

**A STRATEGIC ANALYSIS OF
MOBILE DATA SERVICE OFFERINGS FOR THE
VANCOUVER 2010 WINTER OLYMPIC GAMES**

By

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ABSTRACT

This paper is a strategic analysis of the roles mobile services may play in the upcoming 2010 Winter Olympics and Paralympic Games in Vancouver, British Columbia. The paper has two objectives. First, the paper outlines the projected, infrastructure landscape that vancouver2010.com may operate in during the Games. The paper identifies trends in a mobile-communication technology mix and mobile-user demographics that drive consumer demand. This research identifies the driving forces that will shape the competition for projected market share in the 2010 mobile phone market. The paper can thus help the Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games(VANOC) identify the target segments for delivering value-added services in mobile communications. The second objective of this paper is to suggest a list of potential services, which will meet the goal of improving tourist ease of use in accessing mobile services while attending Olympic events. The paper utilizes extensive secondary market research to develop this list.

Keywords: VANOC, Vancouver 2010, Winter Olympics, Mobile Services, Mobile Internet, Cellular Services

DEDICATION

To my family and friends, for their steadfast support made my pursuit of the MBA a reality.

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TABLE OF CONTENTS

Approval	ii
Abstract.....	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vi
List of Figures.....	viii
List of Tables	ix
Glossary	x
1: Introduction	1
1.1 Growth of the Internet	1
1.2 Culture of Cellular Communication	2
1.3 VANOC: Organizing Committee for the 2010 Olympic Winter Games	3
1.4 VANOC mobile strategy project.....	4
2: Use-case Scenarios - A day in the life of the user.....	6
2.1 Segmenting the user pool	7
2.1.1 National – Local	9
2.1.2 National – Travellers	11
2.1.3 International – Locals	13
2.1.4 International – Travellers	15
2.2 Use case implications	18
2.2.1 Use case implications – Accessibility	18
2.2.2 Use case implication – Usability	20
2.2.3 Use case implications - Pricing of services	21
2.3 Critical success elements.....	22
3: Wireless Market trends.....	23
3.1 Fast Paced, Dynamic Trends	24
3.2 Wireless Devices Forecasts	24
3.3 Wireless Devices Adoption Trend	26
3.3.1 Faster, Smaller, Cheaper.....	26
3.3.2 The Growth of Feature phones and Smartphones	28
3.4 Network Operators	32
3.4.1 Wireless spectrum auction and market dynamics	33
4: Technology Adoption - issues and implications.....	34
4.1 Issues facing mobile communications – The business model.....	34

4.2	Issues facing mobile communications – Data Services Adoption	36
4.3	Issues facing mobile communications - Roaming.....	37
4.4	Global mobile Internet adoption pattern	38
4.5	Japan and South Korea.....	41
4.6	Adoption Barriers – Accessibilities, Usability and Pricing.....	43
4.6.1	Barrier to Adoption – Accessibility.....	43
4.6.2	Barrier to Adoption – Usability.....	44
4.6.3	Barrier to Adoption – Pricing.....	45
5:	Discussions and Recommendations.....	48
5.1	Discussions of Findings	48
5.2	Mobile Content – The data for distribution.....	52
5.2.1	“National and International traveller” – Downloadable content scenario.....	53
5.3	Data Distribution Model - Complete Package Experience	54
5.3.1	“International – Traveller” – Complete Packaged Access Scenario	55
5.4	Data Distribution Model – Wi-Fi.....	56
5.4.1	“International – Traveller” Wi-Fi access Scenario.....	58
5.5	Data Distribution Model – Bluedirectory, Bluetooth Technology.....	58
5.5.1	“National-Local” Bluetooth access Scenario	59
5.6	Data Distribution Model - Email, SMS Text messages	60
5.6.1	“National – Traveler” Email Access Scenario	61
5.7	Data Distribution Model - Mobile Web Portal.....	61
5.7.1	Helsinki, Finland - mobile portal.....	64
5.7.2	Vancouver.mobi - mobile portal.....	64
5.8	Location based services.....	65
5.9	Strategic Focus	66
5.9.1	Pre-Games	66
5.9.2	During Games.....	66
5.9.3	Post Games	67
5.9.4	Cost recuperation and sustainability.....	67
5.10	Conclusion.....	68
Appendices.....	69	
Appendix A	69	
Appendix B	70	
Appendix C – Recent Business Developments in Mobile Phone Manufacturers	71	
Appendix D – Smartphone Trends and Platforms	82	
Smartphone Platforms	82	
Demographics and device preference of Smartphone Users.....	93	
Reference List.....	96	

LIST OF FIGURES

Figure 1: Simplified Mobile Internet Networking Diagram	6
Figure 2: User Segmentation Grid	8
Figure 3: Global Handset Sales (% of Total Sales) Source: Yankee Group 2006, Global Handset Forecast	29
Figure 4: Smartphone Penetration and Growth: June '06 vs July '07. Source: M:Metrics Smartphone Owners Presentation October 15 th 2007	31
Figure 5: Mobile Internet Data Networking	34
Figure 6: Mobile subscribers per 100 inhabitants in OECD countries 2005	40
Figure 7: Japan: Internet access by device, 2006. Source: OECD.....	42
Figure 8: Japan and Korea, broadband vs Mobile. Source: OECD	42
Figure 9: Proposed Data Distribution infrastructure Model	57
Figure 10: Quarterly worldwide Smartphone sales by OS Vendor. Source: Canalys.....	85
Figure 11: Q3 2007 Smartphone sales by OS vendor by region. Source: Canalys	85
Figure 12: RIM Subscriber Growth	88
Figure 13: RIM Revenue and Net Income.....	88
Figure 14: Apple's iPhone market positioning.....	91
Figure 15: Age, Gender Profile and Size of Market for Smartphones United States - Source: M:Metrics Smartphone Owners Presentation October 15 th 2007.....	95
Figure 16: Age, Gender Profile and Size of Smartphone Market - UK 2007. Source: M:Metrics Smartphone Owners Presentation October 15 th 2007.....	95
Figure 17: Age, Gender Profile and Size of Smartphone Market - Italy 2007. Source: M:Metrics Smartphone Owners Presentation October 15 th 2007.....	95

LIST OF TABLES

Table 1: Scenario Summary	9
Table 2: 2007 Mobile Devices Worldwide Market Shares.....	26
Table 3: Nokia Corporation - Revenue vs Profit Margin	27
Table 4: Top selling Smartphones in the US (Aug - Oct, 2006) Sources: NPD Group	32
Table 5: Proposed Mobile Portal Functionalities.....	63
Table 6: Top 10 Smartphones in the US, August 2007. Source: M: Metrics October 2007	69
Table 7: Top 10 Smartphones in Italy, August 2007. Source: M: Metrics October, 2007.....	69
Table 8: Top 10 Smartphones in the UK, August 2007. Source: M: Metrics October, 2007.....	69
Table 9: Mobile Subscriber Monthly Consumption of Content and Applications	70
Table 10: Percentage of Mobile Subscriber Monthly Consumption of Content & Applications by OEM	70
Table 11: Top Five Mobile Phone Vendors, Worldwide Full Year 2007 Results.....	71
Table 12: Top Five Converged Mobile Device Vendors, FY 2006.....	83

GLOSSARY

3G (Third Generation Wireless)	3G refers to the third generation of developments in wireless technology in mobile communications. 3G includes capabilities and features such as Enhanced multimedia (voice, data, video, and remote control), Usability on all popular modes (cellular telephone, e-mail, paging, fax, videoconferencing, and Web browsing). Broad bandwidth and high speed (upwards of 2 Mbps). Roaming capability throughout Europe, Japan, and North America.
Airtime	Total time that a wireless phone is in connected and in use for talking. This includes use for calls both received and placed.
Bandwidth	Describes the transmission capacity of a medium in terms of a range of frequencies. A greater bandwidth indicates the ability to transmit a greater amount of data over a given period of time.
Bluetooth	A short range wireless protocol meant to allow mobile devices to share information and applications without the worry of cables or interface incompatibilities. Operates at 2.4 GHz, see bluetooth.com .
Broadband	Describes a communications medium capable of transmitting a relatively large amount of data over a given period of time. A communications channel of high bandwidth.
Carrier	A company that provides telecommunications services.
CDMA (Code Division Multiple Access)	A digital communication technology used by some carriers to provide mobile phone service. Also known as IS-95A or cdmaOne.

CDMA2000 1xEV-DO (and 1xEV-DV)	CDMA2000 1xEV-DO (and 1xEV-DV) A 3G wireless communications standard further evolved from CDMA2000 technology. 1xEV-DV is optimized for both data and voice transmissions.
Cellular	The type of wireless communication that is most familiar to mobile phones users.
Coverage Area	The geographic area served by a wireless system. Same as Service Area.
CRTC	The Canadian Radio-television and Telecommunications Commission is an independent agency responsible for regulating Canada's broadcasting and telecommunications systems.
Digital	A method of encoding information using a binary code of 0's and 1's. Most new wireless phones and networks use digital technology.
Dual band	A feature on some mobile phones that allows the handset to operate using either the 800 MHz cellular or the 1900 MHz cellular frequencies.
GSM (Global Standard for Mobile)	A digital communication technology used by some carriers to provide digital Cellular service.
Handset	Any hand held device used to transmit and receive calls from a wireless system. Also known as a wireless phone, a cellular phone, a mobile phone, and many other terms.
Home Coverage Area	A designated area within which cellular calls are local and do not incur roaming or long distance charges.
HSDPA (High Speed Downlink Packet Access)	A packet based mobile telephony protocol used in some 3G networks to increase data capacity and speed up transfer rates.

MMS (Multimedia Messaging Service)	MMS is a messaging system where messages may include multimedia elements such as pictures, video and audio. These multimedia elements are included in the message, not as attachments as with email.
PC (Personal Computer)	A general-purpose computer equipped with a microprocessor and designed to run commercial software (as a word processor or Internet browser) for an individual user. The term refers to both Desktop as well as Laptop computers.
Prepaid Cellular/Wireless	A service plan offered by some wireless carriers that allows subscribers to pay in advance for wireless service.
Roaming	Using your wireless phone in an area outside its home coverage area. There is usually an additional charge for roaming.
Service Area	The geographic area served by a wireless system. Same as Coverage Area.
SMS (Short Messaging System)	A feature of mobile phones that allows users to receive and transmit short text messages.
Talk Time	The time a phone is on and actively transmitting or receiving a call.
UMTS (Universal Mobile Telecommunications System)	An evolution of GSM technology to 3G.
VANOC	The Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games. The Committee's mandate is to support and promote the development of sport in Canada by planning, organizing, financing and staging the 2010 Olympic and Paralympic Winter Games.

WAP (Wireless Application Protocol)

A global protocol used in many newer wireless devices that allows the user to view and interact with data services. Generally used as a means to view Internet web pages using the limited transmission capacity and small display screens of portable wireless devices.

Wi-Fi

A wireless data networking protocol generally used to connect PCs and laptops to a network. It is the most common means of wireless networking in offices and residences. It operates at 2.4 GHz.

1: INTRODUCTION

The purpose of the paper is to develop a strategy to meet the rising demand for accessible, mobile content. The Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games (VANOC) recognizes the need to forecast a mobile communication landscape for the 2010 Winter Games. In order to aid this endeavour the paper will recommend mobile communication strategies to ensure that wireless access to information regarding the Games is available in local and international venues.

This paper relies mostly on secondary research and examines consumers' needs in relation to current mobile data communications, current technology trends, and usage patterns. The paper then generates recommendations based on the above findings. These recommendations are essential data for VANOC to reference when formulating mobile use strategies. The rising demand for mobile content is a worldwide phenomenon that exhibits varying levels of technological expertise on the part of mobile users. In accordance with VANOC's mandate for operational excellence, current accessibility to mobile channels of communication needs to increase in speed and ease of access, in order to meet the needs of mobile users.

1.1 Growth of the Internet

The integration of the Personal Computer (PC) into users' daily lives is the key factor in defining the popularity of the modern internet. The creation of the World Wide Web and the web browsers enabled people to access information easily. The use of search engines allowed users to sort through vast amounts of data. The combination of connectivity, ease of use and presentation

of relevant information, resulted in the explosion of the internet and further increased consumer adoption of the PC.

For the last decade, the sales of portable, laptop PCs have skyrocketed and this has contributed to a sharp rise in the mobility of information distribution. The laptop PCs and its smaller cousin, the Ultra Mobile PC (UMPC) harness the capability of built-in WiFi which provide the means for these devices to wirelessly access the internet within the bounds of the service providing wireless access points. With a subscription fee and an add-on module, these devices can also be connected to the cellular network in order to break the limiting WiFi range and take advantage of the cellular network's wide coverage area. The internet is now truly mobile and accessible by consumers almost everywhere.

In the last two decades, the cellular phone has transitioned from being an expensive communication device for the business elite, to a widespread and low-cost personal item for mass consumption. Cellular phone subscriptions have out-numbered landline phones in many countries. Given such a high level of market penetration, the cellular phone has become a key target for mass communication strategies.

1.2 Culture of Cellular Communication

The cultural changes that have evolved due to the adoption of the cellular phone are profound. In the age cohort of young adults between 15-25 years; the cellular phone is utilized as a primary channel of communication between their peers, worksites, family and the Internet. In the business culture, the adoption of communication devices has created higher standards for operational efficiency for tasks management. As a result, the boundaries between work and personal time are now indistinct, as people receive personal calls at work and work-related calls

during vacations. This push-pull utilization of mass connectivity has created a new paradigm of a cell phone in every pocket as opposed to the previous generation's payphone on every street corner. Real time communication and access to information is spontaneous and immediate. As a result, when the winner of the bid for the 2010 Winter Olympics was announced by the IOC, mobile users had the option of viewing the results through accessing the Internet.

1.3 VANOC: Organizing Committee for the 2010 Olympic Winter Games

On July 2, 2003 the International Olympic Committee (IOC) chose Vancouver, British Columbia as the host of the 2010 Winter Olympic Games. Factors that may have influenced the IOC are Metro Vancouver's strong positioning as a Pacific Rim trading partner, its open-door immigration policies, and the natural attractions that frame the city of Vancouver from sea to sky. This win has created a sustainable opportunity for this region to respond to the challenges of technology adaptation and infrastructure.

VANOC holds the mandate to support and promote the development of sports in Canada by planning, organizing, financing and staging the 2010 Olympic and Paralympic Winter Games. VANOC utilizes their official website, vancouver2010.com as the main hub for communication and public relations. Information that is available includes: 2010 related news releases, opportunities to get involved with the games, game details, schedule, and information about the host cities, Vancouver and Whistler. vancouver2010.com is also a platform for launching the mobile web strategy of the Olympic Games. The Vancouver Sun reported that in October 2007, vancouver2010.com has received over one million page views, clustered during the time period when VANOC announced ticket information¹.

