireless technologies in both countries.

³¹⁸ Harmantzis, Fotios C., and Venkata Praveen Tanguturi. 2007. "Investment decisions in the wireless industry applying real options." *Telecommunications Policy* 31:107-123.



ATTACHMENT 1

Acronym List

1G	First Generation Mobile Network
1x-RTT	First Phase of CDMA-Radio Transmission Technology
2G	Second Generation Mobile Network
2.5G	Second and a half Generation Mobile Network
3G	Third Generation Mobile System
4G	Fourth Generation Mobile Network
AMPS	Advanced Mobile Phone Service
AOL	America On Line
CAD	Canadian Dollars
CDMA	Code Division Multiple Access
CDMA2000	Code Division Multiple Access 2000
CRTC	Canadian Radio-television and Telecommunications Commission
CTIA	Cellular Telecommunications & Internet Association
CWTA	Canadian Wireless Telecommunications Association
EDGE	Enhanced Data Rates for Global Evolution
ETSI	European Telecommunications Standards Institute
EV-DO	Evolution-Data Optimized
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GB	Giga Bit
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GWM	Global Wireless Matrix
HSDPA	High-Speed Downlink Packet Access
HSPA	High-Speed Packet Access
HTML	Hyper-Text Markup Language
iDEN	Integrated Digital Enhanced Network
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IM	Instant Messenger
IMS	IP Multimedia Subsystem
IMT-2000	International Mobile Telecommunications-for the year 2000
IP	Internet Protocol
ITU	International Telecommunication Union
kHz	kiloHertz
Mbps	Mega bits per second
ML	Merrill Lynch
MP3	MPEG Layer-3
MP	Multi-Pulse or Multi-Protocol
MPEG	Moving Picture Expert Group
MSA	Metropolitan Statistical Areas
NG	Next Generation
NHL	National Hockey League



**The State of Wireless Technologies
In Canada
Attachment 1**

MSN	MicroSoft Network
PC	Personal Computer
PDA	Personal Data Assistant
PTT	Push To Talk
QWERTY	The name for a computer or typewriter keyboard, named after the left side, upper row of letters.
SMS	Short Message Service
TDMA	Time Division Multiple Access
TIA	Telecommunication Industry Association
TPR	Federal Telecommunications Policy Review Panel
TV	TeleVision
UMTS	Universal Mobile Telecommunications System
US	United States
VGA	Video Graphics Array
WCDMA	Wideband Code Division Multiple Access
Wi-Fi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Access Network
WLNP	Wireless Local Number Portability



ATTACHMENT 2

**Archive of Press Releases Regarding Technology and Services
Deployment and Innovation for the Major Canadian and US Mobile**

I. CANADIAN MOBILE WIRELESS CARRIERS

A) BELL MOBILITY

- 4/25/07: Bell Mobility announces that it will make available in the summer of 2007 the BlackBerry® 8830 World Edition smartphone – the first CDMA BlackBerry smartphone that is compatible international roaming on GSM/GPRS networks outside of North America.¹
- 3/19/07: Bell Mobility announces the exclusive availability of Samsung SPH-m610 multimedia mobile phone – the thinnest phone in North America.²
- 2/28/07: Bell Mobility announces “Bell to Bell Calling” – a set of rate plans providing unlimited calling from Bell mobile, residential and business phones.³
- 2/22/07: Bell Mobility announces exclusive content from GOLTV, Canada’s only 24 hour soccer network for Bell Mobility customers with video-capable mobile phones.⁴
- 2/15/07: Bell Canada launches “Mobile Movies,” the first service in Canada providing full-length pay-per-view movies to video-capable phones. Mobile Movies streams movies over Bell Mobility’s wireless high speed network over at least 5 different handsets available from Bell Mobility, with more to be launched in 2007.⁵
- 12/7/06: Bell Canada announces nationwide availability of LG FUSIC™, the first phone in Canada with a built in FM transmitter, along with MP3 player and access to largest music download catalog in Canada.⁶
- 10/31/06: Bell Canada launches Nokia 6275i handset – Bell’s first 2 MP mobile phone, along with other multimedia functionality.⁷
- 8/14/06: Bell Canada announces Canada’s first music video ringtones.⁸

¹ “First CDMA BlackBerry Smartphone to Support International Roaming on GSM/GPRS Networks.” Bell Mobility Press Release. 4/25/07.

² “Bell Introduces the Slimmest Phone in Canada – Ultra-Thin Samsung SPH-m610 Features Stereo Sound, Big Colour Screen.” Bell Mobility Press Release. 3/19/07.

³ “Bell to Bell Calling Offers Unlimited Local Calling to and From Bell Mobile, Residential and Business Phones.” Bell Mobility Press Release. 2/28/07.

⁴ “Bell Launches Exclusive GOLTV Soccer Content on Mobile Phones and sympatico.msn.ca.” Bell Mobility Press Release. 2/22/07.

⁵ “Full Length Pay-Per-View Movies Can Be Watched Directly on Bell Mobility Phones.” Bell Mobility Press Release. 2/15/07.

⁶ “Bell Tunes in the LG Fusic™ Mobile Music Phone.” Bell Mobility Press Release. 12/7/06.

⁷ “Silver Phone Combines Sleek and Stylish Looks with Hot Features That Include Videoplayer and MP3 phone Expandable Memory.” Bell Mobility Press Release. 10/31/06.

⁸ “Listen and Watch the Latest Music Videos on Your Phone When it Rings!” Bell Mobility Press Release. 8/14/06.

The State of Wireless Technologies In Canada Attachment 2

- 7/13/06: Bell Canada and Good Technology, Inc. announce Good™ Mobile Messaging and Good Mobile Defense – enterprise push email with advanced mobile security features.⁹
- 1/24/06: Bell Canada announces availability of Motorola RAZR V3c handset – the next generation RAZR and first CDMA dual mode 1x digital handset on the market.¹⁰
- 1/19/06: Bell Canada announces nation-wide availability of exclusive NHL video clip service – first in Canada.¹¹
- 12/19/05: Bell Canada and Groove Mobile announce launch of nationwide full track mobile music download service – allowing browsing, reviewing, downloading and sharing music.¹²
- 12/12/05: Bell Canada announces flat-rate, per minute billing for global roaming on GSM networks – a Canadian wireless industry first.¹³
- 11/14/05: Bell Canada launches streaming video clip service – the first in Canada – allowing viewing of, for example, movie trailers and music videos.¹⁴
- 10/31/05: Bell Canada launches 3G EVDO network – along with the first 3 EVDO-based handsets.¹⁵
- 10/17/05: Bell Canada launches Motorola e815 mobile flip phone – first MP3 capable phone available on Bell 1x network.¹⁶
- 8/31/05: Bell Canada announces availability of MSN Messenger over its mobile devices.¹⁷
- 8/18/05: Bell Canada announces trial of next generation 911 service for wireless customers – first in Canada.¹⁸

⁹ “Bell Canada Offers Greater Choice for Corporate Email and Data Solutions for Wireless Customers.” Bell Mobility Press Release. 7/13/06.

¹⁰ “Bell Canada Announces Availability of Next-Generation Motorola RAZR phone.” Bell Mobility Press Release. 1/24/06.

¹¹ “Bell Canada Offers Mobile Customers Exclusive NHL Game Content.” Bell Mobility Press Release. 1/19/06.

¹² “Bell Canada Launches Nationwide Mobile Music Download Service With Groove Mobile.” Bell Mobility Press Release. 12/19/05.

¹³ “Bell Canada Launches Canada’s First Flat-Rate Billing Service for Global Roaming on GSM Networks.” Bell Mobility Press Release. 12/12/05.

¹⁴ “Bell Canada Launches First Mobile Streaming Video Clip Service in Canada with Sanyo 8300 Handset.” Bell Mobility Press Release. 11/14/05.

¹⁵ “Bell Canada Launches Fastest Mobile Data Network.” Bell Mobility Press Release. 10/31/05.

¹⁶ “Bell Canada and Motorola Launch e815 for the Ultimate Mobile Multimedia Experience.” Bell Mobility Press Release. 10/17/05.

¹⁷ “Bell Canada First in Country to Offer Rich MSN Messenger on Mobile Phone.” Bell Mobility Press Release. 8/31/05.

¹⁸ “Bell Canada First to Trial Next-Generation 9-1-1 for Wireless.” Bell Mobility Press Release. 8/18/05.

The State of Wireless Technologies In Canada Attachment 2

- 8/9/05: Bell Canada launches Seek & Find, Canada's first wireless location based service for families.¹⁹
- 3/16/05: Bell Canada launches "10-4" – walkie talkie service.²⁰
- 3/9/05: Bell Canada announces first in the world partnership with Sproqit Technologies to deliver remote access from PDA to all desktop applications.²¹
- 2/28/05: Bell Canada announces partnership with Universal Music Canada to deliver music ringtones (True Tones) and a Canada first "Caller Ring Tune" service.²²
- 2/16/05: Bell Canada announces availability of BlackBerry 7250 – first in Canada.²³
- 12/13/04: Bell Canada announces plans to roll out EVDO 3G technology.²⁴
- 10/14/04: Bell Mobility launches phone to phone video messaging service on Samsung SPH-a680 phone – first in Canada.²⁵
- 8/31/04: Bell Mobility and palmOne Canada announce availability of Treo™ 600 smartphone – first time palmOne device is available on CDMA 1x network in Canada.²⁶
- 8/12/04: Bell Canada announces opening of Wireless Innovation Centre at Bell Mobility's Creekbank campus to focus on development of innovative wireless applications, devices and services.²⁷
- 2/24/04: Bell Mobility and Sprint launch North America's first interoperable picture messaging service for camera phone users.²⁸

¹⁹ "Bell Launches Canada's First Location-Based Service for Families." Bell Canada Press Release. 8/9/05.

²⁰ "Bell Canada Pushes Button on its Wireless Walkie Talkie Service and Says "10-4, Good Buddy." Bell Mobility Press Release. 3/16/05.

²¹ "Bell Canada First To Partner with Sproqit to Deliver Laptop Functionality to Handheld Devices." Bell Mobility Press Release. 3/9/05.

²² "Bell Canada's Partnership with Universal Music Offers Canadians first "Caller Ring Tunes" Service." Bell Mobility Press Release. 2/28/05. Caller Ring Tunes allows callers to hear music instead of traditional ring when calling a Ring Tunes customer.

²³ "Bell Canada First in Country to Launch BlackBerry 7250." Bell Mobility Press Release. 2/16/05.

²⁴ "Bell Canada Announces Roll Out of Canada's Fastest Wireless Network." Bell Mobility Press Release. 12/13/04.

²⁵ "Bell Mobility Launches a Canadian First with Phone to Phone Video Messaging." Bell Mobility Press Release. 10/14/04.

²⁶ "palmOne's Treo 600 Smartphone Now Available to Bell Mobility Customers Over Leading 1x Digital Network." Bell Mobility Press Release. 8/31/04.

²⁷ "Bell Canada Opens Wireless Innovation Centre." Bell Mobility Press Release. 8/12/04.

²⁸ "Camera Phone Users Have One More Reason to Smile as Bell Mobility and Sprint Launch Cross-Border Picture Messaging Service." Bell Mobility Press Release. 2/24/04.

- 2/16/04: Bell Mobility announces suite of ruggedized data products and services on its 1x wireless network.²⁹
- 11/14/03: Bell Mobility launches Samsung SPH-600 camera phone for first time in Canada, allowing picture messaging.³⁰
- 6/18/03: Bell Mobility announces enhanced wireless games for Samsung n400, with broadest suite of games in Canada.³¹
- 5/15/03: Bell Mobility launches image download service to allow personalizing mobile phones.³²
- 2/27/03: Bell Mobility and VoiceGenie Technologies, Inc. announce a \$800,000 R&D initiative to extend speech recognition platform into a multimodal platform allowing access to information, graphics and streaming video on wireless devices using voice commands.³³
- 2/19/03: Bell Mobility launches BlackBerry 6750 – first on CDMA technology in Canada.³⁴
- 1/28/03: Bell Mobility launches availability of MSN messenger service.³⁵
- 1/23/03: Canadian and US wireless industries introduce cross-border inter-carrier text messaging services.³⁶
- 12/17/02: Bell Mobility launches MyFinder, the first offering in Bell’s Location Based Services.³⁷
- 11/6/02: Bell Mobility and Sprint announce collaboration to further advance CDMA2000 capabilities.³⁸

²⁹ “Bell Mobility Business Customers Get ‘Ruggedized’ With Durable Wireless Data Devices.” Bell Mobility Press Release. 2/16/04.

³⁰ “Bell Mobility Launches Picture Perfect Camera Phone.” Bell Mobility Press Release. 11/14/03.

³¹ “Swing, Jump, Jam, Race and Wrestle Like Never Before with Enhanced Wireless Games from Bell Mobility.” Bell Mobility Press Release. 6/18/03.

³² “Put Your Face on Your Bell Mobility Phone.” Bell Mobility Press Release. 5/15/03.

³³ “Bell Mobility and VoiceGenie Developing Simple Voice Command Technology.” Bell Mobility Press Release. 2/27/03.

³⁴ “Bell Mobility Launches RIM’s BlackBerry 6750™ with Built-in Cellphone.” Bell Mobility Press Release. 2/19/03.

³⁵ “MSN.CA and Bell Mobility bring MSN Messenger and More to Canadian Cell Phone Users.” Bell Mobility Press Release. 1/28/03.

³⁶ “Canadian and U.S. Wireless Service Providers Unify North American Text Message Markets.” Bell Mobility Press Release. 1/23/03.

³⁷ “Bell Mobility Introduces MyFinder – Canada’s First Wireless Location Based Service.” Bell Mobility Press Release. 12/17/02.

³⁸ “Sprint and Bell Mobility Collaborate on CDMA Technology Advancement.” Bell Mobility Press Release. 11/6/02.