VANOC's mandate for operational efficiencies in the staging of the Games includes addressing a multitude of needs in communication and information distribution. In the past decade the consumer need for communication, mobility and portability has driven the proliferation of real-time, wireless communication. People now communicate events in streaming bandwidth, through the global interconnectivity of their mobile devices

. In response to this demand for services, the Metro Vancouver region with its diverse, technical, product-offerings has been established as a well-known cluster for technology development in the last five years. Well-established companies such as Microsoft, Nortel, and Sierra Wireless have utilized skilled technicians, competitive infrastructure and favourable business climate of this region to further expand their positioning in the global marketplace. Telecommunication providers such as TELUS, Bell and Rogers Communications are operating in a strong, competitive market for consumer telecommunications needs. In the next two years, the combination of consumer needs for communication services, well-established communication providers, and media attention focused on this region creates opportunities for VANOC to showcase the cutting-edge communication infrastructure currently under development in the Metro Vancouver region.

1.4 VANOC mobile strategy project

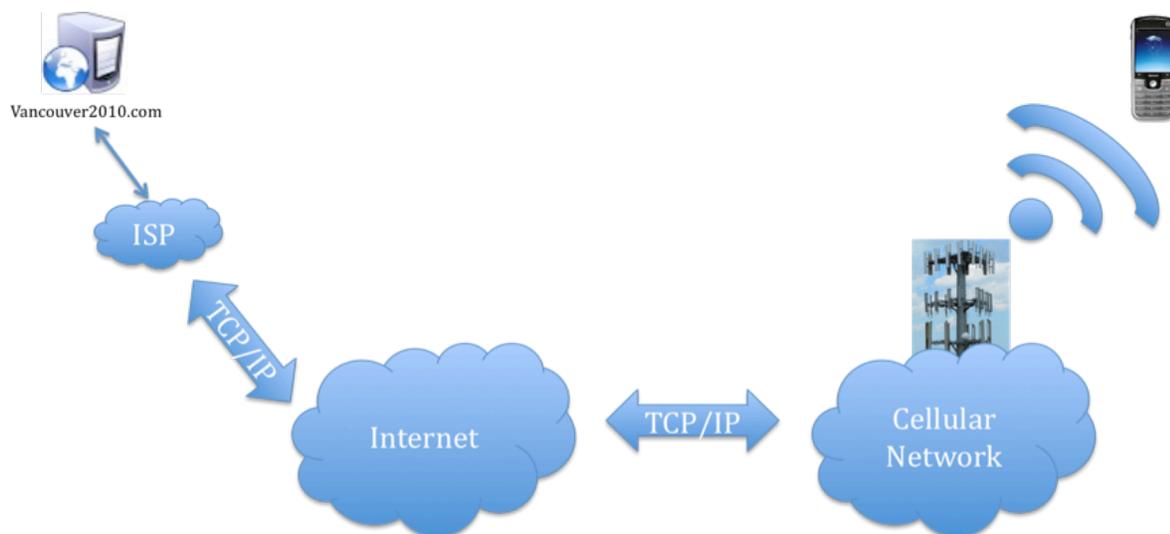
VANOC must be ready to service the growing demand for communication tools. According to the mobile research firm ABIresearch, the total numbers of subscribers for the mobile phone worldwide are pushing over 3.5 billion by 2008. A mobile data strategy is therefore a necessity. This paper will first establish critical success factors through examining use-case scenarios that illustrate usage-related issues that create barriers to accessing the wireless system. Through outlining the possible usage scenarios one should gain a better understanding of

the difficulties and challenges surrounding technology usage by mobile device users, hence enabling a better design of data services and lowering the barrier to adoption. Then the project will detail the market trends and map out the adoption patterns. The next chapters will then examine the different barriers to adoption and highlight the main factors that prohibit the mobile Internet's growth. Lastly, by analyzing the above findings, a set of recommendations will then be presented in the last chapter.

2: USE-CASE SCENARIOS - A DAY IN THE LIFE OF THE USER

Mobile device companies are producing mobile phones that enable users to utilize more features than voice communications. Users may now play games, surf the Internet, send text messages, take photos and video or use a mobile GPS to seek direction. However, with the exception of text messaging these other methods of communications are not yet widely adopted. Furthermore, as an information distribution medium, the mobile phone is still in its infancy. Therefore, little research data is available to support the usage pattern of the average mobile data user. Figure 1 shows a simplified networking diagram illustrating the connection between mobile data user and the Internet. It also highlights the path that data would flow from a website such as Vancouver2010.com to a mobile phone.

Figure 1: Simplified Mobile Internet Networking Diagram



During the 2008 Beijing Games, US-based Olympics host broadcaster NBC is attempting to collect data on how people are supplementing TV viewership². NBC wants to learn how people are using tools such as video streaming, video-on-demand and mobile phones, to access event-related information. In order to understand adoption patterns, the underlying need that drives technology use needs to be understood. One method is to analyze different use-case scenarios and reveal the consumers' "job to be done". This outcome-based analysis illustrates how consumers are using the technology to solve some specific problems. Secondly, by examining the scenarios closely, the potential pitfalls that result from adopting this technology are highlighted

2.1 Segmenting the user pool

The 2010 Winter Olympics will have 80+ countries participating in the Games; therefore multitudes of people worldwide will focus their attention on Vancouver, British Columbia. VANOC will need to anticipate that visitors will speak different languages, use different Cellular technologies, and have different combinations of Cellular preferences. For the purpose of simplifying our analysis, a user could either live in Canada or live abroad. Secondly, the user could be a visitor to Vancouver for the Games or they could be watching from home. Hence, one user can be classified into one of the four categories: National Travellers, National Locals, International Travellers and International Locals.

National Local users are residents of the Lower Mainland and surrounding areas and subscribers to their local Cellular providers' service. National Travellers are people from within Canada, who will travel to Vancouver for the events. International Locals are Citizens of their respective countries and they are accessing the services in their own region. No physical travelling is involved within this category of people. International Travellers are people from

other countries who will be travelling to Vancouver to attend the events. Figure 2 outlines the user scenarios that will be examined in the following sections.

Figure 2: User Segmentation Grid

	National	International
Locals	Vince from Vancouver Bernard from Burnaby Wendy from Whistler	Min from Seoul Nigel from Lancaster Yoko from Yokohama
Travellers	Tony from Toronto Marie from Montreal Stephen from Calgary	Andrew from Perth Arnold from Sacramento Ming from Shanghai

The following sections highlight the use case scenarios for twelve different individuals, three from each quadrant. These characters represent the various nationality profiles and different level of technology adoption. Each scenario is an example of the individual’s home network providers’ technology, available service, and the respective pricing information. Each of these different scenarios takes place in 2010, and assumes that no further changes to the current systems would be made. Table 1 summarises each character’s use of their respective technology as well as highlighting any barriers to adoption.

Table 1: Scenario Summary

Character	Home Network Operator	Cellular Technology	Key User Need	Main Barrier
Vince	Rogers Wireless	GSM / GPRS	Initial adoption	New to mobile data
Bernard	Bell Mobility	1X EVDO Rev. 0	Up to date technology	Legacy Hardware
Wendy	Telus Mobility	1x EVDO Rev 0	Up to date information	Familiar to only one application
Tony	Telus Mobility	1x EVDO Rev 0	Pushed content	Fixation on one application
Marie	Bell Mobility	1X RTT	Email	New to mobile data
Stephen	Rogers Wireless	HSPDA	Initial adoption	New to 3G
Min	KTF	1x EVDO Rev. A	Office connection / Entertainment	Localization
Nigel	O2	EDGE	Spontaneous / impulse information	Localization
Yoko	KDDI	1x EVDO Rev. A	Research	Localization
Andrew	Telstra	HSDPA	Connectivity	Roaming cost
Arnold	AT&T	HSDPA	Location based information	Roaming cost
Ming	China Mobile	n/a	Vancouver City information	Language

2.1.1 National – Local

Vince lives in Yaletown a downtown section of Vancouver, British Columbia. He has been a subscriber with Rogers Wireless for the past 2 years. Vince is currently signed up for a 3-year contract with the company. His Rogers wireless service agreement includes unlimited, local calling during evenings and weekends. Vince has not signed-up for a data agreement with Rogers, as he primarily uses his Cellular phone for voice communications.

Vince received a text message from Rogers Wireless advertising their unlimited On-Device Mobile Browsing Plan. As a new user, he went to the nearest Rogers Wireless store to find out more about the service. Rogers is offering unlimited browsing for extra \$7 a month. Vince signed-up for the service, and asked the store associate to explain mobile browsing. Using his Motorola RAZR V3, he finds mobile browsing is very confusing. He is not used to inputting

characters on a numeric keypad in order to input long Internet addresses. Furthermore, some web pages do not properly appear on his screen. He is unable to go to hotmail.com in order to view his email and uses his desktop computer instead. Later he talks to a friend with the same plan and finds out there is a mobile specific web address that he needs to enter for him to get the mobile version.

Vince likes Rogers' own mobile home page, which contains all the Olympics headline updates that he is interested in browsing. In order to navigate he uses the arrow keys on his keypad and the ok button. Overall, he finds that mobile web-browsing is difficult. He is not on the road for his job and does not have special need to access the Internet with his mobile device. So he decided to cancel his browsing service next month

Bernard lives in Burnaby, British Columbia. He has been a customer of Bell Mobility for the past 6 months. Bernard loves to hangout with his teenage circle of friends. Since he is tech-savvy, he has signed-up with Bell Mobility's Unlimited Mobile Browser service. This service allows him to browse the Internet on his phone without worrying about extra data access charges. However, he frequently uses the text message feature to communicate with his friends.

Bernard heard that Bell and Rogers partnership has won the host broadcasting right for Canada³. As a result, Bell mobility is providing video-on-demand coverage of the 2010 Winter Olympics. However, Bernard soon found out that his phone is incapable of subscribing to the service. He went down to the local Bell mobility store and inquired about an early upgrade. Bernard found out that it would cost him \$200 to upgrade to a sleek, mobile phone capable of receiving videos He decides to send less text messages to his friends in order to pay for the upgrade fee, which will allow him to watch the Olympic coverage on his mobile phone. The mobile TV service will cost Bernard an extra \$10 (before tax) on his monthly phone bill. Now

every time Bernard wants to watch the Olympic coverage, all he has to do is to select Media Player applications from his phone's menu and select Live TV or Video Clips option. Live TV provides Bernard with 30 different channels. Bernard is planning on watching the commentated live broadcast while attending his favourite Games events.

Wendy is a real estate agent whom lives in Whistler, British Columbia. She is a TELUS customer, and her life revolves around her Motorola Q. Aside from frequent phone calls with clients, Wendy extensively uses the email capability of the Motorola Q. Since she has an unlimited data package, Wendy is able to send and receive messages without worrying about the incremental cost of each individual message.

Wendy also subscribes to the Tempo Wireless's MarketLinx service and has been accessing real estate MLS listing information directly onto her Smartphone. She works outside the office showing homes to clients and finds it valuable to have up-to-date information at her fingertips. Wendy is excited about the increased interest in Whistler real estate due to the upcoming Olympics. Wendy is able to access several websites that are dedicated to Olympics news in between client calls using her unlimited data plan

2.1.2 National – Travellers

Tony lives in Toronto, Ontario and is a business subscriber with TELUS Mobility. He uses a Blackberry in order to keep in touch with his business associates. He commutes back and forth between Vancouver and Toronto on a monthly basis and connects with his office through email messages. Tony uses his Blackberry to check his email messages all day and late into the night. Aside from the built-in calendar and scheduling, Tony rarely uses the other functions on the Blackberry. In fact browsing the Internet through his Blackberry does not interest him. As his

plane touches down in Vancouver, Tony turns on his Blackberry to check his email and thinks about the upcoming, 2010 Olympic Games. “If only I could subscribe to a service that updates me with all the Olympics news via email...”

Marie has spent most of her life in Montreal, Quebec and rarely travels away from this region. However, she has recently won a pair of tickets to see an Olympic hockey game in Vancouver. Her boyfriend is an avid team Canada supporter and has convinced her to invite him to come with her. Marie is excited to fly to the West Coast, but she is also nervous about leaving her familiar environment. She has decided to take her cell phone with her so that she will be able to keep in touch with her family and friends in Montreal while visiting Vancouver.

Marie calls the Bell mobility customer service centre in order to inquire about roaming charges. She discovers that any call she receives in Vancouver is considered a long distance call, and a long distance charge will apply to her monthly bill. However, if she calls a local number while she is in Vancouver, that call will be considered local. She also inquired about the data plan, and was told that there are no roaming charges for data because her phone will be operating in a Bell mobility network within Canada. So she decides to add on a mobile browser to help cut down on the extra voice charges. She plans on using her mobile browser to access her Gmail account, which Google claims is optimized for mobile use. Instead of carrying around a laptop computer, she will be accessing her web-based email using her mobile phone.

Before Marie leaves for Vancouver, she discovers that VANOC has published mobile software that will allow her to receive all the up-to-the-minute events updates on her mobile device. She tried to download it onto her mobile phone, but discovered that the application does not work on her model. Marie is discouraged and decides to rely on Bell’s mobile portal for daily Games event updates.

Stephen lives in Calgary, Alberta but works in Ottawa, Ontario. He commutes between the two cities several times a month. When the iPhone 3G was made available, he decided to subscribe to Rogers Wireless. The iPhone costs \$299 with a 3-year contract. For \$100 per month, Stephen receives 600 weekday minutes with up to 1 GB of data downloads, 200 text messages, Visual Voicemail and as a bonus, 3 months of Unlimited Local Calling. However, Stephen also needs call display in order to screen incoming calls. Unfortunately, that function is not included with the plan, so he needs to purchase the additional “iPhone 3G Value Pack”, which cost \$15 extra per month. Included in the Value Pack is an option to access maps with GPS functionality.

Stephen came to Vancouver, British Columbia for the opening ceremony. He decides to search the downtown Vancouver sector for a pizza parlour, prior to entering the stadium. He takes out his iPhone, opens the GPS location application; types in Pizza and immediately his iPhone pinpoints all the pizza restaurants around his current location. Thinking that he should meet up with his friend Arnold, who has also travelled to Vancouver, to discuss their Olympic hockey bet. Stephen sends Arnold a text message inviting Arnold to join him at the pizza restaurant he found for an early dinner.

2.1.3 International – Locals

Min has recently moved to Seoul, South Korea. He signed on with KTF, Korea’s second largest mobile provider. Korea has been on the cutting edge of 3G technologies, and has also successfully commercialized Wireless Broadband (Wi-Bro) technology, (a derivative of Wi-Max) for Wireless Internet access. Min decided to go online with his Ultra Portable PC, to work on his daily email while he is in transit to and from his workplace. With his Wi-Bro connection, Min’s Ultra Portable PC runs Microsoft Windows XP, which allows him to run desktop

applications. Even though his train is moving over 120 km/h, Min is able to connect to the Internet with high-speed access without dropping the signal. After he is done with his email, Min decided to watch some TV and catch up with the 2010 Olympic highlights. So he takes out his mobile phone, selects mobile TV and tunes into a local news station.