- 11/8/02: Bell Mobility and MOTIVUS Software Ltd. Launch MOTIVUS mobile desktop for real-time access to their desktop/files/emails through a wireless PDA or laptop.³⁹
- 9/16/02: Bell Mobility launches Audiovox Thera™, Canada's first 1X Handheld PocketPC with Built in cellphone,⁴⁰ providing internet access, email, text messaging, speakerphone, voice recorder, MP3 player and phone.
- 4/23/02: Bell Mobility selects Sun Microsystems' JAVA™ technology to deliver wireless Java services to Bell Mobility handsets using 1x technology.⁴¹
- 4/2/02: Bell Mobility, Microcell, Rogers and TELUS launch North America's first inter-carrier mobile text messaging (SMS) network.⁴²
- 2/12/02: Bell Mobility launches 1x wireless network, devices and services.⁴³
- 1/22/02: Bell Mobility announces availability of VoiceNet (a product developed through BCE's \$70 million Convergence Fund) which is a voice recognition application that enables Bell Mobility customers to have their email and web content read to them.⁴⁴
- 11/6/01: North American First announced – a Canadian wireless initiative to enable inter-carrier, mobile text messaging.⁴⁵
- 4/27/01: Bell Mobility and Speedware Corp. announce partnership to foster innovation of wireless Internet applications and services by creating the first Canadian website for wireless developers – providing all information needed to build innovative applications for Bell Mobility.⁴⁶
- 4/25/01: Bell Mobility and Compaq Canada Corp. announce alliance to develop and deliver new wireless solutions.⁴⁷

³⁹ "MOTIVUS Software and Bell Mobility Bring the Windows Desktop to Canadian Wireless Customers." Bell Mobility Press Release. 5/8/02.

⁴⁰ Bell Mobility Launches Audiovox Thera – Canada's First 1X Handheld PocketPC with a Built-In Cellphone. 9/16/02. Available at: www.mobilemag.com/content/100/333/C1289/

⁴¹ "Bell Mobility Selects Sun Microsystems' Java™ Technology to Deliver Java Applications to Canadian Wireless Customers." Bell Mobility Press Release. 4/23/02.

⁴² "Canadian Wireless Carriers Announce Availability of North America's First Inter-Carrier Mobile Text Messaging Network." Bell Mobility Press Release. 4/2/02.

⁴³ "Bell Mobility Launches Next Generation Wireless Network, Devices and Services." Bell Mobility Press Release. 2/12/02.

⁴⁴ "Heard the Latest? Bell Canada Delivers First Wireless Voice Recognition Portal to Canadians." Bell Mobility Press Release. 1/22/02.

⁴⁵ "Canadian Wireless Carriers Break Through North American Text Messaging Barriers."

⁴⁶ "Bell Mobility Launches First Canadian Website for Wireless Application and Service Developers." Bell Mobility Press Release. 4/27/01.

⁴⁷ "Compaq Canada Corp. and Bell Mobility Form Alliance to Develop and Deliver new Wireless Solutions." Bell Mobility Press Release. 4/25/01.

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- 2/27/01: Bell Mobility and Siebel Systems, Inc. announce partnership to provide Siebel eBusiness Applications over Bell Mobility's Mobile Browser.⁴⁸
- 2/15/01: Bell Mobility announces expanded wireless email applications suite from Nortel and Novell.⁴⁹
- 1/11/01: Bell Mobility announces agreement with Sierra Wireless to deliver the AirCard 510, available through Bell Mobility in March 2001, making available Canada's first wireless CDMA PC Card technology in Canada.⁵⁰
- 1/11/01: Bell Mobility announces first consumer field trial of wireless multimedia services in Canada.⁵¹
- 12/20/00: Bell Mobility launches Canada's first colour display wireless phone (Motorola Timeport™ P8767).⁵²
- 11/30/00: Bell Mobility and Yahoo! Canada launch North America's first French-language wireless IM service on web-enabled phones.⁵³
- 9/21/00: Bell Mobility launches wireless access to MSN Hotmail through Mobile Browser™ - first time in Canada.⁵⁴
- 9/19/00: Bell Mobility announces that it will offer BlackBerry email solutions for use on ARDIS network.⁵⁵
- 5/24/00: Bell Mobility and Yahoo! Canada announce North America's first instant messaging service available on a Digital PCS phone.⁵⁶
- 4/12/00: Bell Mobility announces North America's first trial of myAladdin.com, a wireless location based information service.⁵⁷

⁴⁸ "Bell Mobility First in Canada to Offer Siebel eBusiness Applications on Internet-ready Wireless Devices." Bell Mobility Press Release. 2/27/01.

⁴⁹ "Bell Mobility Launches New Wireless Business Applications." Bell Mobility Press Release. 2/15/01.

⁵⁰ Sierra Wireless Signs Supply Agreement with Bell Mobility, AirCard 510 Becomes First CDMA wireless data PC Card Solution in Canada. 1/11/01. Available at: www.sierrawireless.com/news_events/news.aspx?year=1&contentid=F12DE869-39FF-42C8-BC4A-53D62DA3DFD9

⁵¹ "PacketVideo Teams with Bell Mobility to Launch Canada's First Market Trial of Wireless Multimedia Customers." Bell Mobility Press Release. 1/11/01.

⁵² "Bell Mobility Launches Canada's First Colour Display Wireless Phone." Bell Mobility Press Release. 12/20/00.

⁵³ "Yahoo!Canada and Bell Mobility Launch North America's First French-Language Wireless Instant Messaging Service on Web-Enabled Digital PCS phones." Bell Mobility Press Release. 11/30/00.

⁵⁴ "Bell Mobility First Cellular Service in Canada to Offer Wireless Access to MSN Hotmail." Bell Mobility Press Release. 9/21/00.

⁵⁵ "Bell Mobility to Offer BlackBerry Wireless Email Solution." Bell Mobility Press Release. 9/19/00.

⁵⁶ "Bell Mobility and Yahoo! Canada Launch North America's First Wireless Instant Messaging Service on 'com-ready' Digital PCS phones." Bell Mobility Press Release. 5/24/00.

⁵⁷ "Bell Mobility and NeoPoint, Inc. Launch First Trial in Canada of Wireless Location-based Services." Bell Mobility Press Release. 4/12/00.

- 2/16/00: Bell Mobility and Amazon.com announce Canada's first on line shopping services through mobile phones.⁵⁸
- 2/9/00: Bell Mobility and Yahoo! Canada announce availability of Yahoo over Bell Mobility phones.⁵⁹
- 2/7/00: Bell Mobility announces availability of QUALCOMM pdQ™ smartphone – the only smartphone to offer Palm Computing® platform and support full-time access to the Internet using standard Internet protocols.⁶⁰
- 10/25/99: Bell Mobility announces the completion of North America's first two "wireless campuses" – a new system that combines access to 3 communications networks via a single telephone.⁶¹
- 6/15/99: Bell Mobility offers the world's first tri-mode dual band CDMA handset (Nokia 6185).⁶²
- 5/13/99: Bell Mobility, in a series of Canada's and world firsts, announces initiatives to provide email, internet, ecommerce applications to mobile wireless handsets: Digital DATA to Go™, PCS Mobile Browser, etc.⁶³
- 11/23/98: Bell Mobility announces availability of Sony CM-Z100 Zuma handset – smallest phone on the market.⁶⁴

B) ROGERS WIRELESS

- 5/8/07: Rogers launches the "talking cellphone" for customers with vision loss.⁶⁵
- 4/12/07: Rogers launches mFleet™, a GPS based wireless fleet management solution.⁶⁶
- 4/2/07: Rogers announces wireless video calling (part of Rogers VISION suite), turning the mobile phone into a webcam for face to face calling in real time – the first and only wireless carrier in North America to offer video calling.⁶⁷

⁵⁸ "Bell Mobility and Amazon.com Launch First Wireless On-Line Shopping Service in Canada." Bell Mobility Press Release. 2/16/00.

⁵⁹ "Yahoo! Canada and Bell Mobility Provide Wireless Access to Yahoo! Canada Internet Services on Your Digital PCS phone." Bell Mobility Press Release. 2/9/00.

⁶⁰ "QUALCOMM'S pdQ Smartphones Enters Commercial Service with Bell Mobility of Canada." Bell Mobility Press Release. 2/7/00.

⁶¹ "New Breakthrough in Mobile Communications." Bell Mobility Press Release. 10/25/99.

⁶² "Bell Mobility Offers the World's First Tri-mode, CDMA phone." Bell Mobility Press Release. 6/15/99.

⁶³ "Bell Mobility Offers Customers Wireless Access to E-Mail, Internet, and E-Commerce." Bell Mobility Press Releases. 5/13/99.

⁶⁴ "Bell Mobility Offers Smallest Digital Phone." Bell Mobility Press Release. 11/23/98.

⁶⁵ "Rogers Wireless launches 'Talking Cellphone' for Customers with Vision Loss." Rogers Press Release. 5/8/07.

⁶⁶ "Rogers introduces mFLEET™ - An advanced Wireless Fleet Management Solution for the Canadian Market." Rogers Press Release. 4/12/07.

- 3/23/07: Rogers launches HTC s621 smartphone – first in Canada – providing Microsoft® Windows Mobile 5.0®.⁶⁸
- 1/10/07: Rogers announces turn-down of TDMA and analog networks effective 5/31/07.⁶⁹
- 12/19/06: Rogers announces availability of Call Manager – allowing the managing of use of phones on one account.⁷⁰
- 12/18/06: Rogers announces availability of MOTOKRZR K1.⁷¹
- 12/13/06: Rogers announce Canadian launch of BlackBerry® Connect™ for Nokia E62 (available 12/21/06) – allowing access to BlackBerry wireless services through Nokia phones.⁷²
- 12/5/06: Rogers announces exclusive availability of Palm® Treo™ 680 smartphone.
- 11/2/06: Rogers debuts HSDPA – first in North America.⁷³
- 10/3/06: Rogers announces availability of BlackBerry Pearl for the first time in Canada.⁷⁴
- 9/6/06: Rogers announces availability of Nokia E62 for the first time anywhere in North America – providing push e-mail and enhanced web browsing.⁷⁵
- 8/9/06: Rogers announces exclusive availability of Sony Ericsson W810i Walkman™ phone, and first in Canada to provide 1GB memory card.⁷⁶
- 6/6/06: Rogers Wireless and Fido launch Name Display, the first offering in North America to show the name of the person calling even if not in personal contacts.⁷⁷
- 5/25/06: Rogers announces availability of Sony Ericsson W810 Walkman® phone with 2MP camera and auto-focus – first in North America.⁷⁸

⁶⁷ “Rogers Introduces Next Generation of Wireless Technology.” Rogers Press Release 4/2/07.

⁶⁸ “Rogers Wireless and HTC Launch HTC S621 Smartphone in Canada.” Rogers Press Release. 3/23/07.

⁶⁹ “Rogers Wireless to Upgrade Remaining TDMA and Analog Wireless Customers.” Rogers Press Release. 1/10/07.

⁷⁰ “Rogers Wireless Introduces the Ultimate in Cell Phone Control: Call Manager.” Rogers Press Release. 12/19/06.

⁷¹ “MOTOKRZR™ K1 Now Available from Rogers Wireless.” Rogers Press Release. 12/18/06.

⁷² “Nokia and Rogers Wireless Introduce BlackBerry Connect on the Nokia E62 Device.” Rogers Press Release. 12/13/06.

⁷³ “Rogers Debuts HSDPA in Golden Horseshoe.” Rogers Press Release. 11/2/06.

⁷⁴ “Rogers Wireless brings the BlackBerry Pearl to Canada.” Rogers Press Release. 10/3/06.

⁷⁵ “Nokia E62 Push E-Mail Device from Rogers Wireless Brings Freedom of Mobility to Professionals.” Rogers Press Release. 9/6/06.

⁷⁶ “New 1GB MP3 Phone from Rogers Wireless Holds up to 280 Songs.” Rogers Press Release. 8/9/06.

⁷⁷ “Rogers Wireless and Fido Introduce Name Display for Mobile Phones.” Rogers Press Release. 6/6/06.

- 5/24/06: Fido announces exclusive Canadian launch of the LG 9200 wireless handset providing access to Yahoo! And MSN instant messaging – with QWERTY keyboard.⁷⁹
- 3/31/06: Inukshuk Completes first phase deployment covering 5 million households and 40% of the population of Canada.⁸⁰
- 3/31/06: Rogers announces Portable Internet from Rogers Yahoo! Hi Speed Internet providing access to internet speeds of up to 1.5 Mbps download and 256 Kbps upload.⁸¹
- 2/1/06: Rogers announces launch of Rogers Podcast Service – North America’s first mobile podcast service.⁸²
- 12/14/05: Rogers announces availability of Canada’s first Walkman™ phone, the Sony Ericsson W600i – providing music phone, 3D gaming, 1.3MP camera phone.⁸³
- 11/22/05: Rogers announce availability of MyMail push email service on Motorola RAZR V3, providing Java-based push email available for GSM handset.⁸⁴
- 11/9/05: Rogers announces availability of BlackBerry® 8700r Wireless Handheld™ (available 11/29) – first in Canada to support EDGE technology.⁸⁵
- 11/3/05: Fido announces exclusive Canadian launch of Nokia 8801 handset – stainless steel slidephone.⁸⁶
- 10/13/05: Rogers announces trial of UMTS/HSDPA network technology and Converged IP Multimedia Subsystem (IMS) Platform.⁸⁷

⁷⁸ “Stylish Sony Ericsson W810 Walkman® Phone with 2Mega Pixel Camera Makes its North American Debut on Rogers Wireless.” Rogers Press Release. 5/25/06.

⁷⁹ “Instant Messaging Goes Mobile with Launch of LG9200 Wireless Handset with Yahoo! And MSN messenger on Fido.” Rogers Press Release. 5/24/06.

⁸⁰ “Inukshuk Announces Availability of National Wireless Broadband Network.” Rogers Wireless Press Release. 3/31/06.

⁸¹ “Rogers Offers Canadians Access to Its Portable Internet Service Across Canada.” Rogers Press Release. 3/31/06.

⁸² “Rogers Wireless and Melodeo Introduce North America’s First Mobile Podcast Service.” Rogers Press Release. 2/1/06.

⁸³ “Take a Walk on the ‘Dial’ Side.” Rogers Press Release. 12/14/05.

⁸⁴ “Rogers Wireless and Motorola Drive ‘Push Email’ to Business and Consumer Markets with MyMail on the Motorola RAZR V3.” Rogers Press Release. 11/22/06.

⁸⁵ “Rogers Wireless and Research In Motion Introduce the BlackBerry 8700r.” Rogers Press Release. 11/9/06.

⁸⁶ “Fido announces Exclusive Canadian Launch of the Much-anticipated Nokia 8801 Handset.” Rogers Press Release. 11/3/05.

⁸⁷ “Rogers Communications Inc. To Begin a Trial of 3rd Generation UMTS-HSDPA Wireless Network Technology and Converged IP Multimedia Subsystem (IMS) Platform with Ericsson.” Rogers Press Release. 10/13/05.

- 10/4/05: Rogers announces availability of BlackBerry® 7100g™.⁸⁸
- 9/16/05: Rogers launches channel line up on Rogers Mobile TV platform, providing real time access to live TV programming, news, music videos, etc.⁸⁹
- 8/23/05: Rogers launches MusiquePlus Edition Pay as You Go™ phone, allowing music downloads.⁹⁰
- 8/8/05: Rogers launches Firefly phone for pre-teens, providing call control capabilities.⁹¹
- 8/3/05: Rogers launches Samsung p207 the first phone with speech to text capabilities.⁹²
- 6/2/05: Rogers announces availability of HP iPAQ Pocket PCs.⁹³
- 5/9/05: Rogers announces Canada's first mobile music experience, with MP3 capability, mobile downloads of full songs, ring tunes, etc.⁹⁴
- 4/14/05: Rogers and MobiTV announce Rogers Mobile Television, real-time access to live TV programming (available in 2Q05).⁹⁵
- 3/24/05: Rogers announces exclusive availability of UTStarcom SMT5600 Smartphone, providing functionalities seen in larger devices in a smaller device.⁹⁶
- 3/14/05: Rogers announces new Treo™ 650 Smartphone in Canada, the first all in one, quad-band smartphone on EDGE.⁹⁷
- 2/22/05: Rogers launches Motorola Razr V3.⁹⁸
- 2/1/05: Rogers announces availability of Sony Ericsson Z500a wireless phone, providing VGA digital camera, video camera, 3d gaming, etc.⁹⁹

⁸⁸ 10/4/05: "Rogers Wireless Expands BlackBerry Portfolio." Rogers Press Release. 10/4/05.

⁸⁹ "Rogers Launches Exclusive Channel Line Up for Rogers Mobile Television." Rogers Press Release. 9/16/05.

⁹⁰ "Rogers Launches the MusiquePlus Edition Pay As You Go Phone." Rogers Press Release. 8/23/05.

⁹¹ "Rogers Wireless Lightens Up Life with Firefly – The Mobile Phone for Mobile Kids™." Rogers Press Release. 8/8/05.

⁹² "Samsung Electronics Launches p207 Phone Featuring Canada's First Speech To Text Capabilities." Rogers Press Release. 8/3/05.

⁹³ "HP Canada and Rogers Wireless Announce Availability of HP iPAQ Pocket PCs in Canada." Rogers Press Release. 6/2/05.

⁹⁴ "Rogers Wireless Puts Your Life to Music." Rogers Press Release. 5/9/05.

⁹⁵ "Rogers First In Canada to Announce the Arrival of Live TV on Your Wireless Phone." Rogers Press Release. 4/14/05.

⁹⁶ "Audiovox SMT 5600, World's Smallest Windows Mobile-Based Smartphone, Comes to Canada Exclusively With Rogers Wireless." Rogers Press Release. 3/24/05.

⁹⁷ "palmOne Canada Launches Treo 650 Smartphone on Rogers Wireless High-Speed EDGE Network." Rogers Press Release. 3/14/05.

⁹⁸ "The Ultra-Thin, Revolutionary Motorola Razr V3 Makes its Canadian Entrance Exclusively With Rogers Wireless." Rogers Press Release. 2/22/05.

- 2005: Rogers Wireless is first carrier in North America to implement downloadable music to a cellphone.¹⁰⁰
- 11/23/04: Rogers announces first national implementation of wireless priority service in Canada, providing government authorized wireless phone users priority on the network during emergencies.¹⁰¹
- 11/16/04: Rogers announces availability of BlackBerry 7100r™, providing always-on connectivity to email, voice, text messaging, HTML web browsing, etc.¹⁰²
- 11/9/04: Rogers launches Video messaging service, allowing capture, share and save moments up to 20 seconds.¹⁰³
- 11/2/04: Rogers launches “MuchPhone” with MuchMusic.¹⁰⁴
- 10/22/04: Rogers announces availability of BlackBerry 7290 Handheld™ in Canada.¹⁰⁵
- 1998: Rogers Wireless first carrier in the world to deploy a commercial integrated dual-band (1900 and 850 Mhz) dual-mode (TDMA and AMPS) network within the same service areas.¹⁰⁶
- 1992: Rogers Wireless if first carrier in North America to implement commercial digital wireless cellular service.¹⁰⁷
- 1989: Rogers Wireless is first carrier in North America to commercially deploy a public access digital wireless packet switching network; with Mobitex as Canada’s largest such network.¹⁰⁸
- 1987: Rogers Wireless is first carrier in Canada to offer fully automatic roaming.¹⁰⁹

⁹⁹ “Sony Ericsson and Rogers Wireless Introduce Z500a Wireless Video Phone.” Rogers Press Release. 2/1/05.

¹⁰⁰ Rogers Response to QSI Questions, p. 1 of 8.

¹⁰¹ “Rogers Wireless Announces Deployment of Wireless Priority Service in Canada.” Rogers Press Release. 11/23/04.

¹⁰² “BlackBerry 7100r Now Available for Rogers Wireless Customers in Canada.” Rogers Press Release. 11/16/04.

¹⁰³ “Vide Messaging Allows Rogers Wireless Customers to Shoot, Share & Save Special Moments – Instantly.” Rogers Press Release. 11/9/04.

¹⁰⁴ “MuchMusic and Rogers Wireless Deliver “MuchPhone.”” Rogers Press Release. 11/2/04

¹⁰⁵ “Rogers Wireless and RIM Introduce the New BlackBerry 7290 in Canada.” Rogers Press Release. 10/22/04.

¹⁰⁶ Rogers Responses to QSI’s Questions, p. 1 of 8.

¹⁰⁷ Rogers Responses to QSI’s Questions, p. 1 of 8.

¹⁰⁸ Rogers Responses to QSI’s Questions, p. 1 of 8.

¹⁰⁹ Rogers Responses to QSI’s Questions, p. 1 of 8.

C) TELUS MOBILITY

- 02/07: TELUS introduces Pantech PN-8200 from UTStarcom, a smart phone exclusive to TELUS customers, with 1.3Megapixel digital camera, memory card slot up to 4GB, entertainment capabilities including Internet Explorer Mobile, Windows Media Player Mobile 10.¹¹⁰
- 11/06: TELUS expands TELUS GPS for small and mid sized business market, proving real time tracking over wireless handsets and in vehicle modems, running over 1X and Mike networks.¹¹¹
- 11/06: TELUS introduces Motorola i880.
- 3Q06: TELUS expanded its SPARK with five new offerings: TELUS Kid Find, TELUS Navigator – GPS based services, Apna Des – a S. Asia based service, My Email; Mobile Search.¹¹²
- 8/4/06: TELUS and Amp'd Mobile announce exclusive relationship for the sale and distribution of Amp'd branded entertainment services, and Amp'd will use TELUS' EVDO network.¹¹³
- 7/17/06: TELUS announces exclusive availability of Motorola i580, the first Motorola to bring together stylish design and ultra-ruggedness, runs on Mike network.¹¹⁴
- 7/6/06: TELUS and XM Canada announce TELUS Mobile Radio, the first real time streaming satellite radio service from mobile phones in Canada.¹¹⁵
- 6/21/06: TELUS announces availability of multimedia messaging with US companies.¹¹⁶
- 6/16/06: TELUS announces Nokia 6265i – TELUS' first 2MP digital camera with video capability and customized video ringtones.¹¹⁷
- 6/15/06: TELUS announces availability of Motorola Q (MOTOQ), the world's slimmest QWERTY device – first in Canada.¹¹⁸

¹¹⁰ TELUS News Release 4Q06, p. 6.

¹¹¹ TELUS 4Q06 update.

¹¹² TELUS News Release 3Q06, p. 6.

¹¹³ "TELUS and Amp'd Mobile Bringing Next Generation Mobile Entertainment Services to Canada." TELUS Press Release. 8/4/06.

¹¹⁴ "TELUS Introduces the Motorola i580, the Ultimate in Sophistication and Ruggedness." TELUS Press Release. 7/17/06.

¹¹⁵ "TELUS and XM Canada Launch Canada's First Streaming Mobile Radio Service." TELUS Press Release. 7/6/06.

¹¹⁶ "TELUS Clients Can Now Instantly Share Video and Picture Messages with Friends, Family and Colleagues in U.S." TELUS Press Release. 6/21/06.

¹¹⁷ "TELUS Introduces the Nokia 6265i Mobile Phone with 2 Megapixel Camera and Video Ringtone Capability." TELUS Press Release. 6/16/06.

¹¹⁸ "TELUS First to Bring the Highly Anticipated MOTOQ to Canada." TELUS Press Release. 6/15/06.

- 6/13/06: TELUS announces Motorola i833, smallest Mike phone ever; has data capability.¹¹⁹
- 5/29/06: TELUS announces exclusive Canadian availability of Samsung A950, featuring mobile access to TELUS Mobile Music, TELUS Mobile TVTM, MP3, Bluetooth, 1.3MP Camera, video recorder.¹²⁰
- 5/12/06: TELUS introduces Motorola i605, the first ruggedized Mike phone enabled with Bluetooth.¹²¹
- 5/5/06: TELUS introduces the Migo (LG phone) for pre-teens geared toward safety and security.¹²²
- 4/11/06: TELUS introduces BlackBerry 7100i for Mike users, exclusive in Canada to TELUS.¹²³
- 4/6/06: Panasonic announces that its ruggedized CF18 and CF29 notebooks will offer Canada's first Integrated Sierra Wireless EM5625 embedded modules, on TELUS' network.¹²⁴
- 3/13/06: TELUS announces TELUS Mobile Music, access to Canada's largest mobile music catalog and the only offering from all of the world's biggest record labels; also announces exclusive availability of LG8100 – mobile entertainment device with MP3 player, stereo speakers, etc.¹²⁵
- 2/2/06: TELUS introduces exclusive Canada availability of Samsung SPHA840, in different colors and personalized postcards – fashionable but affordable.¹²⁶
- 2/2/06: TELUS announces Kyocera Passport KPC650 – a CDMA2000 1x EVDO PC Card, providing speeds at least 6 times faster than previous mobile data services.¹²⁷
- 2/1/06: TELUS announces national availability of Canada's first EVDO capable Motorola RAZR V3c.¹²⁸

¹¹⁹ "TELUS Introduces a New Limited Edition Mike Phone Designed by Pininfarina." TELUS Press Release. 6/13/06.

¹²⁰ "TELUS and Samsung Electronics Canada Introduce Advanced Multimedia Device for Wireless High Speed Network." TELUS Press Release. 5/29/06.

¹²¹ "TELUS Introduces Rugged, Bluetooth-enabled Mike Phone." TELUS Press Release. 5/12/06.

¹²² "TELUS and LG Introduce a Wireless Phone for Pre-Teens." TELUS Press Release. 5/5/06.

¹²³ "TELUS and Research In Motion Introduce the BlackBerry 7100i for Mike Users." TELUS Press Release. 4/11/06.

¹²⁴ "Panasonic Canada Announces Canada's First Certification of Toughbook Notebooks for High-Speed EVDO Network." TELUS Press Release. 4/6/06.

¹²⁵ "SPARK a Rhythm with TELUS Mobile Music and the LG 8100 Mobile Entertainment Service." TELUS Press Release. 3/13/06.

¹²⁶ 2/2/06: "TELUS Introduces the Flashy and Fashionable Samsung SPHA840 Phone." TELUS Press Release. 2/2/06.

¹²⁷ "Kyocera Wireless and TELUS Offer Wireless High Speed to Mobile Data Users." TELUS Press Release. 2/2/06.

- 12/8/05: TELUS announces availability of BlackBerry 7130e.¹²⁹
- 11/18/05: TELUS announce availability of UTStarcom Pocket PC 6700, the first Pocket PC in Canada with Microsoft Windows Mobile 5.0.¹³⁰
- 11/14/05: TELUS launches Wireless High Speed Network based on CDMA 1xEVDO technology with speeds of 400-700kbps, with maximum speeds of 2 Mbps.¹³¹
- 11/11/05: TELUS announces availability of Palm® Treo™ 650 Smartphone.¹³²
- 8/26/05: TELUS launches TELUS mobile TV, offering real-time access to live TV programming including news, weather and shopping channels on wireless phones.¹³³
- 8/25/05: TELUS announces availability of Motorola i860, the first of several Mike phones with multimedia messaging (Push to View Picture Messaging, Push to Send Contacts, Push to Send My Info).¹³⁴
- 7/7/05: TELUS announces availability of Motorola V265 and V262, two new phones with advanced speech recognition and personalization options.¹³⁵
- 6/29/05: Canada's wireless service providers to introduce inter-carrier multimedia message services (MMS) on 7/1/05.¹³⁶
- 5/25/05: TELUS introduced Multi-Network Data Access Solution, for public safety and business clients to access critical data, including security.¹³⁷
- 5/17/05: TELUS announces LG 4750, with instant PTT communication.¹³⁸

¹²⁸ "High-Speed Motorola RAZR V3c Now Available Across Canada from TELUS." TELUS Press Release. 2/1/06.

¹²⁹ "TELUS Wireless High Speed Brings Broadband Data Access to the BlackBerry 7130e." TELUS Press Release. 12/8/05.

¹³⁰ "TELUS Mobility Launches First Wireless High Speed Pocket PC in Canada." TELUS Press Release. 11/18/05.

¹³¹ "TELUS Mobility Introduces National Wireless High Speed Network." TELUS Press Release. 11/14/05.

¹³² "TELUS Mobility Extends Mobile Business Solutions Line with Palm Treo 650 Smartphone." TELUS Press Release. 11/11/05.