Nigel lives in Lancaster, England and while out for a drink at the local pub he watches the 2010 Olympic Winter Games men's curling events. Curious about other event results such as the women's curling events he sends a SMS text message "MY Olympic" to 81010 and receives a reply from the BBC mobile service. The text message includes a link to a BBC mobile website that specifically caters to Olympic curling information. The text message will cost Nigel 15p however, BBC sports provides him with up to date information coverage. Nigel only has a WAP (Wireless Application Protocol) based browser on his mobile which is adequate because most of BBC Sport's content is text-based.

Yoko lives in Yokohama, Japan; she has been a long-term subscriber with KDDI, Japan's number two wireless service provider. While she was on a train this morning, she receives a video message from her cousin. He asked if Yoko was paying attention to the 2010 Winter Olympics, women's figure skating event. His best friend is competing, and as a gesture of support, he suggests that they pay more attention to the games coverage.

Yoko pays for her canned coffee from a vending machine using the "EZ FeliCa" payment system that is built into her cell phone. She then pulls up Asahi cell phone news service while sipping the beverage to search for news on Miki, her cousin's friend. After scrolling through a few pages of an article about alpine skiing and curling events, Yoko clicks on the link to the event schedule, and discovers that the women's figure skating event is scheduled for two days from today.

2.1.4 International – Travellers

Andrew lives in Perth, Western Australia. He is a mobile subscriber with Telstra, Australia's number one telecomm company. Andrew will be staying in Vancouver for the two-week duration of the Games and will receive numerous phone calls and text messages. He plans to carry his phone with him on his trip to the 2010 Winter Olympic Games so that his relatives don't have to dial a Canadian number to contact him, while he is in Vancouver and Whistler, British Columbia. With the Telstra closure of CDMA network in 2006, Australia is now largely standardized on the GSM suite of Cellular communication technologies; Telstra's network operates on 900 / 1800 MHz frequency range. It is the same network technology that Rogers Wireless currently deploys throughout Canada. However, the Rogers' network operates on the North American standard of 800/1900 Mhz. Due to the similarity in deployed technology, Telstra has a roaming agreement with Rogers Wireless. In order for Andrew to utilize the Cellular network while he is in Vancouver, his cell phone must support a frequency of 1900 Mhz, in addition to 1800 Mhz at home.

When he arrives in Vancouver, British Columbia, Andrew will need to select Rogers as his signal provider. Feature use will not change however; the difference will be in the airtime charges behind the scene. Because he is using a Telstra-branded mobile overseas in British Columbia, Telstra will be charging him \$0.015 per kilobyte of data transmitted and received plus a "Flag fall" charge of \$0.50 per session initiated. Assuming that a typical mobile web page contains around 60 kilobyte of data, therefore each webpage will cost Andrew roughly \$1.50 (Australian dollar) each time he accesses one webpage.

Aside from data, Andrew will be paying \$1.44 per minute of voice calls while in Vancouver and each text message that he sends and receives will also cost him \$0.44. If he would like to call home to Australia, Andrew will be paying \$1.82 per minute. All these costs are above and beyond his monthly contract fees.⁴ If he also accesses VANOC's website for event-scheduling and changes, announcements and visitor information, Andrew could easily run up a bill of more than \$600 at the end of his trip. (Australian dollar)

Unfortunately, Andrew's experience with the roaming mobile Internet during his trip to Vancouver is rather negative. He tried accessing some tourism information with his mobile. However, his mobile device's limited web browsing capability was unable to properly accommodate the tourismvancouver.com website. Although, the mobile browser attempted to scale down the site for mobile use, the amount of images on the site caused Andrew to wait a long time before anything useful appears on his phone's screen. In addition, the video segments simply do not work over the WAP browser. Andrew resorted to using the courtesy PC from his hotel and was not able to access information while attending Game events. Andrew felt the mobile phone browser was a costly experiment that did not yield any useful information.

Arnold travels from Sacramento, California to attend the opening ceremony. In planning for his trip he contacted AT&T and the AT&T representative advised him to purchase the international data-roaming package for his iPhone. Heeding this advice, Arnold purchased the \$59.99 international data package. The package covers 50 MB of usage and if Arnold happens to use up all 50 MB, AT&T will charge \$0.005 per kilobyte in additional coverage.

On the morning of the ceremony, Arnold uses his iPhone to check any updates regarding the events before heading down to BC Place stadium. He launches the built-in Safari Web Browser and enters the URL www.vancouver2010.com. The webpage renders well on the

iPhone and looks identical to what would appear on his laptop computer. While browsing the site, he decides to check out the store section. He places an order for the Sumi, Miga and Quatchi mascot dolls and an Olympic Winter Games coin collection for his four nieces and nephews.

After placing the order, Arnold got a text message from his friend Stephen saying that he used his mobile GPS to find a pizza parlour close to the stadium. Stephen texts him the address but Arnold persuades him to look for a sushi place instead. They take pictures of each other with their mobile phone cameras and persuade the waitress to pose with them for a picture. Thinking about his friends back home, Arnold uploads a photo to his Facebook profile and comments that he expects to send more photos as the week unfolds. In regard to their hockey bet, Stephen suggests that the loser should use the winner's national anthem as their ring tone for a whole month. With this suggestion in mind, Arnold wonders if there is an easy way for him to download a national anthem.

Ming lives in Shanghai, China and after experiencing the 2008 Summer Olympics in Beijing first hand; he decided to experience the Winter Olympics two years later in Canada. Since he has poor English skills, Ming decides to go to Vancouver with a friend. His friend has an extended family living in Vancouver who are always eager to welcome overseas relatives. Ming and his friend will be staying at their place for the duration of the Olympic Winter Games. Due to the Skytrain line now extending to Richmond (a neighbouring city), they will also check out the night market at the Lansdowne mall and shop at the Aberdeen mall between attending the speed-skating events at the Richmond Olympic Oval.

Ming would like to rent a Cellular phone while he is in Vancouver. He finds some offers to rent a mobile phone online, it will cost him around a \$100 a month also he will need to pay for a prepaid SIM card in order to use the phone. So he visits several cell phone stores and is offered

him a low quality refurbished phone for \$70. He is shocked to discover the high price of Cellular services in Canada. In order to save money Ming borrows a phone from one of his friend's relatives.

While Ming is enjoying the speed-skating event, his friend mentions that he can find out more information about the athletes with his mobile phone browser. However, due to the language barrier, Ming cannot understand how to use any of the functions. He makes a mental note to try and watch coverage of the Games on the local, Fairchild television channel, in order to gain a richer perspective on the featured athletes.

2.2 Use case implications

Through these use case scenarios, we are able to comprehend the difficulties that some mobile Internet users are facing. Categorically, these issues can be organized into three groups, namely Accessibility, Usability and Pricing.

2.2.1 Use case implications – Accessibility

2.2.1.1 Technology compatibility

The global mobile networks are made up of a number of different and incompatible systems. For example, even though Australia is largely standardized on GSM suite of technologies, their systems are operating in a different spectrum than North American GSM networks. If the subscriber needs to function on both continents, their device must be able to bridge the dissimilarities in different carrier technologies. First of all, a GSM device will not function in a CDMA network, and vice versa. To solve that issue, some devices are capable of supporting different technology suites (GSM, CDMA, etc), allowing them to encode and deliver data using different protocols. Secondly, even if the device is compatible in technology, the

networks might designate different channels to communicate. To solve that issue, some devices are flexible enough to operate on multitude of different frequencies (800Mhz, 900Mhz, 1.8Ghz, 1.9Ghz, 2.1Ghz, etc).

2.2.1.2 Connectivity

Regardless of equipping the user with compatible mobile devices, connectivity is sometimes still a challenge. Signal strength largely depends upon the proximity of a Cellular tower as well as minimizing interference. If the subscriber is located outside a serviceable range, he/she will have a difficult time trying to access the mobile data network. The same would apply to users who are inside of a building with thick concrete walls. One way to solve this issue is to increase the density of Cellular towers within a coverage area, another method involves is the use of technology. For example, the Korean Wi-Bro service is capable of covering 1-5 km radius, while providing service for fast moving devices of up to 120 km/h.

2.2.1.3 Relevant and timely information

It is difficult to justify the use of mobile data services if relevant information is not presented to the user in a timely fashion. If the consumer is already spending time entering text and waiting for the rendering and delivery of web pages, the resulting data should be useful to him/her. Mobile data service design should implement low-tech alternatives that allow users to collect similar information. For example, the system should be as easy to use as a paper phone book and provide better feedback.

2.2.2 Use case implication – Usability

2.2.2.1 Limiting input and output devices

The mobile phone has inherited the numeric keypad of the traditional phone as its default input device. This input method is not ideal for typing out long sentences or obscure Internet addresses. For example, In order for a user to enter the word “mobile”, he/she has to press ‘6’ once, wait until the curser moves to the next space, then press ‘6’ three times, follow by ‘2’ twice, ‘4’ three times, and lastly ‘3’ twice. This input method is cumbersome and prone to making mistakes. To help solve this issue, software such as T9 input system utilize a built-in dictionary to predict the word that the user is trying to spell out. This input system virtually eliminates the need to press the same number repeatedly to get the correct character. However, if the word that the user is trying to spell out is not included within the T9 dictionary, then the user will end up spending more time repeating the entry using the traditional method.

2.2.2.2 Mobile Browser Limitation

Multiple studies published in technology journals are concluding that the current method of browsing and accessing the Internet from a WAP based mobile phone is not adequate⁵. With its limited screen size, and limited input device, a mobile phone cannot provide the same ease of use as the desktop computer. In response to these limitations, Internet browser developer Opera software has developed Opera mini to address the needs in mobile browsing. Opera mini incorporate a server to pre-render web page data so that web pages are able to scale and fit better on the mobile screen. The built in zooming function also allow user to magnify a section of the web page to a readable level. The original WAP specification is designed to function on high

latency and low bandwidth environment. With the introduction of 2G (second generation) and the current 3G networks, the amount of bandwidth available should render WAP obsolete.

2.2.2.3 Language barrier

Language will indeed be an issue that VANOC must consider. Although both official languages of English and French are spoken by many Canadians, many visitors may have difficulties utilising either languages effectively. Even though most of these visitors may have made prior arrangements to help them overcome such issues (such as guides, translators, etc), language use poses a large barrier to the system's adoption.

2.2.3 Use case implications - Pricing of services

Most network carriers charge data access in a per kilobyte basis. This pricing model has a limiting effect on the actual usage of data services. Under this tariff regime, a user will need to consciously keep track of their data consumption and be very careful on their usage pattern or face a larger bill at the end of the month. Unlimited mobile browsing plans are starting to be available for subscribers which charge a fixed, monthly price so the user can enjoy unlimited browsing on their mobile phone.

2.2.3.1 Mobile data plans

Some Network carriers are now including unlimited mobile browsing as an add-on to subscribers' service agreements. For example, local carriers Bell Canada and Rogers Wireless both charge \$7 per month for their subscribers to enjoy unlimited browsing of the Internet on their mobile phone. Yet, other network operators are still placing volume restrictions on their mobile browsing plans. Australian mobile provider, Telstra, is charging their subscriber a three level pricing system to enable Internet browsing on their mobile phones. The pricing structure is

based on volume of utilization, calculated on a per mega byte basis.

2.2.3.2 Mobile TV

Mobile TV is a service that is well received in Asia. All three Canadian carriers are providing this service for their subscribers. 3G networks increase the available bandwidth and enable the delivery of video and other multimedia contents on mobile phones. With a compatible device, a subscriber can pay a fee to enjoy TV content on their mobile phone. In addition to regular television content, video clips such as news broadcasts are also available for individual download. The pricing structure in North America is flat-fee based, while Australia's Telstra charges in per episode or per video basis.

2.2.3.3 Mobile data roaming

Mobile data roaming charges are a concrete barrier to mobile data adoption. Please see chapter 4 for a more detailed discussion on the implications of roaming.

2.3 Critical success elements

Currently, Tourism BC is working with VANOC and other Olympic partners to create unique media opportunities which take advantage of the new medium⁶. VANOC will need to pay close attention to the whole product approach in order to market this initiative. In comparison, the Beijing Summer Olympics in 2008 now enjoys official status as a showcase of mobile technologies. China Mobile is initiating a set of Olympics related wireless services, including mobile TV broadcasting⁷. In order to maximize the potential of adoption, Vancouver2010.com's services will have to adequately address accessibility, usability and pricing issues.

3: WIRELESS MARKET TRENDS

The suite of carrier grade 3G wireless technologies (such as UMTS, HSDPA, etc) is not entirely relevant to the scope of this paper, although cannot be dismissed in its entirety. Firstly, most manufactures have different versions of similar devices that support different standards, which conceal from the average user the complication of connectivity. Secondly, subscribers choose carriers by their coverage, and service price plan, most do not worry about the underlying technology. Thirdly, software applications that run on mobile devices are the main interface between the users and the available bandwidth. Therefore, it is the mobile devices and the increased use of their applications that is driving the need for higher bandwidth.

VANOC is location-bound and must operate within the constraint of the local carriers' technology, all of which have only completed upgrading their network to the 3G standards within the last several years⁸. They have yet to fully amortise their roll-out expenses. It is highly unlikely that they will introduce another big-scale upgrade that is incompatible to the current generation of handsets. Hence, any network upgrades within Canada for the next few years will have little effect on the application that the end users will experience. Since carrier-based technologies are largely invisible to the average user, this paper will only focus on wireless device trends.

3.1 Fast Paced, Dynamic Trends

The wireless device industry is a quick changing, fast paced and highly dynamic. In 2004, the Motorola RAZR⁹, was a new product offering which gain Motorola an iconic product. The Motorola RAZR achieved the top-selling phone status, making history that year in the wireless industry. However, since 2004 Motorola has failed to introduce follow-up triumphs with their successive products, surprising industry observers. News of plummeting sales and profits in 2006, followed by massive layoffs and the selling of non-core assets only two short years after their iconic success, further shocked industry observers. Motorola fell from a position as industry leader for a new product offering and lost market share in the handset market, from 23% down to 13% in 2007¹⁰, leaving them struggling to find a foothold in the mobile phone market.

The wireless device market is extremely fluid and competitive. This means that the popularity of one product will not guarantee any company's market share position. In fact, Motorola's strategy was focused on one product, leading them to a significant loss of market share, despite allocating time and money to research and development. This scenario is a strong marker of how the wireless device market environment may be volatile and to some extent unpredictable in reaction to external forces. Nevertheless, in order for VANOC to prepare for the future it is necessary to follow market predictions and trends. This section analyzes the operating environment of the wireless device industry in anticipation of the 2010 Winter Olympics events.