¹³³ "TELUS Mobility Launches TELUS Mobile TV on Its National 1x Network." TELUS Press Release. 8/26/05.

¹³⁴ "TELUS Mobility's Mike Extends the "Push To" Technology Into Instant Multimedia Communications." TELUS Press Release. 8/25/05.

¹³⁵ "TELUS Mobility Adds Stylish New Motorola Handsets To Its Exclusive Phone Line-Up." TELUS Press Release. 7/7/05.

¹³⁶ "Canadian Wireless Carriers Launch Inter-Carrier Multimedia Messaging on July 1." TELUS Press Release. 6/29/05.

¹³⁷ "TELUS Mobility Introduces Managed Wireless Data Communications for Critical Operations." TELUS Press Release. 5/25/05.

¹³⁸ "TELUS Mobility Introduces Its Newest Push to Talk Phone, The LG 4750." TELUS Press Release. 5/17/05.

- 5/16/04: TELUS introduces Motorola i355, a ruggedized PTT phone with walkie talkie feature and GPS.¹³⁹
- 5/4/05: TELUS announces availability of Sierra Wireless AirCard® 580 network card, the first in Canada capable of operating on EVDO network.¹⁴⁰
- 5/2/05: TELUS announces exclusive availability of Motorola M800, an in-vehicle CDMA phone allowing connections on the job site.¹⁴¹
- 4/1/05: TELUS announces exclusive availability of BlackBerry® 7520 – powered by Mike.¹⁴²
- 3/14/05: TELUS announces that clients using Fastap phone send more than twice as many text messages those who use other PCS phones.¹⁴³
- 3/4/05: TELUS announces exclusive availability of LG 535 phone, including high resolution digital camera, video recorder, MP3, stereo speakers.¹⁴⁴
- 3/2/05: TELUS Mobility announces BlackBerry 7250.¹⁴⁵
- 1/17/05: TELUS announces Instant Talk, a new PTT service.¹⁴⁶
- 11/30/04: TELUS Mobility announces availability of Fastap™ LG 6190 the world's first wireless phone that integrates text keys around a standard numeric phone keypad.¹⁴⁷
- 11/16/04: TELUS announces availability of Nokia 3205i a wireless phone focused on multimedia messaging and personalization.¹⁴⁸
- 10/14/04: TELUS announces Audiovox 8920 King Kam, Canada's First 1.3MP Camera Phone.¹⁴⁹

¹³⁹ "TELUS Mobility Introduces New Ruggedized Mike Phone." TELUS Press Release. 5/16/04.

¹⁴⁰ "TELUS Mobility Delivers First EVDO Capable Wireless Network Card For Portable PCs." TELUS Press Release. 5/4/05.

¹⁴¹ "TELUS Mobility Launches The Motorola M800 In-Vehicle Fixed CDMA Phone." TELUS Press Release. 5/2/05.

¹⁴² "TELUS Mobility Launches Newest BlackBerry® Device for Mike Clients." TELUS Press Release. 4/1/05.

¹⁴³ "Digit Wireless Intuitive Fastap™ Technology Significantly Increases Data Usage For Canadian Wireless Carrier TELUS Mobility." TELUS Press Release. 3/14/05.

¹⁴⁴ "TELUS Mobility Introduces the LG 535, a Multimedia Slider Phone." TELUS Press Release. 3/4/05.

¹⁴⁵ "TELUS Mobility Launches Bluetooth®-enabled BlackBerry® Handheld." TELUS Press Release. 3/2/05.

¹⁴⁶ "TELUS Mobility Introduces Push To Talk Service on Its National PCS Network." TELUS Press Release. 1/1/05.

¹⁴⁷ "TELUS Mobility Launches World's First Fastap™ Wireless Phone For Fast Texting." TELUS Press Release. 11/30/04.

¹⁴⁸ "Nokia and TELUS Mobility Get Personal With The Nokia 3205i." TELUS Press Release. 11/16/04.

¹⁴⁹ "TELUS Mobility Expands Picture Messaging Lineup With Highest Resolution Camera Phone." TELUS Press Release. 10/14/04.

The State of Wireless Technologies In Canada Attachment 2

- 9/2/04: TELUS offers iR1200 Rugged and iR1200 GPS-enabled for use on Mike network.¹⁵⁰
- 7/12/04: TELUS launches international text messaging to more than 25 countries.¹⁵¹
- 6/24/04: TELUS announces launch of 6 new wireless data modems equipped with GPS capability (ruggedized devices).¹⁵²
- 6/10/04: TELUS introduces Motorola i830, the smallest Mike phone ever.¹⁵³
- 5/4/04: TELUS announces cross-border walkie talkie service with Nextel.¹⁵⁴
- 5/4/04: TELUS launches two new BlackBerry handhelds, BlackBerry 7510™ and BlackBerry 7750™.¹⁵⁵ BlackBerry 7510 is the BB first device in Canada to operate on the Mike iDEN network and the first BB with speakerphone.¹⁵⁶
- 3/16/04: TELUS offers next generation arcade style multimedia mobile games.¹⁵⁷
- 12/23/03: TELUS launches Canada's first integrated Windows® based PDA camera phone, the Samsung i700 Windows® Powered Pocket PC.¹⁵⁸
- 10/23/03: TELUS Mobility announces exclusive new camera phone and unique picture messaging service.¹⁵⁹
- 10/16/03: TELUS announces enhancements to all in one Mike wireless network and first wireless handsets with GPS capability.¹⁶⁰
- 2/20/03: TELUS introduces the Windows-powered Thera™ Pocket PC from Audiovox, providing Microsoft applications.¹⁶¹

¹⁵⁰ "TELUS Mobility Launches Rugged, GPS-Enabled Wireless Modem for Mike." TELUS Press Release. 9/2/04.

¹⁵¹ "TELUS Mobility Launches International Text Messaging To More than 25 Countries." TELUS Press Release. 7/12/04.

¹⁵² "TELUS Mobility Introduces Rugged Global Positioning System (GPS) Wireless Modems." TELUS Press Release. 6/24/04.

¹⁵³ "TELUS Mobility Introduces Smallest Mike® Phone Ever." TELUS Press Release. 6/10/04.

¹⁵⁴ "TELUS Mobility and Nextel® Extend Digital Walkie Talkie Service Across Canada and the United States." TELUS Press Release. 5/4/04.

¹⁵⁵ "TELUS Mobility Launches Two New BlackBerry® Handhelds." TELUS Press Release. 5/4/04.

¹⁵⁶ TELUS 2004 Annual Report, p. 19.

¹⁵⁷ "TELUS Mobility Scores Big With Multimedia, Arcade-Style Mobile Games Featuring Full Sound and Enhanced Colour Graphics." TELUS Press Release. 3/16/04.

¹⁵⁸ "TELUS Mobility Launches Canada's First Fully Integrated Wireless PDA Camera Phone." TELUS Press Release. 12/23/03.

¹⁵⁹ "TELUS Mobility Introduces Exclusive Camera Phone, Unique Picture Messaging Service." TELUS Press Release. 10/23/03.

¹⁶⁰ "TELUS Mobility's Mike Network Grows with National Direct Connect, Powerful New Phones." TELUS Press Release. 10/16/03.

¹⁶¹ "Audiovox's Thera™ Pocket PC phone Enables Mobile Professionals to Maximize Benefits of TELUS Mobility's National 1x Network." TELUS Press Release. 2/20/03.

- 1/20/03: TELUS and RIM announces plans to offer RIM's BlackBerry™ wireless platform on TELUS 1x network.¹⁶²

II. U.S. MOBILE WIRELESS CARRIERS

A) AT&T

- 2/28/07: AT&T announces availability of Motorola M900, in vehicle communications device for homeland security.¹⁶³¹⁶⁴
- 2/12/07: AT&T first carrier in North America to launch the BlackBerry® 8800, the slimmest BlackBerry handset yet.¹⁶⁵
- 1/9/07: AT&T/Cingular announces that it will be exclusive US carrier of Apple iPhone.¹⁶⁶
- 1/5/07: AT&T/Cingular makes its first wireless video share call – in demo – which is first in US.¹⁶⁷
- 12/18/06: AT&T/Cingular announces NetMotion Mobility XE, which allows wireless applications to be available for data input and activity even if the user travels outside of wireless coverage area and resumes the wireless session automatically once the mobile device regains contact with the network.
- 12/11/06: AT&T/Cingular announces availability of HP Compaq nc6400 Notebook PC, the first notebook PC in the US with global mobile broadband capability.¹⁶⁸
- 12/5/06: AT&T/Cingular introduces the new CU400, the first 3G PTT phone.¹⁶⁹
- 11/30/06: AT&T/Cingular announces availability of BlackBerry® Pearl.¹⁷⁰

¹⁶² “TELUS Mobility and RIM To Provide the BlackBerry Platform to 1x Wireless Enterprise Client.” TELUS Press Release. 1/20/03.

¹⁶³ “AT&T Launches Motorola M900 for Homeland Security, Emergency Management Community.” AT&T Press Release. 2/28/07.

¹⁶⁴ “Cingular Wireless Eliminates Data Loss Risk With NetMotion Mobility XE.” AT&T Press Release. 12/18/06.

¹⁶⁵ “AT&T Customers Go Sleek & Stylish With the New BlackBerry 8800.” AT&T Press Release. 2/12/07.

¹⁶⁶ “Apple Chooses Cingular as Exclusive U.S. Carrier for Its Revolutionary iPhone.” AT&T Press Release. 1/9/07.

¹⁶⁷ “Cingular Makes First Wireless Video Share Call.” AT&T Press Release. 1/5/07.

¹⁶⁸ “HP and Cingular Wireless Introduce First Global Mobile Broadband Notebook PC in U.S.” AT&T Press Release. 12/11/06.

¹⁶⁹ “LG Electronics Mobilecomm and Cingular Wireless Offer the First 3G Phone with Push to Talk.” AT&T Press Release. 12/5/06.

- 11/22/06: AT&T/Cingular announces availability of Palm® Treo™ 680.¹⁷¹
- 11/20/06: AT&T/Cingular launches enhanced version of TeleNav GPS Navigator on the Nokia E62, becoming the first carrier in US to introduce navigation system with 3D maps and “fuzzy search”.¹⁷²
- 11/13/06: AT&T/Cingular announces availability of the BlackJack, providing entertainment features, Windows Mobile® 5.0, on AT&T’s 3G Broadband Connect Service.¹⁷³
- 11/6/06: AT&T/Cingular announces the first UMTS/HSDPA-enabled PDA in North America – the Cingular 8525 Pocket PC.¹⁷⁴
- 11/2/06: AT&T/Cingular announces Cingular Music, allowing content from Napster, Yahoo! Music, XM Satellite Radio and eMusic.¹⁷⁵
- 10/3/06: AT&T/Cingular announces completion of National GSM Network Integration stemming from the merger of Cingular and AT&T Wireless.¹⁷⁶
- 10/2/06: AT&T/Cingular announces Melodeo, Inc. mobile podcast.¹⁷⁷
- 9/12/06: AT&T/Cingular announces availability of Sierra Wireless AirCard® 875, the first commercially available HSDPA 3.6 Mbps network card in the Americas.¹⁷⁸
- 9/12/06: AT&T/Cingular announces availability of Nokia E62.¹⁷⁹
- 9/12/06: AT&T/Cingular announces availability of MOTORAZR v3i mobile music device.¹⁸⁰

¹⁷⁰ “Cingular Rings in Holidays with BlackBerry Pearl.” AT&T Press Release. 11/30/06.

¹⁷¹ “Cingular Wireless Offers New-Look, \$199 Palm Treo 680.” AT&T Press Release. 11/22/06.

¹⁷² “Cingular Unveils PDA-Based Wireless GPS Navigation System with 3D Moving Maps.” AT&T Press Release. 11/22/06.

¹⁷³ “Cingular, Samsung Have Ace in Hand With Launch of New BlackJack, a Smart Device Vide Available.” AT&T Press Release. 11/13/06.

¹⁷⁴ “Cingular 8525 Rides Wireless Speedway.” AT&T Press Release. 11/6/06.

¹⁷⁵ “Cingular Wireless Customers Can Now Enjoy Music Content from Napster, Yahoo! Music, XM Satellite Radio and eMusic.” AT&T Press Release. 11/2/06.

¹⁷⁶ “Cingular Completes National GSM Network Integration.” AT&T Press Release. 10/3/06.

¹⁷⁷ “Listen Up. Cingular Teams With Melodeo to Offer Mobile Podcasting.” AT&T Press Release. 10/2/06.

¹⁷⁸ “Cingular Adds Sierra Wireless AirCard® 875 Wireless WAN LaptopConnect Card to its 3G Device Portfolio.” AT&T Press Release. 9/12/06.

¹⁷⁹ “Cingular, Nokia Introduce Nokia E62.” AT&T Press Release. 9/12/06.

¹⁸⁰ “Cingular Wireless and Motorola Introduce Latest Music Enhanced Phone – the MOTORAZR v3i.” AT&T Press Release. 9/12/06.

- 8/29/06: AT&T/Cingular launches Samsung SGH-zx20, Samsung's first commercially available HSDPA phone for the US market.¹⁸¹
- 6/8/06: AT&T/Cingular announces new BlackBerry® 7130c.¹⁸²
- 5/31/06: AT&T/Cingular announces availability of Pantech C300 – the world's smallest camera flip phone.¹⁸³
- 3/29/06: AT&T/Cingular announces that Cingular UMTS/HSDPA 3G technology built into Dell Latitude D620 and D820.¹⁸⁴
- 3/7/06: AT&T/Cingular announced availability of Cingular Video On-Demand Streaming video service, with a large selection of content, including TV shows, sports, news, weather, entertainment on 3G capable phones.¹⁸⁵
- 2/9/06: AT&T/Cingular announces Cingular Sounds Live, the first-ever concert series exclusively for mobile environment.¹⁸⁶
- 2/9/06: AT&T/Cingular launches EDGE enabled Cingular 8100 series Pocket PC to expand its Windows Mobile 5.0 roster.¹⁸⁷
- 1/31/06: AT&T/Cingular announces availability of Motorola SLVR L7, providing iTunes.¹⁸⁸
- 1/18/06: AT&T/Cingular announces Cingular 2125, the first Smartphone in US to feature Microsoft Mobile 5.0 operating system.¹⁸⁹
- 12/15/05: AT&T/Cingular announces upcoming availability of on-demand streaming video service over 3G phones.¹⁹⁰

¹⁸¹ "Samsung and Cingular Wireless Unveil Award-Winning HSDPA Wireless Handset for North America." AT&T Press Release. 8/29/06.

¹⁸² "Cingular Gets Personal with BlackBerry." AT&T Press Release. 6/8/06.

¹⁸³ "Cingular Offers GoPhone® Exclusive: World's Smallest Camera Flip Phone." AT&T Press Release. 5/31/06.

¹⁸⁴ "Cingular Built Into New Dell Notebooks." AT&T Press Release. 3/29/06.

¹⁸⁵ "Watch This! Cingular Video™ Now Available." AT&T Press Release. 3/7/06.

¹⁸⁶ "Cingular Launches First Ever Made-for-Mobile Concert Series, Cingular Sounds Live." AT&T Press Release. 2/9/06.

¹⁸⁷ "Cingular 8100 Series Pocket PCs Join Cingular's Windows Mobile 5.0 Roster." AT&T Press Release. 2/9/06.

¹⁸⁸ "Ultra-Thin Motorola SLVR L7 Debuts Exclusively at Cingular Wireless." AT&T Press Release. 1/31/06.

¹⁸⁹ "Cingular Debuts Cingular 2125 Smartphone." AT&T Press Release. 1/18/06.

¹⁹⁰ "Cingular Wireless Launches Cingular Video with Exclusive Content." AT&T Press Release. 12/15/05.

- 12/05: AT&T/Cingular introduces first 3G product called “LaptopConnect,” which combines a laptop modem card, Cingular’s Communication Manager software and a Data Connect plan for use on laptops so that customers can access the Internet or email, download large files and attachments and run corporate business applications. Where UMTS/ HSDPA is not available, the laptop modem card seamlessly falls back to the EDGE/GPRS networks but at lower speeds.¹⁹¹
- 12/6/05: AT&T/Cingular launches 3G UMTS/HSDPA network.¹⁹²
- 11/14/05: AT&T/Cingular and MobiTV launch MobiRadio for Cingular customers – streaming digital music.¹⁹³
- 11/1/05: AT&T/Cingular launch BlackBerry 8700c on 11/21/05, the world’s first EDGE enabled BlackBerry device.¹⁹⁴
- 10/24/05: AT&T/Cingular announce availability of Mobile Email and Mobile IM.¹⁹⁵
- 10/18/05: AT&T/Cingular announce HP iPAQ hw6500 series Mobile Messenger, the first pocket PC in US to use Cingular’s EDGE network.¹⁹⁶
- 9/28/05: AT&T/Cingular announces the availability of EDGE powered Nokia 9300 – the first carrier to launch BlackBerry® services on third party handset through the BlackBerry Connect program.¹⁹⁷
- 9/28/05: AT&T/Cingular announces that RealNetworks will launch Helix OnlineTV for Cingular mobile customers.¹⁹⁸
- 9/7/05: AT&T/Cingular announces the first mobile phone with iTunes.¹⁹⁹
- 7/25/05: AT&T/Cingular announce launch of RAZRWIRE™, Bluetooth® enabled eyewear available through Motorola and Cingular’s network.²⁰⁰

¹⁹¹ AT&T 2005 10-K, p. 5.

¹⁹² “Cingular Launches 3G Network.” AT&T Press Release. 12/6/05.

¹⁹³ “Cingular and MobiTV Announce First Radio Service for the Nation’s Largest Digital Voice and Data Network.” AT&T Press Release. 11/14/05.

¹⁹⁴ “BlackBerry 8700c Accelerates in Cingular Fast Lane.” AT&T Press Release. 11/1/05.

¹⁹⁵ “Cingular Responds to Consumer Demand by Bringing New Mobile Messaging Services to the Masses.” AT&T Press Release. 10/24/05.

¹⁹⁶ “HP and Cingular Wireless Announce Complete Wireless Solution on HP iPAQ Mobile Messenger.” AT&T Press Release. 10/18/05.

¹⁹⁷ “Cingular, Nokia ‘Connect’ with Nokia 9300.” AT&T Press Release. 9/28/05.

¹⁹⁸ “RealNetworks to Launch Helix OnlineTV for Mobile Carriers with Cingular.” AT&T Press Release. 9/28/05.

¹⁹⁹ “Apple, Motorola and Cingular Launch World’s First Mobile Phone with iTunes.” AT&T Press Release. 9/7/05.

- 7/7/05: AT&T/Cingular announces Multimedia Messaging Interoperability with the top wireless carriers in US.²⁰¹
- 6/3/05: AT&T/Cingular launches Motorola RAZR Black, the sequel to the RAZR.²⁰²
- 6/6/05: AT&T/Cingular launches HP iPAQ Pocket PC.²⁰³
- 4/12/05: AT&T/Cingular launches Cingular Sounds™ - a music program providing new music singles, ringtones before they are debuted on the radio.²⁰⁴
- 3/15/05: AT&T/Cingular announces exclusive availability of Samsung p777, the first of Samsung's new line of highspeed, high-bandwidth, multimedia phones.²⁰⁵
- 2/10/05: AT&T/Cingular launches BlackBerry 7100g.²⁰⁶
- 2/2/05: AT&T/Cingular launches Treo™ 650 smartphone, the first device of its kind to use AT&T's EDGE technology.²⁰⁷
- 1/25/05: AT&T/Cingular launches MobiTV, offering live TV.²⁰⁸
- 11/30/04: AT&T/Cingular announces plans to begin deploying 3G UMTS/HSDPA.²⁰⁹
- 11/23/04: AT&T/Cingular announces exclusive availability of Motorola V551, using EDGE technology.²¹⁰
- 11/16/04: AT&T/Cingular announces exclusive availability of Motorola RAZR V3.²¹¹

²⁰⁰ "Motorola and Oakley Announce Launch of RAZRWIRE™ With Cingular Wireless." AT&T Press Release. 7/25/05.

²⁰¹ "Cingular Wireless Announces Multimedia Messaging Interoperability With the Nation's Top Wireless Carriers." AT&T Press Release. 7/7/05.

²⁰² "Motorola RAZR Black Brings Hollywood Chic to the Handset Line-Up at Cingular Wireless." AT&T Press Release. 6/30/05.

²⁰³ "Cingular and HP Launch HP iPAQ Pocket PC." AT&T Press Release. 6/6/05.

²⁰⁴ "Cingular Announces Innovative Music Program That Debuts New Singles on Wireless Phones Before They are Heard Anywhere Else." AT&T Press Release. 4/12/05.

²⁰⁵ "New Samsung p777 Slides Into Cingular Wireless Stores." AT&T Press Release. 3/15/05.

²⁰⁶ "Cingular Introduces New Quad-Band BlackBerry 7100g." AT&T Press Release. 2/10/05.

²⁰⁷ "Cingular and palmOne Deliver First Treo 650 Smartphone with High-Speed EDGE Wireless Data Capabilities." AT&T Press Release. 2/2/05.

²⁰⁸ "Cingular Goes Live with MobiTV." AT&T Press Release. 1/25/05.

²⁰⁹ "Cingular to Deliver 3G Wireless Broadband Services." AT&T Press Release. 11/30/04.

²¹⁰ "New Motorola V551 Clamshell Gives Cingular Wireless Users a High-Powered EDGE." AT&T Press Release. 11/23/04.

- 9/28/04: AT&T/Cingular announces availability of BlackBerry 7290 for international travelers.²¹²
- 8/24/04: Cingular and AT&T announce inter-carrier multimedia messaging service.²¹³
- 5/20/04: Cingular/AT&T announces availability of XpressMail(SM) with BlackBerry®.²¹⁴
- 11/13/03: Cingular/AT&T announces availability of Treo 600 from palmOne with QWERTY keyboard.²¹⁵
- 10/10/03: Cingular/AT&T announces next generation Multimedia Messaging Service (MMS).²¹⁶
- 7/17/03: Cingular/AT&T announces Nokia 3300 Music Phone.²¹⁷
- 6/30/03: Cingular/AT&T announces world's first commercial deployment of EDGE.²¹⁸
- 5/6/03: Cingular/AT&T announces Nokia 3560 color display for TDMA customers.²¹⁹
- 5/5/03: Cingular/AT&T announces Nokia 6800 messaging phone.²²⁰
- 3/17/03: Cingular/AT&T announces Nokia 3650, allowing picture messaging.²²¹

²¹¹ "New Motorola RAZR V3 Now Available Exclusively at Cingular Wireless." AT&T Press Release. 11/16/04.

²¹² "Cingular Wireless and RIM Introduce the Blackberry 7290 for International Travelers." AT&T Press Release. 9/28/04.

²¹³ "Cingular Wireless and AT&T Wireless Customers Capture and Share Special Moments Quickly and Conveniently." AT&T Press Release. 8/24/04.

²¹⁴ "Cingular's xPressmail(SM) with BlackBerry® Goes Retail." AT&T Press Release. 5/20/04.

²¹⁵ "Treo 600 From palmOne Now Available for Cingular Wireless GSM/GPRS Customers." AT&T Press Release. 11/13/03.

²¹⁶ "Snap It, Say It, And Send It with Cingular's New Multimedia Messaging Service." AT&T Press Release. 10/10/03.

²¹⁷ "Cingular Wireless Introduces The Nokia 3300 Music Phone for Consumers Who Can't Leave Their Music Behind." AT&T Press Release. 7/17/03.

²¹⁸ "Cingular Wireless Is First to the Edge." AT&T Press Release. 6/30/03.

²¹⁹ "Cingular Wireless and Nokia Bring Color to TDMA Customers." AT&T Press Release. 5/6/03.

²²⁰ "Cingular Wireless Introduces Nokia 6800 for On-the-Go Professionals." AT&T Press Release. 5/5/03.

²²¹ "Cingular Introduces Upscale Nokia 3650 Handset for Work and Play." AT&T Press Release. 3/17/03.

- 5/14/02: Cingular/AT&T demos Data Connect Service, a wireless internet package providing corporate web access, email and more from laptops and PDAs.²²²
- 3/18/02: Cingular/AT&T unveils new service offering providing picture messages, screen savers and downloadable graphics.²²³
- 1/28/02: Cingular announces palm™ i705 “always on” wireless device.²²⁴
- 12/5/01: Cingular/AT&T announces industry’s first inter-carrier roaming for GPRS high speed data services.²²⁵
- 11/28/01: Cingular/AT&T announces availability of VoiceConnect, the carrier’s first voice command product.²²⁶
- 10/30/01: Cingular/AT&T announces that it will begin deploying EDGE technology.²²⁷
- 3/20/01: Cingular/AT&T announces the first operational standards based GPRS in the US.²²⁸

B) VERIZON WIRELESS

- 4/25/07: Verizon announces availability of BlackBerry® 8830 World Edition Smartphone (available 5/14), the first global CDMA/GSM BlackBerry®.
- 3/28/07: Verizon announces April availability of MOTORAZR™ maxx Ve.²²⁹
- 3/28/07: Verizon announces Motorola Automotive Music & Hands Free System T605, providing digital music and hands free phone calls through auto sound system.²³⁰
- 3/28/07: Verizon announces 4GB microSD™ card for use in Verizon phones, largest capacity of world’s smallest memory card.²³¹

²²² “Cingular to Link Laptop and PDA Users to Web Via New Data Connect Service.” AT&T Press Release. 5/14/02.

²²³ “Cingular Powers Next Generation of Wireless Devices.” AT&T Press Release. 3/18/02.

²²⁴ “Cingular Powers the New Palm™ i705 Wireless Handheld.” AT&T Press Release. 1/28/02.

²²⁵ “Cingular Wireless First to Implement Inter-Carrier Roaming.” AT&T Press Release. 12/5/01.

²²⁶ “Don’t Touch That Dial – Voice Connects Cingular Customers.” AT&T Press Release. 11/28/01.

²²⁷ “Cingular Moves to the EDGE.” AT&T Press Release. 10/30/01.

²²⁸ “Cingular Wireless First to Usher In Next Generation of Wireless Internet With Faster, Always-On Service.” AT&T Press Release. 3/20/01.

²²⁹ “Verizon Wireless and Motorola Take MOTORAZR To the Max.” Verizon Press Release. 3/28/07.

²³⁰ “Motorola’s First In-Car Streaming Audio Solution Now Available At Verizon Wireless.” Verizon Press Release.” 3/28/07.

- 3/27/07: Verizon introduces Samsung SCH-u620, the first mobile phone to support Verizon's V-CAST Mobile TV service.²³²
- 3/15/07: Verizon announces commercial availability of the V740 ExpressCard™, the world's first ExpressCard to operate on Verizon's EVDO Rev A technology.²³³
- 3/14/07: Verizon announces availability of TiVo® Mobile, allowing TiVo functions exclusively over Verizon phones.²³⁴
- 2/20/07: Verizon announces Palm® Treo 700wx, providing Microsoft Window Mobile 5.0 and Direct Push Technology.²³⁵
- 2/14/07: Verizon announces availability of Samsung SCH-u740, messaging phone with dual hinge.²³⁶
- 2/1/07: Verizon announces launch of EV-DO Rev. A technology.²³⁷
- 1/7/07: Verizon announces availability of LG VX9400 that will support VCAST Mobile TV.²³⁸
- 1/7/07: Verizon announces availability of V CAST Mobile TV in 1Q07.²³⁹
- 12/18/06: Verizon announces commercial availability of Sierra Wireless AirCard® 595 PC Card for EV-DO Rev A.²⁴⁰
- 11/28/06: Verizon announces availability of YouTube on Verizon phones.²⁴¹
- 11/24/06: Verizon announces MOTOKRZR K1m.²⁴²
- 9/12/06: Verizon launches BlackBerry 8703e.²⁴³

²³¹ "Verizon Wireless and SanDisk Introduce 4-Gigabyte MicroSDHC Mobile Phone Card for V-CAST Music Phones." Verizon Press Release. 3/28/07.