3.2 Wireless Devices Forecasts

The Boston-based Yankee Group published a report on the global wireless industry on November 7 2005 and they made a 5 year projection regarding the future of the wireless industry¹¹. Some forecast highlights in the report from the Yankee Group include:

- Worldwide wireless operator service revenue will surpass US\$690 million by 2009.
- Data services will account for just over 21% of the total 2009 revenue.
- Total registered Cellular lines will reach 2.8 billion in 2009, representing a unique user base of nearly 2.4 billion individuals.
- Text messaging revenue will top \$36 billion in 2009.
- Ringtone revenue to carriers and content providers will reach almost US\$28 billion

Datamonitor also published a report on the global mobile phone industry. In that report, they predicted that by 2011, the global mobile phones market would have a value of \$211.9 billion, an increase of 103.1% since 2006¹². The compounded annual growth rate of this market is predicted to be approximately 15%. At the same time, handset shipments are forecast to reach the 1.8 billion unit mark, with a predicted compounded annual growth rate of 18%.

In 2007, five companies dominated the global market. Nokia is the leader by market share, followed by Samsung, Motorola, Sony Ericsson and LG Electronics (see Table 2). Other smaller manufacturers made up the rest of the market but their positioning in the market is uncertain and dependant on market forces. For example, Siemens' mobile division filed for bankruptcy in 2006 and exited the market completely. Subsequent industry rumours of Motorola seeking a buyer for their unprofitable mobile device division in 2008¹³ indicate that the mobile device industry is approaching further consolidation. Fewer numbers of manufacturers will hold the majority of market shares in the near future, resulting in decreased competition.

Table 2: 2007 Mobile Devices Worldwide Market Shares

2007 Mobile Devices Worldwide Market Shares		
2007 Rank	Company Name	2007 Market Share
1	Nokia	38.0%
2	Samsung	14.0%
3	Motorola	13.8%
4	Sony Ericsson	9.0%
5	LG Electronics	7.0%
	Others	18.2%
	Total	100%

Source: iSuppli¹⁴

3.3 Wireless Devices Adoption Trend

The market for mobile devices is growing rapidly and reaching into every aspect of consumer's daily lives. In the consumer segment, the mobile phone has become a fashion item, comparable to a pair of designer jeans. Even fashion shows now feature Cellular accessories, as Italian designers showcase their new creations on the runways of New York¹⁵. Consumers all across the globe are embracing the mobility in communication enabled by the Cellular phone. The emerging markets of Africa, India and China eager to utilize their spending power on new lifestyle trends and devices. This is indicated by the current wave of financial reports from mobile phone makers as well as multiple market research firms¹⁶.

3.3.1 Faster, Smaller, Cheaper

The life cycle of device adoption is becoming increasingly short-lived. The main factor in this is the fact that wireless devices are becoming more commoditized. The profit margin per device is waning and consequently, the need for specialized engineering and customization is in

decline. Low cost and reduced time-to-market is becoming a more important business driver than ever before.

Commoditization increases the overall shipment of devices to users and lowers the prices and profit margins of handsets. This effect was evident through observation of Nokia, the industry leader. By analysing their annual financials for the past 6 years (See table 3), a pattern of increased revenue and decreased profit margin emerges. This trend is predicted to affect Asian countries in which the shipment of low-cost mobile phones is estimated to grow at a rate that outpaces both Europe and the US for the next 5 – 10 years¹⁷.

Table 3: Nokia Corporation - Revenue vs Profit Margin

Nokia Corporation- Revenues vs Profit Margin (in millions)				
	2003	2004	2005	2006
Revenue	37,053.8	36,850.6	42,898.0	51,592.8
Profit Margin	12.0%	10.9%	10.6%	10.5%

Commoditization also shortens the overall product life cycle. Manufacturers will now be required to produce a new revision of their mobile phones in a compressed time frame of a few quarters. A typical upgrade cycle for a mobile phone is now approximately 18 months. In contrast to previous development timeframes that used to be measured in years, the shortened life cycle is creating pressure on research and development sectors. As a result, the designers and manufacturers are researching solutions that will ameliorate their development time crunch problems. Developing phones based on advanced OS is expensive and time consuming. In addition to development pressures, there are also mass customization pressures. Network

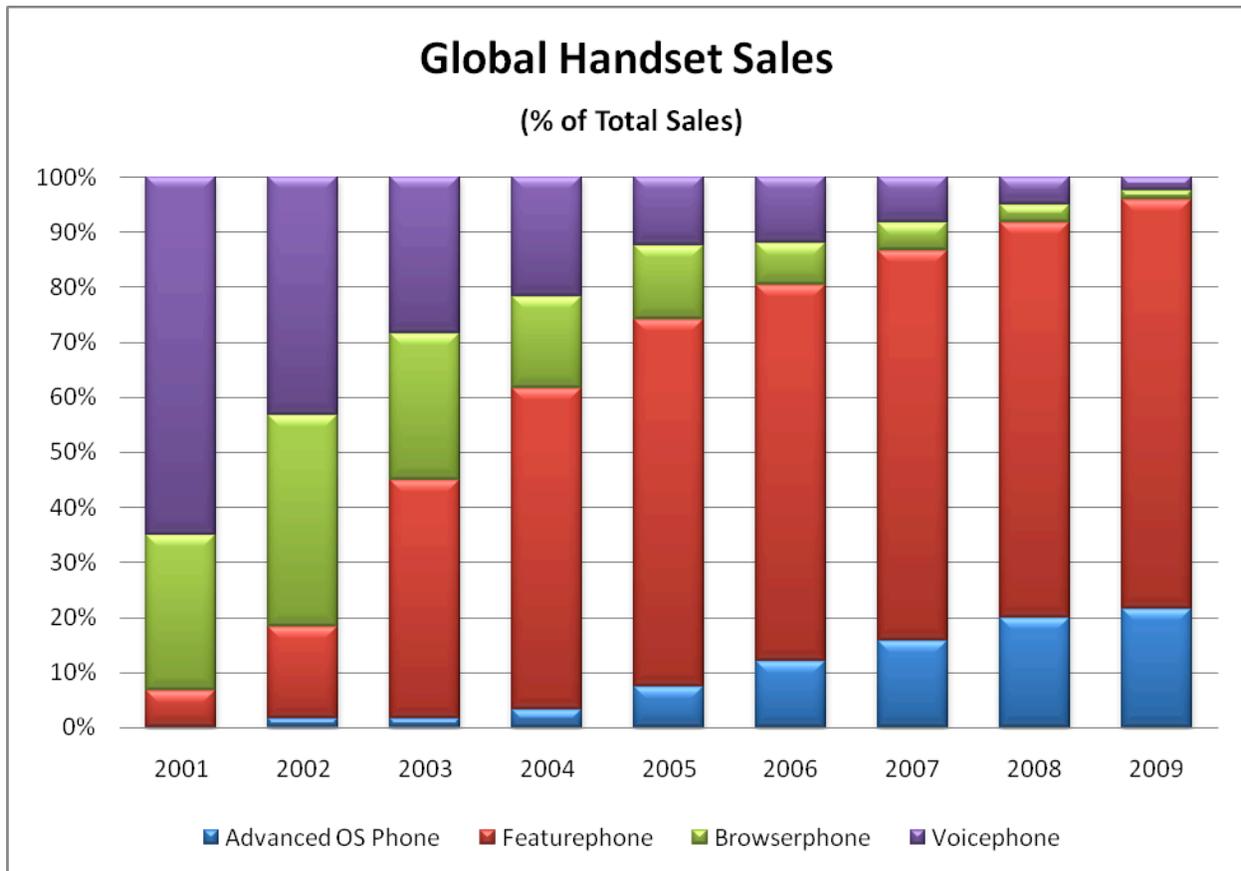
operators wish to impose logos and corporate identity requirements as a means for brand recognition, which conflicts with the end users modifying the appearance of their phones to express individual personality markers.

3.3.2 The Growth of Feature phones and Smartphones

Another trend under development in the mobile device industry is the emergence of the feature phone. The Yankee Group defined the feature phone as less capable and flexible than the Smartphone, yet embedded with different multi-media functionalities¹⁸. In addition to voice and data communication, some feature phones now include functionalities such as: picture and video taking, music playing and Global Positioning System (GPS) tracking. ABI Research went a step further in defining the feature phone as a device with functionality closed and controlled by an operator or the device manufacturer¹⁹.

The feature phones do not have user capability for user's installation of third-party software in comparison to the Smartphone's development of a third-party applications ecosystem. The exceptions to this industry standard are Java based games as well as carrier-sanctioned utilities, which are fee-based downloads from the network operator. Therefore, it would be difficult for an average user of the feature phone to add any additional functionality to the device if it was not included with the original phone package.

Figure 3: Global Handset Sales (% of Total Sales) Source: Yankee Group 2006, Global Handset Forecast²⁰

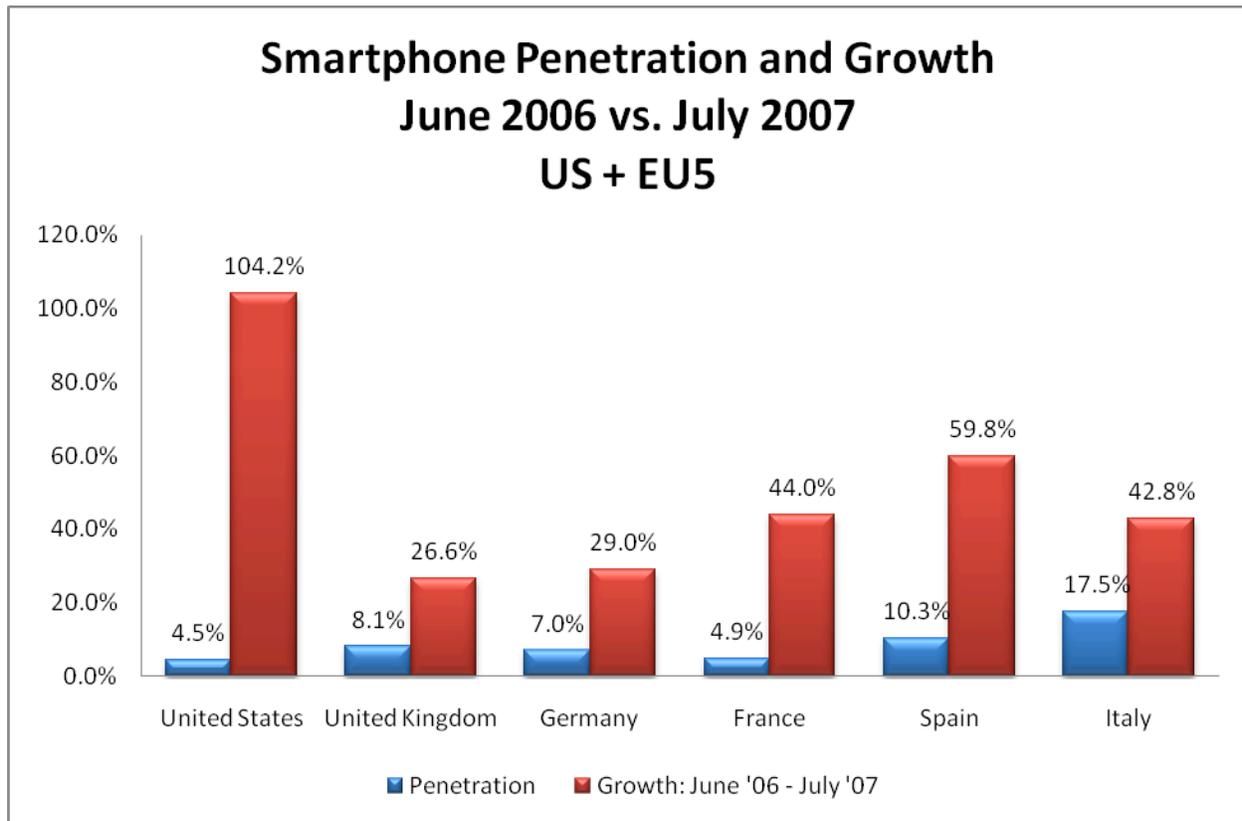


With its overall market penetration of less than 10% in 2001, the feature phone experienced rapid growth and has outpaced the growth of Smartphones and quickly dominated the market. In 2007, this class of mobile phones comprised of more than 70% of the overall global sales, in contrast to the Smartphone, which only achieved around 15% market penetration. The rapid growth rate of the feature phone validates the belief of many industry analysts, that the market demand for a mobile computing platform is not as high as previously projected statistics predicted²¹. Due to this trend, it is predicted that though the Smartphone will enjoy higher market penetration in the near future, the feature phone will continue to dominate the overall mobile device sales for years to come.

The popularity of the feature phone does not necessarily stifle the growth of the Smartphone. Instead, the Smartphone is highly attractive to a niche market of technically adept users that integrate their professional and personal daily activities with the Smartphone's higher level of functionality. There is a lack of universally accepted product classes for a Smartphone placement. However, there are a number of characteristics that this class of mobile devices all share. First of all, the device will equip an underlying operating system that is specialized in the mobile hardware platform. Secondly, the Smartphone is normally built around a more powerful processor with more memory and storage. Thirdly, the Smartphone normally comes equipped with a higher resolution screen that can display more information than feature phone screens.

Mark Donovan, CMO and senior Analyst of M:Metrics Inc., a Seattle-based market research firm specialized in the mobile market, gave a presentation in the Symbian Smartphone Show on October 15, 2007²². In the presentation, he outlined current trends and the established market status for the Smartphone. He also presented demographic data which concluded that the Smartphone is a strong, driving force for the mobile Internet content market. See Appendix D for information regarding Smartphone platforms developments.

Figure 4: Smartphone Penetration and Growth: June '06 vs July '07. Source: M:Metrics Smartphone Owners Presentation October 15th 2007



As expressed in the above figure, in 2007, the United States experienced a rapid growth rate of Smartphone adoption that exceeded that of the European Union. A 104.2% increase compared to the previous year's figures, indicates that the US consumers whom once lagged behind the rest of the world in terms of mobile device adoption, are now enthusiastic adopters despite the low rate of market penetration. The US market penetration for that year was 4.5%, closing the adoption gap with France's 4.9% market penetration. Despite similar market penetration rates, France's growth of 44.0% is less than half of the U.S.'s 104.2%. Other countries on the graph registered higher market penetration percentages, with significantly lower growth than the U.S.

According to market research company, the NPD Group, the U.S. Smartphone market's significant growth spurt is due to several factors²³. Firstly, the average prices have declined by 10%. Secondly, diverse Smartphone products are available, as Motorola, Research In Motion, and Nokia have released new versions of their Smartphones to the market. Thirdly, demand for mobile email usage has doubled since March 2006, enticing consumers to adopt Smartphones as their mobile platform. Furthermore, Smartphones are generally more robust and capable of handling higher numbers of music and video downloads.

Table 4: Top selling Smartphones in the US (Aug - Oct, 2006) Sources: NPD Group

Top selling Smartphones in the US (August – October, 2006)	
1.	Motorola Q
2.	Palm Treo 650
3.	Verizon Wireless XV6700
4.	Palm Treo 700p
5.	Blackberry 8700

3.4 Network Operators

Network Operators provide network access, and have the responsibility to maintain Cellular networks and to provide service. Network operators are the segment within the supply chain that is closest to the consumers. Arguably they are the most powerful force in the supply chain relationship. Traditional Network operators own and operate their corresponding network infrastructure and they usually assert straight control on the selection of devices, as well as applications that run on their networks. Because of the level of control, the network operators traditionally enjoy a greater sphere of influence as well as bargaining power on contract

negotiations. This is most evident with large mobile operators in Canada, particularly Bell and TELUS.

3.4.1 Wireless spectrum auction and market dynamics

Network operators operate in a highly regulated environment. The federal government controls the wireless spectrum required to deliver their services via the Canadian Radio-television and Telecommunication Commission (CRTC). The CRTC has a strategic role to play in the overall operation of the wireless industry by issuing licenses for dedicated airwaves. Thus they actively affect the industry dynamics. For example, towards the end of 2007, the CRTC had announced that a block of wireless-telephone space was being set aside for a possible fourth national carrier to enter the market and increase competition for Cellular rates²⁴.

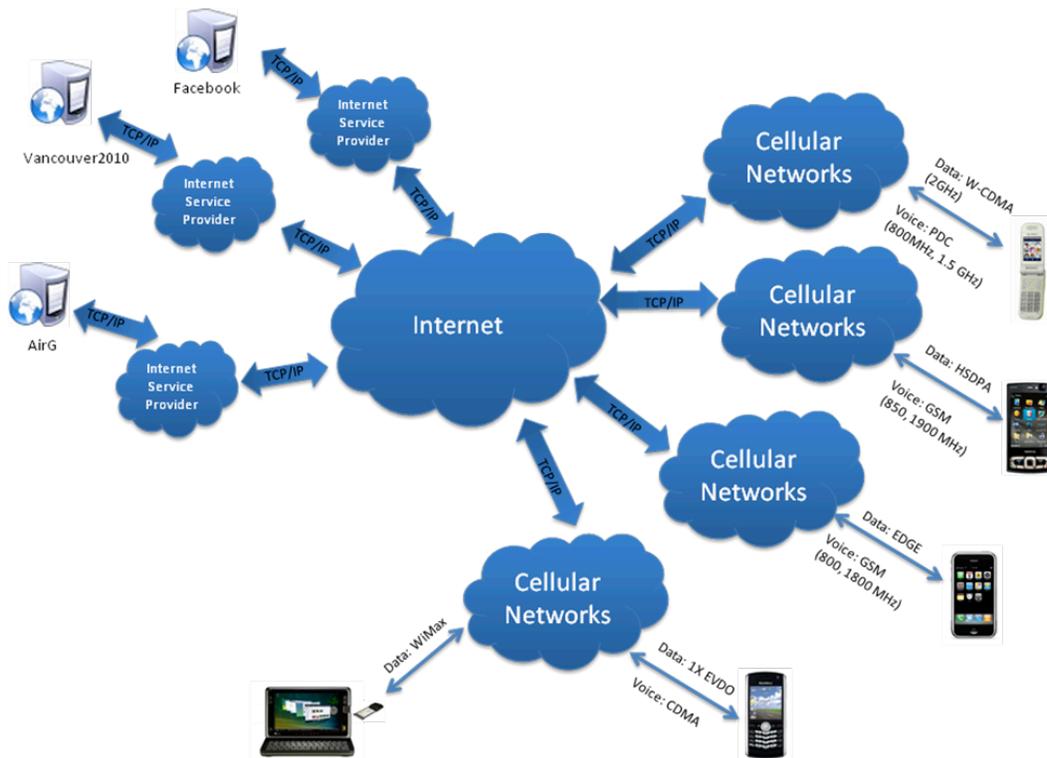
The upcoming spectrum auction had an enormous impact on telecommunications as it determined the industry's future competitive landscape²⁵. The response has been polarised into two opposing views of the market. The incumbent companies have been lobbying extensively for CRTC to allow open auction with no restrictions. They argue that the current wireless market structure is competitive as it is. The opponents, including major cable companies and smaller telecom companies, hope to build a new national wireless network to increase the competitive landscape. The establishment of this new network will entice even more competition and benefit consumers.

4: TECHNOLOGY ADOPTION - ISSUES AND IMPLICATIONS

4.1 Issues facing mobile communications – The business model

A large number of Cellular phone providers were once telephone companies that have chosen to provide wireless communication products alongside their wired counterparts. Companies such as TELUS and Bell mobility in Canada, Telstra in Australia and Orange of France Télécom in France, still control a majority of land-line business. Most of these companies are evolving from the once static government-sanctioned, monopolistic corporate culture of the past. Hence, the business model for mobile Internet services is quite different from the business model adopted by the fixed-line Internet providers.

Figure 5: Mobile Internet Data Networking



For example, most North American residential broadband Internet service providers adopted a monthly connection fee only model where the subscriber of the service is charged a fixed fee each month. Services are differentiated by the level of throughput: the higher the bandwidth and the faster the connection, the more expensive the service become. Under this model, the monthly cost is constant regardless of usage. The Internet service provider will not charge by features regardless if the user decided to use their service for email, video streaming or web browsing. Furthermore, most do not question which manufacturer's PCs are being used on their network. Figure 5 outlines the relationships between different Internet accessing devices. The fixed line subscribers on the left are represented by three content providers: Facebook (social networking website), Vancouver2010.com and AirG (a mobile social networking website). All these services rely on the connectivity provided by their respective Internet service providers, and in turn, the service providers connect to each other via the Internet at large. Mobile phone users' access bandwidth to the Internet is limited by the carrier's deployment of transmission and receiving technology. Along with bandwidth limitation, the Cellular network operators maintain control by restricting the functionalities available on their devices. For example, some devices are enabled to receive streaming video, while others are unable to do so. Compared with the PC, Mobile phones face more restrictions and control. Limited screen size is also a factor when browsing the Internet on the mobile phone. While websites are designed to fit on the PC monitor, they are unable to display properly on a mobile phone's smaller screen. Consequently, some web servers will provide a stripped-down version of the original site to compensate. The end result is often unusable and at best disorganized.

4.2 Issues facing mobile communications – Data Services Adoption

There are several different theoretical models to evaluate the adoption of new technologies. In Everett M. Rogers' 1962 book, *Diffusion of Innovations*, Rogers theorized that innovations would spread through a given society following a normal distribution 'bell' curve. He theorized that only a handful of early adopters would select and adopt the technology first, and then followed by the early majority adaptors, until a technology or innovation is common among the population at large²⁶. By March, 2008, there are many indications that the mobile data adoption is still at an early stage and facing lots of issues. The Yankee Group has recently voiced their concern regarding the current state of proliferation in the mobile Internet market. They also estimated that the untapped market for mobile Internet services should be worth US \$66 billion, versus its actual value of \$9.5 billion. The current state of affairs is not living up to the expectations.

InfoGin, a mobile platform software developer has commissioned a survey to research the mobile Internet's lack of popularity²⁷. Out of the 1,000 UK students polled in the survey, 2/3 of them reported that they had given up on using the mobile web. Eran Wyler, CEO states:

Today mobile users are faced with a very poor experience when they surf the Internet on their mobiles. We commissioned this trial to demonstrate how crucial it is for operators to provide capabilities for end users to surf the real Internet on their mobiles. Students are typically early adopters of services such as mobile Internet, and the trial clearly demonstrates that operators should address such issues as downtime, web page layout and rich web functionality on mobiles²⁸.

Poor overall user experience is the major factor. Bandwidth does not seem to be the issue, because even users with 3G access to the mobile Internet were discouraged by the mobile web

access. They are citing horribly inefficient and inaccurately rendered web pages as the reason for abandoning web browser searches.

4.3 Issues facing mobile communications - Roaming

Each country has their corresponding carriers that service their respective population. If no international standards are established, each carrier will choose to implement their own technology regardless of any other countries' standards. For example, Japanese 2G transmitting standard (Personal Digital Cellular) PDC is incompatible to any other carrier's standard in the world. The original goal of 3G is to unify the world's mobile devices through one single, international radio transmission standard. Unfortunately, the process of unifying the numerous international standards has proved to be impossible to date. After difficult negotiation, a 3G "standard" called IMT-2000 emerged as a rather unsatisfactory compromise. IMT-2000, in fact, represents several incompatible standards lumped together under one banner. The hope of IMT-2000 was that phones using these different standards would be able to move seamlessly among all networks, thus providing global roaming.

Additionally, roaming is more than a technology compatibility issue. It is also a business decision that is made by two carriers. For a foreign user to utilize high bandwidth data services such as video streaming is a highly expensive endeavour. Roaming charges are typically per minute based, and have few options for the user to decrease cost. There is a report that a user of the iPhone with AT&T wireless, who travelled to Europe, received a \$5,000 phone bill that month²⁹. Another user Dave Stolte, experienced the same situation³⁰, however AT&T eventually waived Dave's charges. These incidences raise an issue about the usage of mobile data services, particularly on international roaming. If the network operators cannot come to an agreement on significantly lowering the rate of roaming data plan, they should recognize the punitive effect of

overcharges on the consumer and strategize alternatives. The average subscriber will seek out an alternative to solve that problem. For example, Andrew from Australia was accessing the Internet with a courtesy PC inside their hotel's business centre to bypass roaming charges altogether. Another way to bypass roaming is to subscribe to the local mobile service. Ming from China was trying to purchase a local SIM card and a pay-as-you-go plan to cut down on the cost of overall airtime. Given the choice, many consumers will find ways to bypass roaming charges.

Due to the high cost of roaming, the European Union enacted a regulation on roaming charges, which has been in effect since June 30, 2007. This regulation forced network operators to lower their roaming fees across the board in 27-member countries. The law set a declining price cap for both incoming and outgoing calls³¹. The purpose of the legislation is to entice competition. The regulation will expire in three years (mid 2010) if the Commission is reassured that network operators will continue to keep prices at the set level, or be driven lower by market forces. However, this law does not affect North American carriers.

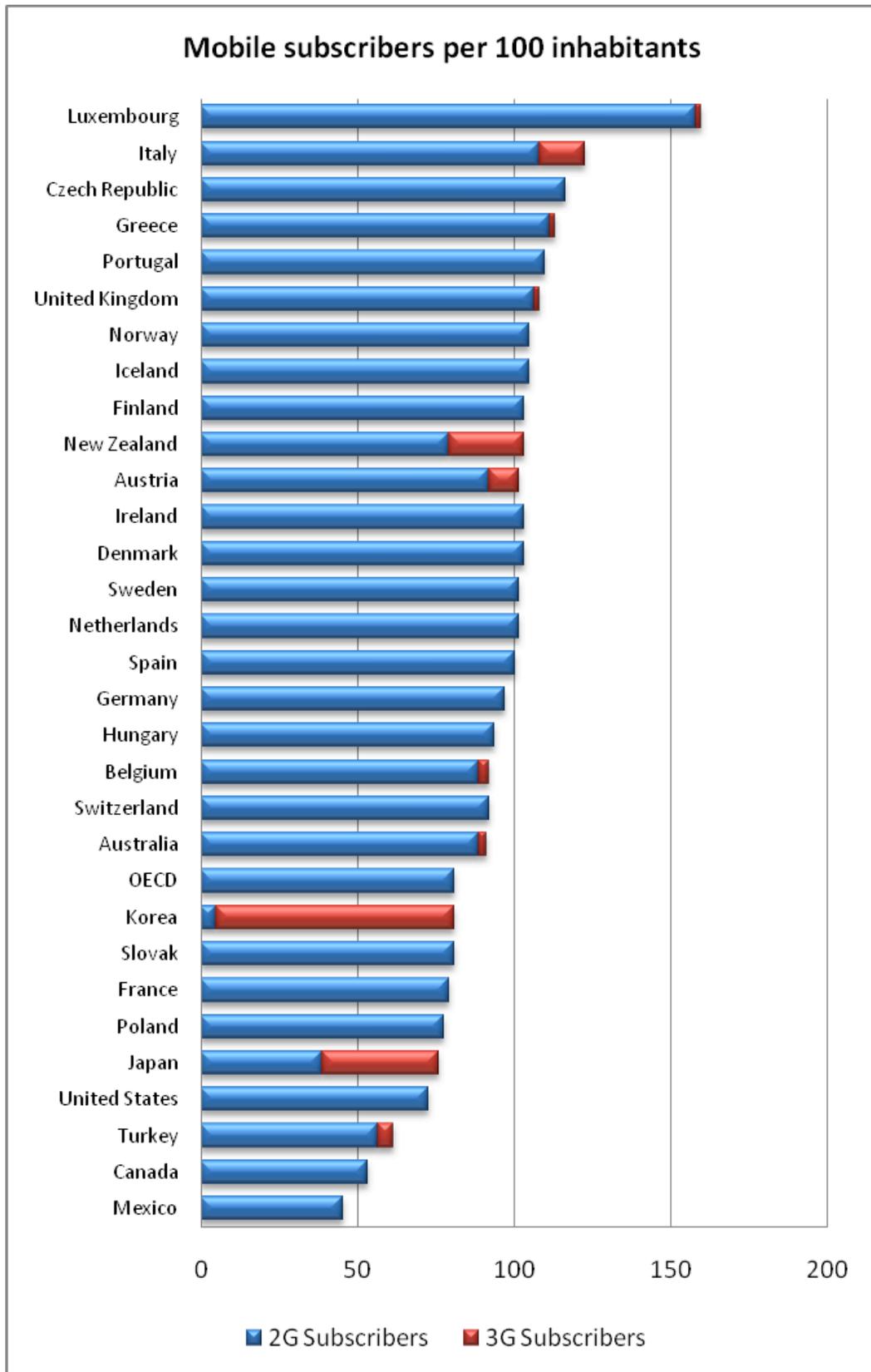
4.4 Global mobile Internet adoption pattern

On the global scale, some countries are adopting the mobile Internet faster than others. The Organisation for Economic Co-operation and Development (OECD) routinely conducts studies which provide statistics and reports for their member countries. One such study is on the proliferation of the broadband Internet access within the member countries that found that mobile Internet access is clearly increasing³². In 2003, only 5% of mobile phone owners in France were accessing the Internet using their mobile phones. By mid-2006, the population of mobile Internet user has grown to 8%. In the United Kingdom, the share of adults accessing the Internet via mobile phones remained constant between January 2001 and April 2003, but increased to 17% by October 2005. The use of mobile Internet access varies greatly country by

country. For example, In Japan and South Korea, people are much more inclined to use their mobile to connect to the Internet. Between March and September 2002, over 66% of Korean mobile users over 12 had accessed the Internet using a wireless connection more than once. The previous year, only 43% of the Korean mobile subscribers had done so. The Korean study also indicates that access to the Internet was dominated by the feature phone (99.6%), compared to other devices such as Notebooks, PDAs, or Smartphones.