²³² "Verizon Wireless Customers Can Now Watch TV on the SCH-u620 – The First V CAST Mobile TV Phone." Verizon Press Release. 3/27/07.

²³³ "Verizon Wireless Offers First ExpressCard by Novatel Wireless to take Advantage of New Faster Wireless Broadband Network." Verizon Press Release. 3/15/07.

²³⁴ "TiVo Launches Remote Scheduling With Verizon Wireless." Verizon Press Release. 3/14/07.

²³⁵ "Verizon Wireless and Palm Announce Treo 700wx Smartphone Now Available." Verizon Press Release. 2/20/07.

²³⁶ "Verizon Wireless and Samsung Introduce Slim, Dual-Hinge Phone." Verizon Wireless Press Release. 2/14/07.

²³⁷ "Verizon Wireless Launches Faster New Wireless Broadband Network." Verizon Press Release. 2/1/07.

²³⁸ "LG Mobile Phones and Verizon Wireless Announces the LG VX9400 to Support V CAST Mobile TV." Verizon Press Release. 1/7/07.

²³⁹ "Verizon Wireless Lifts the Curtain on V CAST Mobile TV." Verizon Press Release. 1/7/07.

²⁴⁰ "Verizon Wireless and Sierra Wireless Offers the AirCard® 595 PC Card For Use With Verizon Wireless' BroadbandAccess Service." Verizon Press Release. 12/18/06.

²⁴¹ "YouTube Goes Mobile." Verizon Press Release. 11/28/06.

²⁴² "Verizon Wireless Customers Can Work Off Their Turkey Dinners With MOTOKRZR K1m." Verizon Press Release. 11/24/06.

²⁴³ "Verizon Wireless Launches the New BlackBerry 8703e." Verizon Press Release. 9/12/06.

- 7/31/06: Verizon announces US debut of LG Chocolate.²⁴⁴
- 6/27/06: Verizon selects Lucent for CDMA2000 1xEV-DO Rev. A Technology.²⁴⁵
- 6/5/06: Verizon announces availability of Motorola RAZR V3m.²⁴⁶
- 6/5/06: Verizon launches Samsung SCH-a930 V CAST Music Phone.²⁴⁷
- 5/22/06: Verizon launches Motorola Q™ on 5/31/06.²⁴⁸
- 4/25/06: Verizon announces Wireless Priority Service during times of emergency.²⁴⁹
- 3/13/06: Verizon introduces Field Force Manager – fleet management tool with Location Based Services.²⁵⁰
- 3/7/06: Verizon announces TiVo functionalities on Verizon phone.²⁵¹
- 1/30/06: Verizon announces availability of Motorola V325.²⁵²
- 1/30/06: Verizon introduces Verizon Navigator – location based services.²⁵³
- 1/6/06: Verizon introduces Samsung SCH-a950.²⁵⁴
- 1/5/06: Verizon introduces V CAST Music.²⁵⁵
- 1/4/06: Verizon introduces Palm Treo 700w Smartphone.²⁵⁶

²⁴⁴ “Verizon Wireless Rocks Mobile Music as Chocolate by LG Makes Its American Debut.” Verizon Press Release. 7/31/06.

²⁴⁵ “Verizon Wireless Selects Lucent Technologies for CDMA2000 1xEV-DO Revision A Technology.” Verizon Press Release. 6/27/06.

²⁴⁶ “Motorola RAZR V3m Gives Verizon Wireless Customers The Skinny On Mobile Music.” Verizon Press Release. 6/5/06.

²⁴⁷ “Verizon Wireless and Samsung Announce the SCH-a930 V CAST Music Phone.” Verizon Press Release. 6/5/06.

²⁴⁸ “Verizon Wireless and Motorola Announce The Highly Anticipated Motorola Q.” Verizon Press Release. 5/22/06.

²⁴⁹ “Verizon Wireless Announces Wireless Priority Service to Be Available During Times of Emergency.” Verizon Press Release. 4/25/06.

²⁵⁰ “Verizon Wireless Introduces Field Force Manager – The Latest Must Have Tool for Small Businesses.” Verizon Press Release. 3/13/06.

²⁵¹ “Verizon Wireless, TiVo Partner to Take TiVo To Mobile Phones.” Verizon Press Release. 3/7/06.

²⁵² “Motorola and Verizon Wireless Deliver Style and Functionality with the V325.” Verizon Press Release. 1/30/06.

²⁵³ “Verizon Wireless Introduces VZ Navigator, Providing Location-Based Service for Consumers.” Verizon Press Release. 1/30/06.

²⁵⁴ “V CAST Music: Samsung and Verizon Wireless Announce the SCH-a950.” Verizon Press Release. 1/6/06.

²⁵⁵ “Verizon Wireless Introduces V CAST Music.” Verizon Press Release. 1/5/06.

²⁵⁶ “Palm Treo 700w Smartphone Available on the Verizon Wireless Network.” Verizon Press Release. 1/4/06.

- 1/4/06: Verizon launches UTStarcom Pocket PC XV6700, first UTStarcom device for Verizon using Microsoft Windows Mobile™ 5.0.²⁵⁷
- 12/5/05: Verizon announces Motorola RAZR V3c.²⁵⁸
- 12/5/05: Verizon introduces RAZRWIRE™.²⁵⁹
- 11/21/05: Verizon introduces BlackBerry 7130e™, the first BlackBerry to use Verizon's EVDO network.²⁶⁰
- 9/6/05: Verizon announces availability of UTStarcom CDM-8940 and LG VX8100 MP3 player phones.²⁶¹
- 6/2/05: Verizon announces new 3D games.²⁶²
- 2/7/05: Verizon announces BlackBerry 7250.²⁶³
- 1/26/05: Verizon first to offer CDM8940 handset, first EVDO phone with built in 1.3MP camera.²⁶⁴
- 1/20/05: Verizon announces Samsung SCH-a890, the first Samsung for Verizon's EVDO network.²⁶⁵
- 1/7/05: Verizon announces the 2/1/05 availability of LG VX8000 phone, the first handset in US for the Verizon EVDO network.²⁶⁶
- 1/7/05: Verizon launches V CAST the US' first and only consumer 3G Multimedia Service.²⁶⁷
- 11/16/04: Verizon becomes first national US Carrier to provide Ringback tones.²⁶⁸

²⁵⁷ "Verizon Wireless and UTStarcom Offer Award-Winning Pocket PC XV6700 With Windows Mobile 5.0" Verizon Press Release. 1/4/06.

²⁵⁸ "This Year's Wireless Must-Have Debuts At Verizon Wireless: The V CAST-Enabled Motorola RAZR V3c." Verizon Press Release. 12/5/05.

²⁵⁹ "Motorola, Oakley and Verizon Wireless Let RAZRWIRE Do the Talking." Verizon Press Release. 12/5/05.

²⁶⁰ "Verizon Wireless Brings Broadband Access to New BlackBerry 7130e with Tethered Modem Capabilities." Verizon Press Release. 11/21/05.

²⁶¹ "Verizon Wireless Phones Groove All Day Long." Verizon Press Release. 9/6/05.

²⁶² "Verizon Wireless Builds On Commanding Lead in Multimedia Services With 3D Games on V CAST." Verizon Press Release. 6/2/05.

²⁶³ "Verizon Wireless Launches New BlackBerry 7250 for Mobile Professionals." Verizon Press Release. 2/7/05.

²⁶⁴ "Verizon Wireless Launches UTStarcom CDM8940 3G EVDO Handset." Verizon Press Release. 1/26/05.

²⁶⁵ "Verizon Wireless and Samsung Announce VCAST-Enabled SCH-a890 Wireless Phone." Verizon Press Release. 1/20/05.

²⁶⁶ "Verizon Wireless and LG Mobile Phones Deliver The Future of Wireless Technology Today With The Launch of the VX8000." Verizon Press Release. 1/7/05.

²⁶⁷ "On-Demand In the Palm of Your Hand: Verizon Wireless Launches 'VCAST' – Nation's First And Only Consumer 3G Multimedia Service." Verizon Press Release. 1/7/05.

**The State of Wireless Technologies
In Canada
Attachment 2**

- 10/26/04: Verizon announces Verizon Mobile Web 2.0(SM).²⁶⁹
- 9/29/04: Verizon announces the availability of AOL® Mail on Verizon phones.²⁷⁰
- 9/23/04: Verizon announces Motorola V710 with integrated 1.2MP phone (one of the first CDMA MP phones in US).²⁷¹
- 8/5/04: Verizon announces availability of MSN Hotmail® and MSN Messenger in 1 application on Verizon phones.²⁷²
- 7/1/04: Verizon launches Mobile Web 2.0, providing web access and email.²⁷³
- 5/28/04: Verizon announces availability of Samsung SCH-a650 with enhanced text messaging capabilities.²⁷⁴
- 5/5/04: Verizon announces availability of dotPhoto, Inc.'s MyWallpaper™ for mobile phones.²⁷⁵
- 3/24/04: Verizon launches Sony Music Box Service for Get It Now customers, allowing download of music clips, Music Tones, ringtones, wallpaper, etc.²⁷⁶
- 2/10/04: Verizon announces Samsung SCH-a610 for Get It Now customers.²⁷⁷
- 1/28/04: Verizon announces availability of LG VX4500 with voice recognition and 2-way speakerphone.²⁷⁸
- 1/28/04: Verizon announces availability of Remo™ allowing remote access to email and calendar/contacts through mobile phone.²⁷⁹

²⁶⁸ "Verizon Wireless Becomes the First National Carrier to Begin Offering Ringback Tones." Verizon Press Release. 11/16/04.

²⁶⁹ "Verizon Wireless and Yahoo! Team Up to Help Customers on the Go Get in the Know With Access to Yahoo! Mail and More." Verizon Press Release. 10/26/04.

²⁷⁰ "Mobile AOL Mail Now Available to Verizon Wireless Get It Now Customers." Verizon Press Release 9/29/04.

²⁷¹ "Verizon Wireless Exclusive: New Motorola V710 Megapixel Camera Phone." Verizon Press Release. 8/12/04.

²⁷² "MSN Mobilizes Hotmail and Messenger for Verizon Wireless Customers." Verizon Press Release. 8/5/04.

²⁷³ "Verizon Wireless Launches Mobile Web 2.0." Verizon Press Release. 7/1/04.

²⁷⁴ "Verizon Wireless and Samsung Let Customers Do the Talking with the Introduction of the SCH-a650." Verizon Press Release. 5/28/04.

²⁷⁵ "dotPhoto, Inc. Launches New Photo Wallpaper Application for Verizon Wireless Get it Now Customers." Verizon Press Release. 5/5/04.

²⁷⁶ "Sony Music Entertainment and Verizon Wireless Launch the First 'Real Music' Ringtone Offering for Verizon Wireless Customers." Verizon Press Release. 3/24/04.

²⁷⁷ "Verizon Wireless and Samsung Advance Wireless Camera Phone Industry with Introduction of SCH-a610." Verizon Press Release. 2/10/04.

²⁷⁸ "LG Mobile Phones and Verizon Wireless Blend Must-Have Style and Advanced Features In Latest Handset." Verizon Press Release. 1/28/04.

²⁷⁹ "Verizon Wireless Launches Complete Connectivity Solution for Mobile Subscribers – Remo by Xpherix Corp." Verizon Press Release. 1/28/04.

- 1/28/04: Verizon announces availability of new wallpaper applications for its Get It Now mobile customers.²⁸⁰
- 1/8/04: Verizon expands its EV-DO service beyond Washington D.C. and San Diego.²⁸¹
- 12/11/03: Verizon announces availability of Audiovox CDM-8900 camera phone with 300-pixel phone and picture messaging.²⁸²
- 9/29/03: Verizon announces roll out of EV-DO service in Washington DC and San Diego on 10/1.²⁸³
- 8/27/03: Verizon announces LG VX6000 picture phone with iPhonebook allowing pictures to be sent to virtually anyone.²⁸⁴
- 8/14/03: Verizon announces availability of national PTT service (on 8/18).²⁸⁵
- 7/8/03: Verizon launches Easy To Use Picture Messaging Service.²⁸⁶
- 7/1/03: Verizon launches mobile AOL® Instant Messaging.²⁸⁷
- 4/30/03: Verizon announces availability of BlackBerry 6750™.²⁸⁸
- 4/28/03: Verizon announces MovieGoer, allowing Verizon customers to download movie guides on phones.²⁸⁹
- 3/9/01: Verizon announces availability of Kyocera 6035, the smartest smartphone that is web-ready, Palm-powered PDA.²⁹⁰
- 11/29/00: Verizon announces availability of first-ever color screen mobile phone.²⁹¹

²⁸⁰ “Vindigo Studios Launches Two New Wallpaper Applications for Verizon Wireless Get It Now Customers.” Verizon Press Release. 1/28/04.

²⁸¹ “Verizon Wireless Announces Roll Out of National 3G Network.” Verizon Press Release. 1/8/04.

²⁸² “Verizon Wireless and Audiovox Announce the New CDM-8900 Camera Phone.” Verizon Press Release. 12/11/03.

²⁸³ “Wireless Broadband Data Service Introduced in Major Metro Areas.” Verizon Press Release. 9/29/03.

²⁸⁴ “Verizon Wireless Customers Can Send Photos to Microsoft Outlook or Palm Contact Lists with iPhonebook.” Verizon Press Release. 8/27/03.

²⁸⁵ “Verizon Wireless Launches National Push To Talk Service.” Verizon Press Release. 8/14/03.

²⁸⁶ “Verizon Wireless Launches Easy-To-Use Picture Messaging Service.” Verizon Press Release. 7/8/03.

²⁸⁷ “America Online and Verizon Wireless Launch Mobile IM Service to Verizon Wireless Customers.” Verizon Press Release. 7/1/03.

²⁸⁸ “Multi-Tasking Just Got Easier With Verizon Wireless’ Express Network and the BlackBerry 6750.” Verizon Press Release. 4/30/03.

²⁸⁹ “Vindigo Brings Verizon Wireless Customers to the Movies.” Verizon Press Release. 4/28/03.

²⁹⁰ “Verizon Wireless Jumpstarts Smartphone Market.” Verizon Press Release. 3/9/01.