Another popular indicator of mobile phone penetration is the statistic, *subscribers per 100 inhabitants*. This statistic models the penetration rate by measuring the average number of mobile phone subscribers per 100 individuals within a given country. Figure 6 illustrates the ratio of subscribers per 100 inhabitants within OECD countries in 2005. According to these statistics published in 2006, Canada lags behind in mobile phone penetration. Canada ranked the second lowest; Mexico has the worst mobile phone penetration ranking among all OECD countries.

Figure 6: Mobile subscribers per 100 inhabitants in OECD countries 2005³³



4.5 Japan and South Korea

The Japanese and South Korean markets are a great starting point in forecasting the future mobile Internet adoption. These countries have the most technologically adapted population, and the high-speed mobile Internet has been a commonplace feature for years. According to the report “Korean Mobile Market Forecast and Carrier Strategy 2006-2010”, South Korea is expected to surpass 23 million 3G network subscribers by 2010³⁴. The cited major driver of Korean 3G adoption include introduction of new handsets, the vast variety in mobile contents, aggressive marketing and attractive price plans. South Korea is also the home for multinational electronics and mobile phones giants Samsung and LG Electronics.

A Business Week magazine article reported that Google is learning a great deal about mobile Internet usage habits from its operations in Japan³⁵. Japan’s mobile Internet penetration is the highest in the world, with almost all of the country's 100 million cell phone users using their handset to access the Internet. Google found that the Japanese mobile Internet infrastructure is also ahead of the rest of the world. Most Japanese mobile users enjoy bandwidth that is comparable to what most European and North Americans would receive at their PC. The article also indicates that Japanese mobile phone users access the Internet via their mobile devices as much at home as they do when they are in other venues. Figure 18 and 19 illustrates OECD’s findings on Japanese modes of Internet access. Aside from regular use of email and messaging, Japanese users are more likely to use their mobile device to search for a nearby destination such as a restaurant. Finally, application and mobile website developers can take note that reducing the number of clicks to perform a function is essential to be successful. The Japanese case study shows that location based services is a highly sought after feature on the mobile Internet. Also,

efficiency and delivering appropriate content at an effective basis constitute a major success factor.

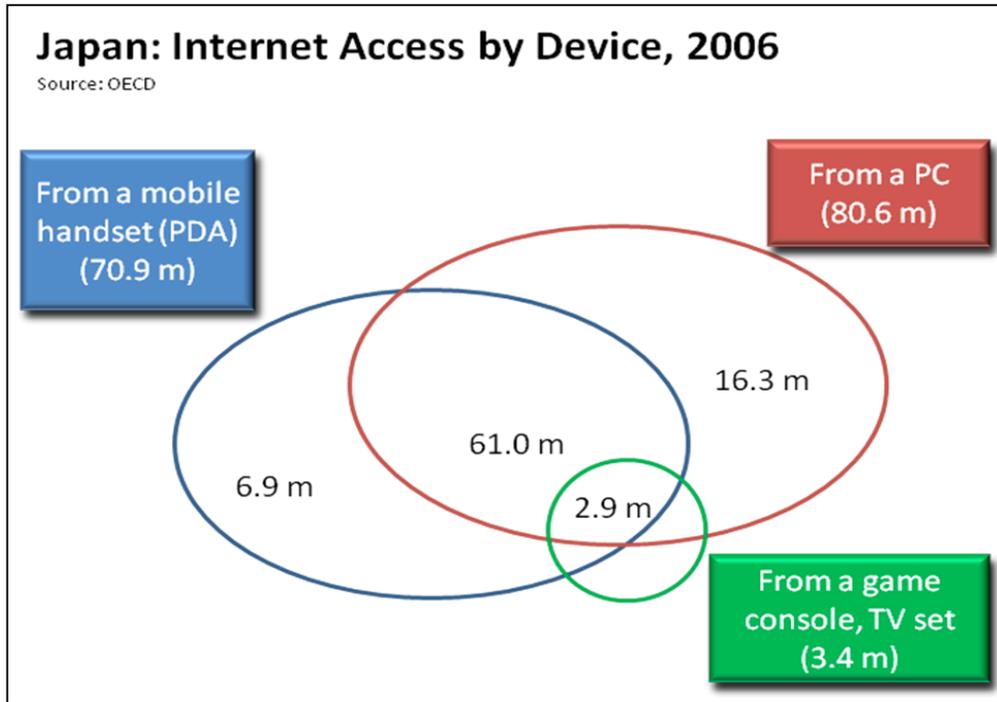


Figure 7: Japan: Internet access by device, 2006. Source: OECD³⁶

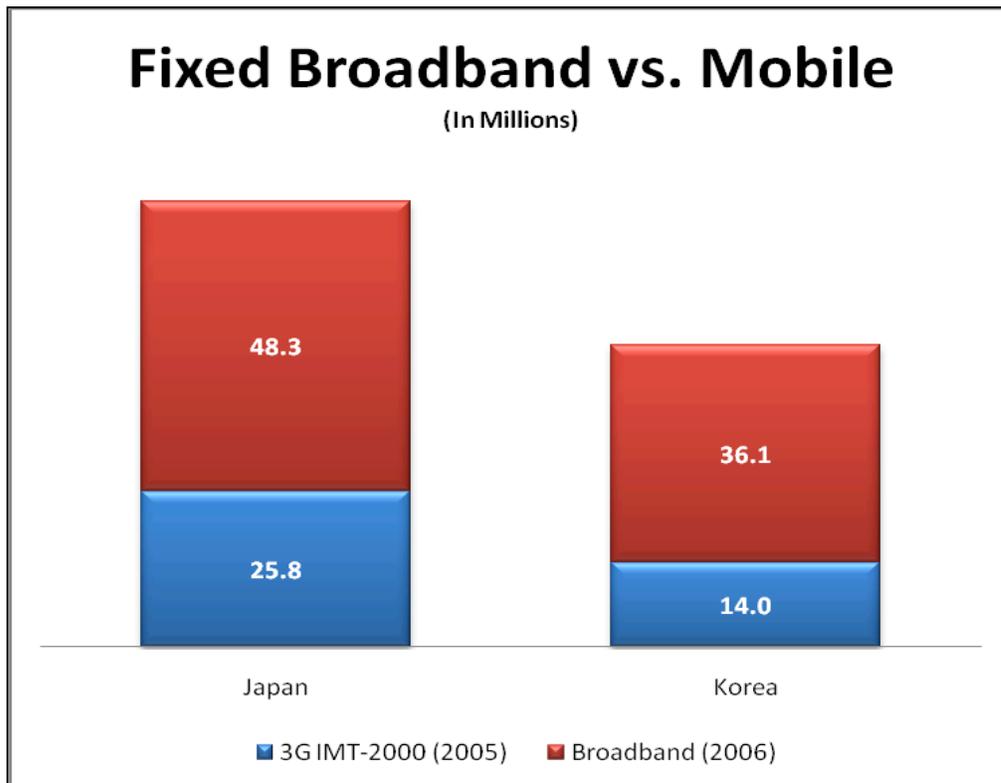


Figure 8: Japan and Korea, broadband vs Mobile. Source: OECD

4.6 Adoption Barriers – Accessibilities, Usability and Pricing

Rhonda Wickham, editor in chief for the Wireless Week, identified several areas in which the current industry is unsuccessful in propagating the mobile Internet experience. She stressed that the blame for unfavourable user experience cannot be directed to the set of technology infrastructure. First of all, the modern 3G networks such as EVDO and HSPDA are currently delivering enough bandwidth to rival or surpass fixed line DSL speeds. Secondly, the devices that are coming out of the assembly lines are more than capable of handling the unique needs of the wire's users. Thirdly, the amount of content that is available in the mobile Internet exceeds consumer need. These points establish that there are several other barriers to adoption of mobile Internet services³⁷. Wickham concluded that the main issues are found in the failure of delivering soft features, namely accessibility, usability, and pricing.

4.6.1 Barrier to Adoption – Accessibility

Rhonda Wickham relied on a scenario that helps to highlight how contextual, relevant data increases the value of mobile Internet. If a user would like to find the location of a restaurant, an ATM or a movie theatre, h/she would not want information about another restaurant that is 1000 miles away. This might be an annoyance while accessing the Internet on the home- desktop Internet which has sort and filter tools and a larger viewer screen. For the mobile Internet user, the smaller viewing screen prolongs the search for information. If it takes longer to look the information up from the mobile Internet than a traditional query such as using a phonebook, asking a passerby for directions or calling for directory assistance, then mobile Internet access will only become a last resort for most users.

Aside from relevant context and information, what makes the mobile web browsing experience so frustrating is the website rendering and overall navigation. This mismatch of presentation space between PC and phone further denies the user access to the information that they seek. Simple functions such as looking up a flight schedule on an airline's website could become an exercise of futility, especially if one could not remember the URL address for the airline's mobile website³⁸. Some search engines would try to re-render the webpage into "mobile browser" friendly format if it detected that you were using a mobile browser, however, the technology does not necessarily translate across every website on the Internet.

4.6.2 Barrier to Adoption – Usability

As manufacturers try to negate the effects of commoditisation of the mobile phone, the constant stream of features becomes a necessity to attract new customers and give old customers reasons to upgrade. However, the CMO Council's Forum to Advance the Mobile Experience (FAME)³⁹ claimed that, "Function fatigue" is afflicting mobile technology users worldwide. It tops several consumer complaint lists and negatively impacting the embrace of new wireless devices and services. The CMO Council's Global Mobile Mindset Audit's result released in February, 2007 at the 3GSM World Congress in Barcelona, Spain, was a milestone study of some 15,000 consumers in 37 countries. The study found that "too many functions I did not use" as the number one device problem in all regions of the world⁹⁷.

Brendon McLean wrote an editorial in The Register outlining the issues regarding the current market landscape of the mobile phone industry⁴⁰. The article paints a bleak picture of the current mobile device market. In particular, the trend to jam-pack features into the phones regardless of their usability and the lack of real product innovation, signals that the industry is lacking direction. He labelled the current trend, "a frantic race to the bottom", involving

absolutely every company in the industry. The author blames the mobile phone companies' neglect of both form and function on the effect of brand psychology and brand loyalty, instead of relying on hype marketing. He also point to a failure to understand and meet the market needs.

According to M:Metrics, a mobile industry research firm, Nokia's phones are the top selling devices in the world, and the Nokia N series are outselling all other Smartphones in Europe⁴¹, yet, many of these new products are complicated to use. Apple brought the issue of usability in the forefront of the media when Steve Jobs mentioned that the killer app on the iPhone was making a call when he unveiled the device to the public⁴². Many of the calling features on a mobile phone are not very intuitive. Advanced features such as three- way-calling may frustrate the user with unintentional hang-ups or hanging-up on the wrong person. Critics might argue that the claim was a part of a hype marketing package that Apple was utilizing to differentiate and promote the iPhone⁴³. However, others argue that the current, usability issues are the direct, side effect of trying to do too much in one device⁴⁴.

Dave Murray, director of the CMO Council's FAME group states, "Clearly, wireless operators, device manufacturers and sales channels need to be much closely aligned and integrated in creating a simpler, more satisfying and predictable user experience,"⁹⁷ If the mobile device industry wants to promote the proliferation of the mobile Internet, the platform that these Internet access are based on must become more usable. There should be more work on usability in order to incorporate these issues into the overall designs.

4.6.3 Barrier to Adoption – Pricing

The Organisation for Economic Co-operation and Development (OECD) standing is a clear indication that Canada lags behind other countries in overall mobile phone subscribers.

According to a CBC article, the critics of Canada's largest Cellular companies express their concern that they are harming the country by raising costs for businesses, limiting productivity and stifling innovation⁴⁵. The article also pointed out that the Canadian Wireless Telecommunications Association's study found that a typical American uses about 800 voice minutes a month, double that of a typical Canadian. In 2006, the government-mandated Telecommunications Policy Review Panel findings indicated this is because of "a persistent and growing gap between the rates between the two countries." In Canada, average users pay 33% more than their U.S. counterparts, while heavy users of cell phones (1,200 minutes a month) pay 56% more. The average monthly bill in 2006 in Canada was \$56 compared to a \$38.28 average monthly bill for Vodafone subscribers across 17 European countries⁴⁶.

In the article "*The Last Barrier?*" from the *NMA mobile*⁴⁷, five different representatives from network operators and content providers segments were interviewed. The findings suggest that mobile data access's cost is too variable for a typical consumer to consider it a viable choice. Some interviewees suggested that people have no idea how much it costs to download content over and above the regular monthly fees. There is still a high level of ignorance among consumers regarding their mobile package, specifically what services they are actually paying for and how much they are paying for them.

This pricing barrier can be reduced significantly by simply adopting a flat rate pricing model. Al Russell, Vodafone's head of mobile Internet and content services explained that a flat-fee browsing rate is very important for two simple reasons. First, it removes the fear factor for consumers that they will receive a large bill at the end of the month. Secondly, simplifying the pricing scheme will entice those who would want to try out the service without the problem of

explaining what a megabyte is. These two factors together will transform the current service positioning from “being nice to have” to “being essential”¹⁰⁰.

Miles Ross, Head of mobile in UK’s IPC Group said, “Mobile Internet take-up has been limited by people’s mental view that it costs a lot. So making the cost reasonable is critical as part of the take-up of these services.”¹⁰⁰ Findings from these interviews suggest, the solution to the price factor of barrier of adoption is for the operator to simplify the charge to flat rate. That will improve consumer confidence, entice new trials and remove the uncertainty regarding the cost of the service.

5: DISCUSSIONS AND RECOMMENDATIONS

5.1 Discussions of Findings

With the exception of Japan and South Korea, World wide mobile data is still in an early stage of adoption. In North America no one has solid data on how mobile users are utilizing data services, aside from text messaging. Although SMS text messaging is the most prevalent form of data services in the world, many still view the mobile phone as a voice communication device. As mentioned in previous chapter, media giant NBC will be experimenting with mobile phone content distribution, treating the coming 2008 Summer Olympics Games in Beijing as a testing ground.

The research in chapter 4 also indicates that with the same exceptions of Japan and South Korea, the majority of cell phone users around the world have yet to fully utilize the potential of 3G high speed data services. As different generations of mobile standards are progressing, the bandwidth available to mobile devices are increasing. Even though today's 3G networks provide enough bandwidth to stream videos and other multimedia data across devices, the experience of accessing the Internet on a mobile phone has shortcomings.

The mobile phone is inherently limited in screen display real estate and input device. A numeric keypad on the mobile phone is more cumbersome to use to type out sentences than a full size keyboard or mouse. Secondly, due to limited screen size, web pages must be designed to fit accordingly. That means website authors must design their content specifically for mobile device access. In addition, common WAP browsers are technically limited. They are designed to strip out most of the dynamic, multimedia content that is available to the PC. For example, there is no

easy way to access video content on youtube.com on most mobile phones. Most 3rd party add-ons that handle streaming videos are only available on Smartphones. For example, Google's new operating system Android, is aiming to encourage more data usage by providing web browser software for mobile devices that more resembles that of the PC. Nokia recently released "Ovi" for similar purpose (see appendix C). In M:Metrics' study of Smartphone usage, operating systems preference based on age group was noted. VANOC would benefit from access to a variety of operating systems to appeal to wider demographics. However, carriers currently designate specific models of phones that can handle mobile video restricting the subscriber to only have access to the carrier's mobile content.

Regarding the cost of mobile data services, data rates vary widely but subscribers usually pay by the kilobyte, unless able to choose a monthly rate plan. Even then, if the customer ever moves outside of his/her home coverage area, data services can quickly become costly. The EU assembly believes that by forcing the mobile operators to lower roaming data charges, more people will choose to adopt mobile data services within the EU. However, data roaming rates continue to be very high within North America.

Most high-speed data services such as video and multimedia messaging are still application based, in which a piece of software is installed directly on the phone, tying the service exclusively to the provider, in order to protect their source of subscription revenue. For the same reason, most phones are locked to prevent users from arbitrarily installing software to increase functionalities.

The current trend is that Smartphones platforms are becoming more and more popular, especially Research In Motion's Blackberry and Apple's iPhone. The advancement of touch screen technology also improves the way people interact with their mobile phone. The

introduction of the iPhone is significant because it entices competition and raises the bar in terms of the standards of usability for future devices. Based on the average upgrade cycle of 18 – 20 months, we will see more people using touch-screen style phones by 2010.

Another significant development is the availability of applications for sale via the iTunes store. iTunes, famous for mass distribution of multimedia products, automates the download and installation process so that it is simple. The process is familiar to most users due to similarities with using the iPod, a worldwide phenomenon. If the iPhone is successful in the next two years, we will see the development of an ecosystem made up of applications and add-on options available for it.

There has been limited discussion of global wireless technology trends in this project because locale constraints forces VANOC to work within the boundary of the local carriers. Bell Mobility, and its parent company BCE, being a premier sponsor of the event, has been working with VANOC to provide the necessary wireless infrastructure. However, the Canadian wireless market is currently dominated by three major carriers, all of which have just recently finished upgrading their network to 3G technologies within the last few years. As a result, the cost of rolling out these existing upgrades is still being amortized, and the likelihood of a technology shift in the next two years is improbable. Secondly, the current level of adoption in 3G network technology is still fairly low. Services that take advantage of the additional bandwidth are not yet popular. By 2010 even if 4G networks are being rolled out, the impact to the average user would still be minimal. Basing on the average 18-20 month upgrade cycle, a vast majority of subscribers will still be operating on the 3G network, although more subscribers will be utilizing more bandwidth than they currently are in 2008.

Supporting roaming subscribers and compatibility of devices across the international boundaries as an issue is less of an issue than affordability. The research indicates that data roaming is highly expensive and unaffordable to many average subscribers. In the Australian example, each web page that the subscriber views on their mobile phone in Canada could potentially cost them over \$1. If they would like to utilize high bandwidth applications such as video streaming, the cost would be even more prohibitive. Most roaming user will most likely to use their phone as a voice communication device only. With the current political climate, it is highly unlikely for the government of Canada or the US to enact a similar legislation to the EU limiting roaming cost.

A final limiting factor is the licensing of broadcast rights. VANOC's role would be similar to a theme park operator, who acts as a host to the visitors to the park and facilitates any logistical and traffic flow issues that arise. However, unlike the theme park operator, the main challenge for VANOC is to build a system that does not compete with the licensee of the Olympic host-broadcasting rights. Many other broadcasters and news outlets have paid for the rights to report on the games, and some are developing mobile websites of their own. US news broadcaster NBC has partnered with Crisp Wireless in developing their own Olympics focused mobile website in time for 2010. ESPN will be redistributing NBC's video content over mobile networks through ESPN mobile TV service. As for the local mobile service providers, due to the fact that the joint venture between BCE and Rogers won the Canadian Olympic host broadcasting rights, their corresponding mobility subsidiaries will therefore offer video programming available to their mobile TV subscribers. In addition, their corresponding mobile portals will also feature 2010 Games updates.

With this limited scope and VANOC's overall mandate in mind, the main goals of the mobile data service strategy should therefore include:

- Provide visitors local, venue specific data in a cost effective, efficient and user friendly manner
- Facilitate and route subscribers' mobile traffic to sponsoring partners.
- Assist tourism BC in their challenges.
- Help to promote local businesses
- Build a sustainable infrastructure that encourages further adoption of mobile Internet around the Metro Vancouver and Whistler area.

As part of the VANOC technology legacy initiative⁴⁸, the mobile Internet project should be part of a lasting technology infrastructure project which will continue to benefit British Columbia after the conclusion of the Games. According to the Tourism 2010 Resource centre, Olympic broadcasters will be expanding their focus and use of new media by tailoring content in their coverage of the 2010 Games. The broadcasters will be creating content to fill these new media platforms including: websites, blogs, podcasts and mobile phone messaging parallel to the traditional TV format. Tourism 2010 also reported that VANOC is working with Tourism BC to promote these new media opportunities⁴⁹. Therefore, in working with the media outlets, VANOC's mobile service strategy will have to incorporate media content service providers into its design consideration.

5.2 Mobile Content – The data for distribution

According to the 2007 Japanese government white paper *Information and Communications in Japan*, mobile advertising only generated US\$330 million of revenue in

2006. However, mobile content such as ring tones, music and games generated a staggering US\$2.2 Billion⁵⁰. If the Japanese mobile trend is a benchmark of what is to come for the rest of the world, we should expect to see that subscribers are more willing to spend money on downloading content than looking at advertisements. According to The Guardian article, *Mobile phone game sales set to soar*; Computer games on mobile phones will generate sales of \$11 billion by 2010⁵¹. Therefore, VANOC should pay attention to this revenue generating potential in mobile games, ring tones and national anthem sales.

VANOC should develop a suite of Winter Olympics themed mobile games and distribute them through the mobile operators worldwide. The distribution of mobile content has been a major contributor of revenue for the mobile operators. TELUS, Bell and Rogers include software, games, music download in their service and charge subscribers a nominal amount for each download. However, VANOC will be unable to achieve mass distribution of applications and content if they cannot establish a working relationship across the board with multiple network operators. As the Winter Olympics is a worldwide event, VANOC should commence a dialog with all the major wireless network operators throughout the world and discuss content-based revenue driving opportunities, resulting from the international distribution and promotion of the event.

5.2.1 “National and International traveller” – Downloadable content scenario

Stephen and Arnold agreed over dinner to Arnold’s suggestion of using the opponent’s national anthem as a ring tone based on which country ranks higher in hockey. Because both are Apple iPhone users, they looked for the availability of the anthems in the iTunes store. For

\$0.99 iTunes users can download either anthem. Satisfied with their research, they decided to download both anthems on their phones in preparation for the events.

During the Olympic curling event, Bernard decided to check out the Bell mobility download site for a curling game while the ice is being cleaned between matches. For \$7 he could download a copy of Sumi, Miga and Quatchi Curling. Although he had planned on reducing his text messages, he was not successful in doing so. He resorted to pleading with his parents to cover the cost.

5.3 Data Distribution Model - Complete Package Experience

Due to the fact that Canadian carriers maintain tight control over their mobile devices, VANOC must involve the big three carriers in order to implement a successful mobile data strategy. VANOC therefore would need to partner with TELUS, Bell and Rogers Wireless in addition to the cell phone manufactures, such as Samsung (one of the premier Olympic Sponsors) in order to pursue two objectives:

- 1) Develop a portal-like software application that will run on the most popular handsets.
- 2) Provide a cost effective short term rental or pay-as-you-go cell phone package to address the expensive data roaming issue.

A software application that is installed on the mobile device is necessary in order to bypass the limitations of the built-in mobile browser. This software application can provide additional streaming multimedia capability, providing dynamic contents such as video and sound clips that plain mobile WAP browsers cannot accommodate. VANOC will be able to control the users' overall experience better, thus enhancing accessibility (users do not have to type in a URL using

their numeric keypads for example). In addition, another advantage of a software application is that it allows VANOC to control timely content updates by providing a means to “push” information to the user. The application can achieve real time information updates, allowing users to access daily announcements, event information without pushing too many buttons. In addition, by utilizing the high bandwidth of the 3G network, teaser clips of events can then be streamed to the users, enticing them to subscribe to the full broadcast on their cell phones. Furthermore, the application can be a potential avenue for ad revenue generation, by streaming video ads directly to the viewers, something that mobile WAP browser cannot achieve.

However, roaming users from other countries will have a tougher time utilizing this application. Therefore, by providing them with a reasonably priced short term contracts that include a mobile device and reasonably sized data plan, out-of-country visitors will be able to enjoy the content without worrying about the hefty roaming data tariff when they go back home. Locally provided mobile phones also solve the technology compatibility problem. Developers will no longer have to worry about which mobile phones are compatible and all they have to consider is identifying the models that are locally available. Users who fall under the “International – Traveller” category will be served by local devices, bypassing roaming altogether. Establishing an equitable price point for package in order to meet the objectives of consumers and industry will be complex. The cost of the phone plus the cost of software and service must not exceed the cost of roaming voice and data combined. However, the hardware must be capable of playing videos and multimedia content without being too expensive.

5.3.1 “International – Traveller” – Complete Packaged Access Scenario

Andrew is frustrated with his current predicament. He is now unwilling to use his mobile at all while he is in Vancouver for fear of running up a large phone bill. He walked past an

Olympics Information Centre and found out that for \$200, he is able to rent a phone for the duration of his stay. The rental plan will include an Olympic edition phone, some local airtime minutes with a nominal amount of long distance. In addition, the plan includes a moderate amount of mobile data browsing in order for him to try out the data service. In addition, he could purchase an unlimited mobile browsing plan or mobile TV package to take full advantage of the services provided during his stay.

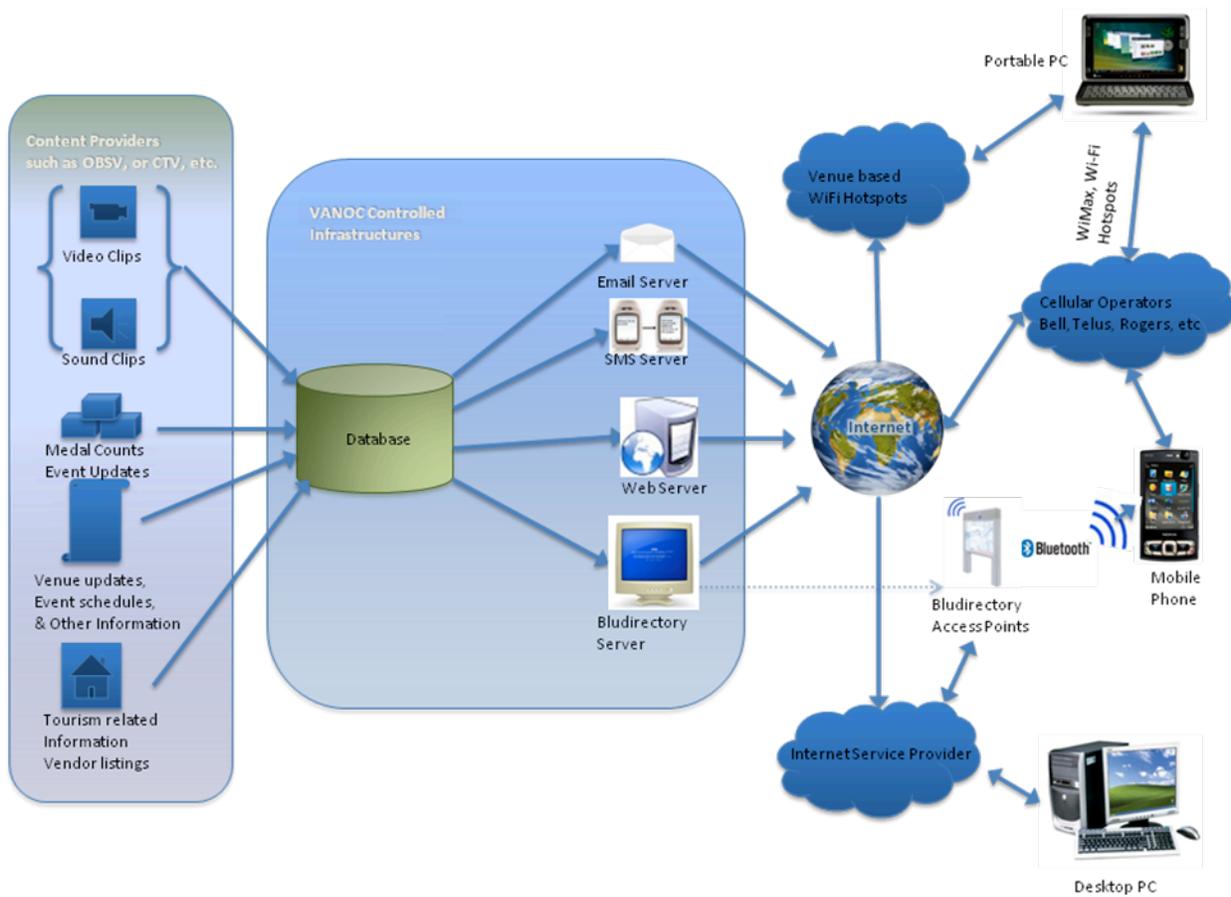
5.4 Data Distribution Model – Wi-Fi

This project highlighted three main barriers that hinder the growth of mobile data access. Limited accessibility, unfriendly usability and high usage-based pricing are the three main factors that are discouraging subscribers from using their mobile phone as a data-accessing device. In order to minimize these barriers, VANOC's mobile infrastructure will need to address each of these issues accordingly. Accessing data through the mobile phone already carries a stigma of being cost prohibitive. Therefore, some other alternatives to carrier access will have to be provided. For example, The Apple iPhone and other Smartphones offer two different modes of accessing data networks. They can connect to the Internet either via Cellular service, which is subject to Cellular service provider's tariff, or Wi-Fi. From the use-cases in Chapter 2 we understand that roaming on a foreign Cellular network is potentially cost prohibitive. The per-kilobyte charge can add a barrier of uncertainty to the data browsing experience. Enabling Wi-Fi access can help address that issue.