²⁹¹ “Just In Time for the Holidays: Cell Phones that Let you See In Color.” Verizon Press Release. 11/29/00.

C) SPRINT/NEXTEL

- 3/26/07: Sprint announces the upcoming availability of Samsung UpStage, a phone on 1 side and a MP3 player on the other.²⁹²
- 3/21/07: Sprint announces GPS bundled with data packages – an industry first.²⁹³
- 1/16/07: Sprint launches group of handsets that use the CDMA and iDEN networks.²⁹⁴
- 1/5/07: Sprint announces that it's the first US carrier to have more than 1 million customers with mobile video capability.²⁹⁵
- 1/3/07: Sprint announces M1 from Sanyo, the first Sprint wireless device with 1GB of internal memory.²⁹⁶
- 11/30/06: Sprint launches new mobile email and messaging service for customers.²⁹⁷
- 11/16/06: Sprint announces LG LX150 text messaging phone, one of the first consumer phones with dedicated text messaging key.²⁹⁸
- 11/14/06: Sprint announces Samsung M500 multimedia phone.²⁹⁹
- 11/9/06: Sprint announces Motorola i880, the first iDEN phone with a 2.0MP camera.³⁰⁰
- 11/6/06: Sprint announces the MOTOKRZR™ K1m by Motorola.³⁰¹
- 11/6/06: Sprint announces the MOTOSLVR L7c, Motorola's first CDMA SLVR handset and Sprint's first candy bar style high speed EVDO consumer phone.³⁰²

²⁹² "Get the Power To Redefine Mobile Music and Turn Up the Volume With UpStage™ by Samsung, exclusively for Sprint." Sprint Press Release. 3/26/07.

²⁹³ "Sprint Customers Get Industry First: GPS Navigation Bundled in Data Packs." Sprint Press Release. 3/21/07.

²⁹⁴ "Sprint Joins Strength of its two Networks to Offer Customers Industry-First Phones, Power To Do More." Sprint Press Release. 1/16/07.

²⁹⁵ "Sprint's Leadership in Mobile Video More Powerful Than Ever." Sprint Press Release. 1/5/07.

²⁹⁶ "Sprint Power Vision M1 by Sanyo Announces as First Sprint Wireless Device with 1 Gigabyte of Internal Memory." Sprint Press Release. 1/3/07.

²⁹⁷ "Sprint Launches Combined Mobile Email Client." Sprint Press Release. 11/30/06.

²⁹⁸ "Sprint PCS Vision Phone LX 150 by LG®." Sprint Press Release. 11/16/06.

²⁹⁹ "Sprint Power Vision M500 by Samsung." Sprint Press Release. 11/14/06.

³⁰⁰ "First 2.0 Megapixel Camera Phone Available on Nextel Network with i880 by Motorola." Sprint Press Release. 11/9/06.

³⁰¹ "MOTOKRZR™ K1m by Motorola." Sprint Press Release. 11/6/06.

- 10/24/06: Sprint launches US' first EV-DO Revision A mobile broadband network.³⁰³
- 9/20/06: Sprint introduces the BlackBerry® 8703e with GPS and EVDO.³⁰⁴
- 9/12/06: Sprint announces 2 network cards for EV-DO Rev. A network.³⁰⁵
- 8/29/06: Sprint launches commercial availability of Novatel Wireless Sprint Mobile Broadband Card – the first EV-DO Rev. A capable device in the US.³⁰⁶
- 8/8/06: Sprint announces plans for 4G wireless broadband using WiMAX IEEE 802.16e-2005 technology standard.³⁰⁷
- 7/6/06: Sprint announces Motorola i580, a rugged iDEN phone.³⁰⁸
- 6/29/06: Sprint announces SCP-2400 phone with parental controls.³⁰⁹
- 5/31/06: Sprint announces BlackBerry 7130e™.³¹⁰
- 5/24/06: Sprint announces LG® FUSIC™ music phone.³¹¹
- 5/16/06: Sprint announces late May availability of Treo™ 700p by Palm – the first broadband capable Palm Treo running Palm OS.³¹²
- 4/26/06: Sprint announces Samsung A580, one of the first mobile device to offer Sprint's storage backup.³¹³

³⁰² "MOTOSLVR™ L7c by Motorola." Sprint Press Release. 11/6/06.

³⁰³ "Sprint Launches Nation's First EV-DO Revision A mobile broadband network." Sprint Press Release. 10/24/06.

³⁰⁴ "Sprint and RIM Introduce BlackBerry 8703e Featuring Sprint Mobile Broadband and GPS Capability." Sprint Press Release. 9/20/06.

³⁰⁵ "Sprint Announces Plans to Expand EV-DO Revision A-Capable Device Portfolio." Sprint Press Release. 9/12/06.

³⁰⁶ "Sprint Launches First EV-DO Revision A-Capable Mobile Broadband Card in the Nation." Sprint Press Release. 8/29/06.

³⁰⁷ "Sprint Nextel Announces 4G Wireless Broadband Initiative with Intel, Motorola, and Samsung." Sprint Press Release. 8/8/06.

³⁰⁸ "Sprint Nextel and Motorola Break new Ground in Rugged Phone Market with the i580 by Motorola." Spring Press Release. 7/6/06.

³⁰⁹ "Sprint and Sanyo Introduce Phone with Parental Control Feature to Help Parents Maintain Control of a Child's Wireless Phone Usage." Sprint Press Release. 6/29/06.

³¹⁰ "Sprint Enhances BlackBerry Portfolio with Mobile Broadband-Powered Devices for the Sprint Power Vision(SM) Network." Sprint Press Release. 5/31/06.

³¹¹ "Hear the FUSIC™ by LG®." Sprint Press Release. 5/24/06.

³¹² "Sprint Announces Plans to Be First to Offer Mobile Broadband-Capable Palm Treo Running Palm OS." Sprint Press Release. 5/16/06.

- 12/12/05: Sprint announces MSpot Movies the first mobile entertainment service to stream full-length films to mobile phones.³¹⁴
- 11/29/05: Sprint announces availability of Samsung MM-A920 and MM-A900, that provides access to Sprint Music Store and on demand video from Sprint TV(SM).³¹⁵
- 11/7/05: Sprint announces Nextel Direct Send(SM) Picture, a first of its kind service allowing pictures to be sent on walkie talkie call.³¹⁶
- 10/31/05: Sprint announces availability of Samsung MM-A940 and Sanyo MM-9000 bringing Sprint Music Store with music downloads and live broadcast TV from Sprint TV.³¹⁷
- 10/31/05: Sprint launches first, instant over the air music download service in US.³¹⁸
- 10/31/05: Sprint launches high speed entertainment and information services via Power Vision network, including Sprint Music Store(SM), On Demand, Sprint TV(SM), Sprint PCS Picture Mail(SM).³¹⁹
- 10/14/05: Sprint launches BlackBerry 7100i™ for Nextel, with slimmer phone like design.³²⁰
- 9/27/05: Sprint launches Motorola i930, the industry's first wireless phone to combine Windows Mobile Smartphone platform with nationwide and international Nextel Walkie Talkie services and international voice and data capabilities.³²¹

³¹³ "Sprint PCS® Vision Phone A580 by Samsung®." Sprint Press Release. 4/26/06.

³¹⁴ "Sprint and MSpot Roll Out Red Carpet with Streaming Movie Service for Mobile Phones." Sprint Press Release. 12/12/05.

³¹⁵ "Eye-Catching Handsets Bring Full-Track Music Download Power and Live Broadcast Television to the Palm of your Hand." Sprint Press Release. 11/29/05.

³¹⁶ "Sprint Launches the Latest Innovation for Nextel Walkie-Talkie Services – Nextel Direct Send (SM) Picture." Sprint Press Release. 11/7/05.

³¹⁷ "Sprint and Samsung Launch the Sprint Power Vision MM-A940..." and "Sprint and Sanyo..." Sprint Press Releases. 10/31/05.

³¹⁸ "Sprint Launches the First, Instant, Over the Air Music Download Service in the U.S." Sprint Press Release. 10/31/05.

³¹⁹ "Sprint Premieres High-Speed Entertainment and Information Services Via Sprint Power Vision(SM) Network." Sprint Press Release. 10/31/05.

³²⁰ "Spring and RIM Launch BlackBerry 7100 series for the Nextel National Network." Sprint Press Release. 10/14/05.

³²¹ "Sprint and Motorola's Newest Windows Mobile-Based Smartphone Lets Business Professionals Get More Done in More Places." Sprint Press Release. 9/27/05.

- 9/26/05: Sprint announces TeleNav GPS service providing Java enabled GPS services.³²²
- 9/26/05: Sprint launches Sprint TV Live.³²³
- 9/16/05: Sprint launches PPC-6700 Smart device, the first PDA/phone combo to provide Windows Mobile 5.0 software.³²⁴
- 9/13/05: Sprint debuts SIRIUS Music on its phones.³²⁵
- 8/23/05: Sprint launches Precision Locator(SM), a fleet management product.³²⁶
- 7/7/05: Sprint announces multimedia messaging inter-operability with T-Mobile.³²⁷
- 7/7/05: Sprint announces it has begun rollout of EVDO network.³²⁸
- 6/22/05: Sprint announces availability of BlackBerry 7250™.³²⁹
- 6/16/05: Sprint announces availability of Novatel Connection Card for Sprint's EV-DO network when it is available.³³⁰
- 6/8/05: Sprint launches enhanced Yahoo! Mobile Email Service.³³¹
- 5/16/05: Sprint introduces 3D games.³³²
- 5/12/05: Sprint launches Samsung MM-A800, the US' first 2MP camera phone.³³³

³²² "Sprint Extends Customer Choice and Flexibility with TeleNav GPS Navigator Offering." Sprint Press Release. 9/26/05.

³²³ "Sprint TV Live Launches on Sprint Multimedia Handsets." Sprint Press Release. 9/26/05.

³²⁴ "Sprint Launches First Pocket PC Phone in the Country to Feature Windows Mobile™ 5.0 Platform." Sprint Press Release. 9/16/05.

³²⁵ "SIRIUS Music Channel Makes Its Mobile Debut on Sprint." Sprint Press Release. 9/13/05.

³²⁶ "Sprint Precision Locator(SM) Helps Businesses Locate Fleets and Mobile Workers Through their Wireless Devices." Sprint Press Release. 8/23/05.

³²⁷ "T-Mobile USA and Sprint Make it a Snap for Customers to Share Picture Messages." Sprint Press Release. 7/7/05.

³²⁸ "Sprint Begins Launch of EV-DO Wireless High-Speed Data Service." Sprint Press Release. 7/7/05.

³²⁹ "Sprint Expands Wireless Portfolio with Availability of New Sprint PCS Smart Device – BlackBerry 7250™ and Enhanced BlackBerry Enterprise Server Features." Sprint Press Release. 6/22/05.

³³⁰ "Sprint Offers EV-DO-Ready Sprint PCS Connection Card™ from Novatel Wireless." Sprint Press Release. 6/16/05.

³³¹ "Yahoo! And Sprint Launch Enhanced Mobile E-Mail Service." Sprint Press Release. 6/8/05.

³³² "Sprint Gives Mobile Games an Extreme Makeover with New Categories and 3D Games." Sprint Press Release. 5/16/05.

³³³ "Sprint and Samsung Launch First Two-Megapixel Camera Phone in the United States." Sprint Press Release. 5/12/05.

- 3/14/05: Sprint introduces music video ringers – the first in US.³³⁴
- 3/3/05: Sprint announces availability of Sierra Wireless AirCard 580 for EV-DO network later in 2005.³³⁵
- 11/16/04: Sprint announces availability of BlackBerry® 7750.³³⁶
- 10/25/04: Sprint announces that it's the first in US to offer Treo™ 650 by palmOne.³³⁷
- 9/22/04: Sprint announces Samsung SP-i600, the Sprint's first Windows Mobile™ based smart device on Smartphone platform.³³⁸
- 8/31/04: Sprint launches Sprint PCS Vision(SM) Multimedia services, offering streaming video and audio content.³³⁹
- 8/27/04: Sprint announces EarthCam Mobile, allowing customers to view Webcams on mobile phones.³⁴⁰
- 7/8/04: Sprint announces availability of Samsung PM-8920, the first 1.3MP camera in the US.³⁴¹
- 2/24/04: Sprint announces North America's first inter-operable picture messaging service with Bell Mobility.³⁴²
- 12/11/03: Sprint announces Samsung VI660, a voice recognition phone.³⁴³

³³⁴ "A First in the United States: Music Videos Now Rock Sprint PCS Vision(SM) Calls." Sprint Press Release. 3/14/05.

³³⁵ "Sprint Begins Offering EV-DO Ready Sprint PCS Connection Card™ by Sierra Wireless to Business Customers." Sprint Press Release. 3/3/05.

³³⁶ "Sprint Launches BlackBerry® on the Enhanced Sprint Nationwide PCS Network." Sprint Press Release. 11/16/04.

³³⁷ "Sprint Announces Plans to Be First Wireless Carrier in the Country to Offer Next-Generation Model Treo™ Smart Device." Sprint Press Release. 10/25/04.

³³⁸ "Sprint and Samsung Help Mobile Professionals Get Organized with Smart Device Featuring Microsoft® Windows Mobile™ 2003 Software for Smartphone." Sprint Press Release. 9/22/04.

³³⁹ "Sprint Launches Nationwide Streaming Video and Audio in United States on The First Built-In MediaPlayer Phone from Samsung." Sprint Press Release. 8/13/04.

³⁴⁰ "Sprint Launches New Live Webcam Application for Mobile Handsets." Sprint Press Release. 8/27/04.

³⁴¹ "Taking Sharper Pictures is Now a Snap as Sprint Launches First 1.3-Megapixel Camera Phone in the United States." Sprint Press Release. 7/8/04.

³⁴² "Sprint Camera Phone Customers Can Now Share Smiles Across the U.S./Canadian Border with Picture Messaging Service Powered by LightSurf." Sprint Press Release. 2/24/04.

³⁴³ "Sprint and Samsung Introduce VI660 Wireless Phone as First Phone in the U.S. Featuring Revolutionary Voice-Activated Status Updates." Sprint Press Release. 12/11/03.

- 12/3/03: Sprint becomes first carrier to truly deliver a Video Mail service to consumers – 15 second clip.³⁴⁴
- 8/23/03: Sprint launches Sprint Messenger(SM) service, allowing customers to receive email on any phone and mass distribute text and voice messages.³⁴⁵
- 7/24/04: Sprint announces Hitachi Model SH-G1000 the first pocket PC to integrate a rotating camera, built in keyboard and wireless phone in 1 device.³⁴⁶
- 3/17/03: Sprint announces Sanyo 8100, the first built in camera phone to add a 10 second voice message to any picture and then send.³⁴⁷
- 1/8/03: Sprint announces America's first Wireless streaming music clip subscription service, allowing ringtone downloads from Warner Music Group.³⁴⁸
- 12/23/02: Sprint announces that it's the first US Carrier to introduce next generation services via PCS Vision(SM) and introduced Samsung SPH-i330 device for the PCS Vision.³⁴⁹
- Sprint introduces Nokia 3585.³⁵⁰
- 11/11/02: Sprint rolls out streaming media application for corporate clients.³⁵¹
- 11/6/02: Sprint and Bell Mobility announce collaboration on CDMA technology advancement.³⁵²
- 10/15/02: Sprint introduces Sanyo 5300, the first phone in US with built in camera.³⁵³

³⁴⁴ "Lights, Camera, Action! Sprint Introduces Video Mail." Sprint Press Release. 12/3/03.

³⁴⁵ "Sprint Introduces Sprint Messenger(SM) Service." Sprint Press Release. 8/19/03.

³⁴⁶ "Sprint Announces Nationwide Availability of the First Pocket PC with Integrated Camera, Built-In Keyboard and Wireless Phone." Sprint Press Release. 7/24/03.

³⁴⁷ "Sprint and Sanyo Debut America's First Camera Phone to Add Voice Messages to Wireless Pictures." Sprint Press Release. 3/17/03.

³⁴⁸ "Sprint and Warner Music Group Offer America's First Wireless Streaming Music Clip Subscription Service..." Sprint Press Release. 1/8/03.

³⁴⁹ "Sprint and Samsung Telecommunications America Usher in Next Generation of Palm Powered™ Phones with PCS Phone SPH-i330." Sprint Press Release. 12/23/02.

³⁵⁰ "Sprint Adds Nokia Handset to Line-Up of PCS phones." Sprint Press Release. 12/2/02.

³⁵¹ "Sprint Rolls Out Streaming Media Capabilities to its Hosted Solutions Portfolio." Sprint Press Release. 11/11/02.

³⁵² "Sprint and Bell Mobility Collaborate on CDMA Technology Advancement." Sprint Press Release. 11/6/02.

³⁵³ "Sprint and Sanyo Introduce America's First Built-In Camera Phone." Sprint Press Release. 10/15/02.

- 9/30/02: Sprint announces new videoconferencing and audioconferencing solutions.³⁵⁴
- 9/16/02: Sprint announces availability of LG 5350, the first LG model with color LCD display.³⁵⁵
- 9/4/02: Sprint announces picture messaging service.³⁵⁶
- 8/22/02: Sprint announces Sanyo 4900 with color screen.³⁵⁷

D) T-MOBILE

- 4/13/07: T Mobile announces T Mobile® Sidekick® iD.³⁵⁸
- 3/21/07: T-Mobile exclusively launches MOTORIZR™ Z3.³⁵⁹
- 10/11/06: T-Mobile announces upcoming availability of T-Mobile Dash™ a Smartphone designed for customers with busy home and work lives.³⁶⁰
- 9/27/06: T-Mobile announce availability of Samsung SGH-t719 a flip phone with BlackBerry Connect service and QWERTY-like keyboard.³⁶¹
- 9/12/06: T-Mobile announce Samsung Trace™, the slimmest bar phone available in US.³⁶²
- 9/7/06: T-Mobile introduces BlackBerry Pearl.³⁶³
- 6/20/06: T-Mobile announces availability of next generation T-Mobile® Sidekick® 3.³⁶⁴

³⁵⁴ "Sprint Announces Automated Videoconferencing and Web-Enabled Audio Conferencing." Sprint Press Release. 9/30/02.

³⁵⁵ "Sprint Offers Full-Loaded PCS Phone by LG Model 5350..." Sprint Press Release. 9/16/02.

³⁵⁶ "Sprint and LightSurf Enable Wireless Customers to Instantly Shoot, View and Share Clear Pictures Nationwide with PCS Vision Camera and LightSurf Technology." Sprint Press Release. 9/4/02.

³⁵⁷ "Sprint Introduces Affordable, Vivid Color Screen PCS Phone by Sanyo Featuring Full Support for PCS Vision(SM) from Sprint." Sprint Press Release. 8/22/02.

³⁵⁸ "T-Mobile Sidekick iD Makes a Statement." T-Mobile Press Release. 4/13/07.

³⁵⁹ "Motorola and T-Mobile Launch the MOTORIZR™ Z3." T-Mobile Press Release. 3/21/07.

³⁶⁰ "T-Mobile Unveils a new Full-Featured Smartphone, the T-Mobile Dash." T-Mobile Press Release. 10/11/06.

³⁶¹ "Samsung and T-Mobile Unveil Premium Slim Flip Phone with BlackBerry Connect and QWERTY-like keyboard." T-Mobile Press Release. 9/27/06.

³⁶² "Samsung and T-Mobile Set the Ultra-Slim Bar with the Samsung Trace™." T-Mobile Press Release. 9/12/06.

³⁶³ "T-Mobile USA and RIM Introduce the Ultra-Sleek BlackBerry Pearl." T-Mobile Press Release. 9/7/06.

³⁶⁴ "T-Mobile Sidekick 3 Available to 'Kick-Start' the Summer." T-Mobile Press Release. 6/20/06.

- 6/12/06: T-Mobile offering kidConnect, allowing parents to keep in contact with kids.³⁶⁵
- 5/2/06: T-Mobile announces Samsung t509, the thinnest bar phone in the US market.³⁶⁶
- 2/13/06: T-Mobile announces availability of two new smartphones – T-Mobile SDA and T-Mobile MDA – EDGE capable with integrated Wi-Fi and QWERTY keyboard.³⁶⁷
- 10/13/05: T-Mobile announces availability of BlackBerry® 7105t as well as BlackBerry Internet Email™ for Yahoo! Mail users.³⁶⁸
- 7/15/05: T-Mobile announces availability of Motorola RAZR.³⁶⁹
- 7/7/05: T-Mobile announces Multimedia Messaging Services interoperability with Sprint.³⁷⁰
- 7/7/05: T-Mobile announces Multimedia Messaging Services interoperability with Cingular.³⁷¹
- 3/11/05: T-Mobile announces availability of BlackBerry 7290.³⁷²
- 12/8/04: T-Mobile launches CallerTunes, the US' first ringback tone service.³⁷³
- 9/22/04: T-Mobile launches T-Mobile Sidekick II.³⁷⁴
- 9/8/04: T-Mobile launches BlackBerry 7100t™ phone, packing BlackBerry functionalities into a phone.³⁷⁵

³⁶⁵ "T-Mobile Introduces kidConnect: A Worry-Free Wireless Plan for Parents to Stay Connected to Kids." T-Mobile Press Release. 6/12/06.

³⁶⁶ "T-Mobile and Samsung Introduce the Thinnest Bar Phone for the U.S. Market." T-Mobile Press Release. 5/2/06.

³⁶⁷ "T-Mobile USA Introduces Two New Smartphones to Keep you Effortlessly Connected." T-Mobile Press Release. 2/13/06.

³⁶⁸ "T-Mobile USA and RIM Launch the New BlackBerry 7105t and new BlackBerry Internet E-Mail Service for Yahoo! Mail Users." T-Mobile Press Release. 10/13/05.

³⁶⁹ "World Renowned Motorola RAZR Debuts at T-Mobile USA." T-Mobile Press Release. 7/15/05.

³⁷⁰ "T-Mobile USA and Sprint Make it a Snap for Customers to Share Pictures and Text Messages." T-Mobile Press Release. 7/7/05.

³⁷¹ "T-Mobile Shows It's Better to Give and to Receive Picture and Video Messages." T-Mobile Press Release. 7/7/05.

³⁷² "T-Mobile USA Welcomes a New Member to the BlackBerry Family." T-Mobile Press Release. 3/11/05.

³⁷³ "T-Mobile USA Launches CallerTunes; The First Nationwide Ringback Tone Service That Lets Users 'Represent Their Style.'" T-Mobile Press Release. 12/8/04.

³⁷⁴ "America Flips its Lid for the T-Mobile Sidekick II." T-Mobile Press Release. 9/22/04.

- 8/31/04: T-Mobile announces availability of Nokia 6800 messaging phone, which makes choice of IM a non-issue.³⁷⁶
- 8/11/03: T-Mobile introduces exclusive availability of BlackBerry® 7230 with high-resolution color display.³⁷⁷
- 6/19/03: T-Mobile announces availability of BlackBerry® 6210™.³⁷⁸
- 3/27/03: T-Mobile introduces video messaging services with Nokia 3650 – first in US.³⁷⁹
- 3/4/03: T-Mobile announces availability of Treo 270.³⁸⁰
- 11/7/02: T-Mobile announces Camera Phones starting at under \$100.³⁸¹
- 8/1/02: T-Mobile launches Windows Powered Pocket PC.³⁸²

³⁷⁵ “A New BlackBerry Phone that Fits In Your Shirt Pocket? Now You’re Talking!” T-Mobile Press Release. 9/8/04.

³⁷⁶ “CUL8R: Triple Tap.” T-Mobile Press Release. 8/31/04.

³⁷⁷ “World-Capable Color BlackBerry 7230 From RIM Arrives in United States, Available Exclusively from T-Mobile USA.” T-Mobile Press Release. 8/11/03.

³⁷⁸ “T-Mobile USA Launches New BlackBerry 6210.” T-Mobile Press Release. 6/19/03.

³⁷⁹ “T-Mobile, First Wireless Carrier to Introduce Video Messaging Services in the U.S.” T-Mobile Press Release. 3/27/03.

³⁸⁰ “T-Mobile Launches Handspring Treo 270.” T-Mobile Press Release. 3/4/03.

³⁸¹ “T-Mobile Introduces Camera Phones Starting at Under \$100.” T-Mobile Press Release. 11/7/02.

³⁸² “T-Mobile Launches Microsoft Windows Powered Pocket PC Phone Edition.” T-Mobile Press Release. 8/1/02.



QSI, an equal opportunity employer, is a dynamic consulting firm specializing in litigation and regulatory support for network industries. QSI's experienced consultants provide services to a wide array of clients, including multi-billion dollar telecommunications companies (wireline and wireless), cable companies, state regulatory commissions, state attorneys general, state legislatures, law firms and small start-up companies. In addition to many years of experience representing clients in state and federal regulatory proceedings, QSI assists clients in developing and implementing business plans and business models, economic and financial modeling, technical and operational research, tariff development and maintenance and billing reconciliation. QSI offers specialized training seminars focused on a number of issues including costing and pricing methodologies, convergence of communications networks and technologies, expert witness skills, and other complex regulatory concepts and strategies. QSI provides the CLE and CEU certified training to industry clients as well as for commission staffs (telecommunications, energy (gas and electric), transportation and water).

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QSI Contributors to the Report:

August Ankum, Ph.D. – Dr. Ankum is a founding partner of QSI and serves as Senior Vice President. He is a practicing economist and consultant specializing in both domestic and international telecommunications issues. Dr. Ankum received a PhD in Economics

from the University of Texas at Austin, a MA in Economics from the University of Texas and a BA in Economics from Quincy College in Illinois.

Olesya Denney, Ph.D. – Dr. Denney serves as Senior Consultant in QSI's Telecommunications Division. Dr. Denney is an economist and statistician and has conducted research in both the telecommunications and energy industries. Dr. Denney holds a PhD and MS in Economics from Oregon State University as well as a BS in Economics from Novosibirsk State University in Russia.

Warren Fischer, C.P.A. – Mr. Fischer, a Certified Public Accountant, is a QSI Partner and Chief Financial Officer for the firm. Mr. Fischer has extensive experience in the telecommunications and accounting industries and is a sought after resource in the regulatory arena. Mr. Fischer, CPA, holds a BS in Business Administration with an emphasis in accounting from the University of Colorado.

Timothy Gates – Mr. Gates is a QSI Partner and serves as Senior Vice President. He has provided expert testimony in more than 200 proceedings in 44 states and Puerto Rico. Mr. Gates holds a BS in Forest Management from Oregon State University and a MM with an emphasis in Finance and Quantitative Methods from the Atkinson School at Willamette University.

Stephanie Goldman, C.F.A. – Ms. Goldman is a Special Consultant to QSI. She has extensive executive experience in both domestic and international utility (telecommunications and energy) regulation and the US financial industry. Ms. Goldman holds a MBA from the University of Texas and a BA in Economics from Wellesley College.

Dima Leshchinskii, Ph.D. – Dr. Leshchinskii is a visiting assistant professor at Lally School of Management Rensselaer Polytechnic Institute (Troy, NY, USA) teaching undergraduate and graduate courses in Corporate Finance, International Finance and Business Economics. His research focuses on corporate and entrepreneurship finance. Dr. Leshchinskii holds a Ph.D. and M.S. in Management (Finance) from INSEAD, Paris, France, MBA from David Eccles School of Business, University of Utah, USA and Honors Diploma in Applied Mathematics, Tomsk State University, Tomsk, Russia.

Sidney Morrison – Mr. Morrison is QSI's Chief Engineer and in charge of QSI's Technical Services Division. He brings over 30 years of experience to the firm, with 22 years at US WEST's Network Management Group. Mr. Morrison has also designed, built and managed networks in Malaysia and Switzerland.

Patrick Phipps – Mr. Phipps is a QSI Senior Consultant with a variety of regulatory experience. As an advisor to regulatory commissioners and as an economist Mr. Phipps has provided extensive expert advice and analysis on the regulation of telecommunications and transportation industries. Mr. Phipps holds an MA in Economics from the University of Illinois and a BS in Economics from Illinois College.