However, the trade-off for the more reasonably priced Wi-Fi access is limited coverage. Wi-Fi access is a short-range, facility-bound technology. However, according to Nortel Network, who is the sole provider of networking equipment for the 2010 Winter Games, each venue is already Wi-Fi enabled⁵². This means that VANOC should consider opening up those Wi-Fi

access points to facilitate visitors. Figure 9 highlights the proposed infrastructure and illustrates how data will be delivered to the subscribers. Here, the VANOC controlled infrastructure is acting as a facilitator to the content providers to the left. These content providers, such as media networks CTV, Tourism BC, etc will be providing the up-to-date contents. VANOC in turn will provide the infrastructure to house and distribute these contents via email, SMS, Web or Bluetooth enabled services sign posts.

Figure 9: Proposed Data Distribution infrastructure Model



5.4.1 “International – Traveller” Wi-Fi access Scenario

Arnold remembered that the advice that he heard from AT&T was to rely more on Wi-Fi access with his iPhone as much as possible. Many local coffee shops provide free Wi-Fi access for their customers. However, by the time he settles inside an Olympic stadium, he is able to find a Wi-Fi signal that he can log on to. It will cost him \$40 to connect for the whole day. He also learns that with the purchase, he would be able to use Wi-Fi through out any VANOC venues at other locations. He figures that the cost will be nominal compare to the monstrous charges that he might face if he ever exceeds his 50MB limit. Wi-Fi connection also provides him with faster speed. He is able to stream live, videos better with the connectivity.

While Ming and his friend are attending the short track speed skating event, they meet up with another friend who lives locally. He owns a Wi-Fi capable Smartphone and uses it to access VANCO’s Wi-Fi infrastructure. Through that device, they connect to a Chinese broadcaster, allowing them to hear commentary in Mandarin for the event that they are watching.

5.5 Data Distribution Model – Bluedirectory, Bluetooth Technology

Another method of delivering content data would be through the use of Bluetooth technology. Most modern mobile phones come equipped with Bluetooth as a standard short-range wireless technology that lets users exchange photos, messages and more between two handsets. Other common uses include wireless headset, or linking to car stereo and speaker phone to enable hands free operation. Bluedirectory, based in Cardiff, Wales pioneered a Bluetooth-based technology that sends maps, tourism and entertainment information directly to the inquirer’s mobile phone⁵³. The service supplements regular sign posts with up-to-date, easy to modify, digital information. When users enter a Bluetooth enabled zone with their Bluetooth connection turned on, they will automatically be sent an invitation to access the information

available from that point. When the user accepts the incoming Bluetooth connection, they will be presented with a user-selectable information range from time tables, detailed road maps with directions, to advertisements for entertainment, restaurants, etc. The system bypasses the data rate and roaming charges by initiating a connection directly to the user's mobile phone. The limited range of Bluetooth technology limits the user's access to within the range of the signpost.

Disney Studios Park in Paris has recently implemented a similar technology; allowing users to access attractions wait times and other park information live, across the park⁵⁴. By enabling Bluetooth in the mobile phone's settings, a user who walks into one of the designated "Bluetooth hotspots" will receive a request to establish a connection. If the user accepts the invitation, and the latest show times, wait times and more will be sent to their phone in the form of small images. The system cycles through the latest information, which is updated in synchronization with the main information board. In addition, advertisements and venue changes will also be broadcasted to the user's phone.

VANOC can implement a similar system in every venue to supplement the information centers' functionalities. While visitors will require information centre's services, this Bluetooth technology will allow system operators a convenient way to update information, as well as open up another avenue for mobile advertisement.

5.5.1 "National-Local" Bluetooth access Scenario

Bernard happened to go past a visitor information booth outside the hockey stadium. He learned from the bulletin board that he is now inside a "Blu Zone" and that the bulletin service will ask him to accept an information service connection with his Bluetooth enabled device. His phone vibrates with a question asking him if he would like to accept the connection. He pressed

the “ok” to accept, and within a few seconds, a picture of an advertisement appears promoting today’s special for a near by restaurant. He presses the OK button again and is presented with the system’s main menu:

Press 1 for Venue Updates

Press 2 for location information

Press 3 for concession specials ... etc.

From the system, Bernard found out that a burger and fries combo meal will cost \$12. Also, as he is going the upper section of the stadium, Gate #3 is blocked and he will need to use Gate #5 for access.

5.6 Data Distribution Model - Email, SMS Text messages

With the popularity of SMS Text messaging, VANOC could provide a way for mobile phone subscribers to keep in touch with current events by providing a Text messaging and / or email response system. The analogous service would be the text response service that VisitBritain has developed⁵⁵. Tourism information network VisitBritain has released a system for visitors in the UK looking for their nearest Tourism Information Centre. The service works by users sending a text message with the code word “TIC LOCATE” to a phone number 64118. The system then establishes where the tourist is by utilizing base-station triangulation and returns a text message with the requested information. VANOC should consider this idea of text response services. However, if location-based technology is not available in time for the 2010 events, then a generic list of phone numbers or a short directory listing could be a default response.

To further the text message concept, the system can be expanded to include different code words for different information. Information such as daily schedules and medal counts,

could be included in the service. In addition to user-initiated requests with individual responses, VANOC could create a list of events for users who wish to receive email updates. News and updates that VANOC can generate for the duration of the events will be published to the list of subscribers on a regular interval.

5.6.1 “National – Traveler” Email Access Scenario

Tony is a busy businessman who utilizes his Blackberry as an everyday channel of communication. Tony will also try to keep himself up-to-date on the Olympics event. Tony found out that Vancouver2010.com is offering an email mailing list that he may join in order to receive breaking news regarding the Olympics. He will be able to receive multiple, different types of information including: changes to venues, possible delays to the shuttle services, and medal counts. In addition, if there is an event that Tony is interested in following, Tony could subscribe solely to that event. Tony happened to be invited to attend one of the hockey semi-final games as part of his business trip. He would like to keep up-to-date on the hockey standings before he goes into the game. He could keep himself abreast by searching online for the information, but he would rather have the news sent directly to his inbox, where he can access it on his Blackberry. Without much effort, Tony is able to keep himself up-to-date, easily and conveniently.

5.7 Data Distribution Model - Mobile Web Portal

The concept of a mobile web portal is not a new feature in the technology sector. All network operators are currently operating portals to service their subscribers. However, the concept of a city-based, mobile portal is relatively new in the technological environment. The Internet Corporation for Assigned Names and Numbers (ICANN) has only assigned the mobile

domain (.mobi) in 2005, and a consortium led by Nokia, Microsoft and Vodafone have been actively promoting the mobile domain ever since. The proposed mobile portal will be similar to the mobile portal of Helsinki, Finland⁵⁶, which went online in July, 2007.

Table 5: Proposed Mobile Portal Functionalities

	Local Users (Locals) Functionalities	Remote Users (Out of Country) Functionalities	Visitors (Tourists) Functionalities
Before and after Games	<p>411 look up Directions and Maps Phone directory</p> <p>News Local News Weather</p> <p>Entertainment Movie schedules Horoscope Shopping, Deals & Destinations Sports</p> <p>Events Concerts Seasonal events Night life</p> <p>Announcements City info</p> <p>Traveling and Mobility Flight times Traffic alerts Bus schedules</p> <p>Public Safety Information Amber alert</p>	<p>News Local News Weather</p> <p>Events Attractions</p> <p>Announcements Promotions City Life info Olympics promotions</p> <p>Traveling and Mobility Flight time Hotel information</p>	<p>411 look up Directions and Maps Phone directory</p> <p>News Local News Weather</p> <p>Entertainment Movie schedule Horoscope Shopping, Deals & Destinations</p> <p>Events Concerts Seasonal events Night life</p> <p>Announcements City info</p> <p>Traveling and Mobility Flight time Traffic alert Bus schedule</p> <p>Public Safety Information Amber Alert</p> <p>Tourist information Tours Destination routes</p>
During Games	<p>411 look up Directions and Maps</p> <p>News Local News Weather Olympics related News</p> <p>Entertainment Movie schedule Shopping Destinations</p> <p>Alerts Daily summary Venue changes Event results</p> <p>Events Attractions Night life</p> <p>Traveling and Mobility Flight time Traffic alert Bus schedule</p> <p>Public Safety information Amber alert</p>	<p>News Olympics related news</p> <p>Alerts Daily summary Event results</p> <p>Events Attractions</p> <p>Traveling and Mobility Flight time Hotel information</p> <p>Tourist information Tours Destination routes</p>	<p>411 look up Directions and Maps Phone directory</p> <p>News Olympics related news Local News Weather</p> <p>Entertainment Movie schedule Shopping Destinations</p> <p>Alerts Daily summary Venue changes Event results</p> <p>Events Attractions Night life</p> <p>Traveling and Mobility Flight time Traffic alert Bus schedule</p> <p>Public Safety information Amber alert</p> <p>Tourist information Tours Destination routes</p>

5.7.1 Helsinki, Finland - mobile portal

Helsinki is currently operating a mobile web portal with the address <http://helsinki.mobi/>. It contains the information such as restaurants, events, sites and attractions, etc. A separate section named “Helsinki mobile guide” features: tourist information, offers tourists maps, suggests routes, sights, and special events. The site is currently targeting foreign tourists through paid advertising on airlines, at airport and ship terminals⁵⁷. Micah Gland, of Greater Helsinki Promotion, said:

The launch of Helsinki.mobi was held in conjunction with the 52nd edition of the Eurovision Song Contest in May 2007. Being able to promote a site, like Helsinki.mobi while thousands of visitors were in the city proved to be a good way to encourage use of the site and was reflected in the strong number of 'hits' that Helsinki.mobi received. Even better, the number of visitors to the site has remained steady since then.

5.7.2 Vancouver.mobi - mobile portal

Vancouver.mobi is currently under development by MobiGuides⁵⁸. According to the site, the mobile guide to Vancouver “is coming in the fall of 2007”. However, there is currently no meaningful content available. None of the links are currently active.

5.7.2.1 “International – Local” Mobile Portal Scenario.

While Yoko is viewing women figure skating, she notices an advertisement for Vancouver.mobi. Even though she is currently in Japan, she is curious about Vancouver. After viewing the mobile portal on her phone, she decides to start planning a trip to British Columbia the next year.

5.8 Location based services

According to the BusinessWeek article mentioned in the previous chapter, Japanese mobile Internet usages are predominantly location-based services. Therefore, location-based services could be a main driver for this portal. Services that are specifically tailored to the city will attract further adoption⁵⁹. An InfoWeek article reported that location-based services (LBS) revenue is expected to grow from \$515 million to \$13.3 billion in the next five years⁶⁰. This explosive growth is mainly driven by the increasing number of handsets that incorporate GPS capabilities; as well as rising consumer interest in personal navigation features.

ABI Research, a research company that conducted the study separates the LBS market into five categories: personal navigation, friend finder, local information searches, family-tracker applications, and fleet management. In terms of revenue potential, ABI forecasted that enterprise fleet management and employee tracking would be the leading service, follow closely by personal navigation.

Yellow Pages currently have a mobile service that integrates with the mobile positioning system. The system includes the estimated distances to the target address in the list of search results. If the system incorporates GPS into the mix, it could automatically generate directions and navigation information with the search results. Visitors to the city would greatly benefit from further LBS improvements.

5.8.1.1 “National – Local” Location Based Mobile Portal Scenario

Wendy has a client arriving from Vancouver to view a chalet. The client asked for dining recommendations while in Whistler. Wendy accesses the mobile portal and gives the client three

restaurants to choose from the site. With the help of the additional location based services, Wendy is able to provide her client with turn by turn directions to the restaurant of his choice.

5.9 Strategic Focus

5.9.1 Pre-Games

One of the objectives of the pre-game portal is to attract potential visitors to visit the province and attend the 2010 Olympic Games. Driving Internet traffic from overseas to the mobile portal will be a challenge. The main website, Vancouver2010.com will not be easily viewed with a mobile device. However, it may be used as a medium to advertise the presence of the mobile portal. People overseas could browse the Vancouver2010.com site with their PCs and find downloadable Winter Olympic themed wallpapers with an embedded mobile address. This may entice people's curiosity and encourage them to try to get onto the portal with their mobile devices. This will set the stage for the mobile user to access the mobile portal and let them get acquainted and be comfortable using the mobile portal, previous to using the portal in its local venue.

5.9.2 During Games

Location-based services would be the forefront of functionalities during the Games. Update alerts and venue information should be easily accessible. The mobile portal will be an excellence source of information at this stage for locals and visitors alike. Traffic updates and transportation schedules may also serve the mobile community well. While the events are on, people travelling between venues will need a way to link up to the on-going events of the competition. Directions and navigational information will be very valuable during this time as

visitors navigate a new environment. In addition, ensuring ease of access to sponsors and broadcasters will increase the appreciation and enjoyment of the event.

5.9.3 Post Games

The focus of the post-game mobile portal would be to improve both local accessibility and provide tourism information. Continual subscription from local businesses after the games could help promote the local economy. Vancouver has an active Trade and Convention Centre industry that actively seeks to attract new events to the Lower Mainland region. With the successful implementation of the 2010 Games, other sports and entertainment related events will be a good fit for this region. Due to the rising cost of fuel, pleasure and business related travel is presently transitioning into a luxury class item. Visitors are becoming more specific in seeking value for their travel dollar and are seeking an environment containing: first-class accommodations, fine-dining, cultural events, scenic beauty and ease of access to technology. Vancouver is already well-established as a first-class destination and through the use of the mobile portal business leaders may position themselves for increased market penetration in the event, tourist and business travel segments

5.9.4 Cost recuperation and sustainability

There are several revenue streams that the system could generate: mobile content, subscription fees and mobile advertisements. With the exception of charge - per -download model for mobile content (games, themed wall paper, etc), the overall revenue model should be similar to a directory services. Here, local business is invited to join the directory and in turn, they will incur a monthly fee for the privilege to be listed. Additional advertising fees will be charged if they would like advertisements to be put directly to the end-users' mobile phones.

New developments in the mobile data technology could entice other forms of revenue generation. For example, the proposed location-based services can be used to direct people to take part in mobile commerce⁶¹. Although, at present, Mobile commerce is not a commonplace transaction in Canada, several developments seem to indicate that there is potential in the very near future. For example, one aspect of mobile commerce is mobile payment. Mobile payments are not yet popular in North America but mobile devices are being currently used as an alternative method of payment in Asia. Visa unveiled its plan to turn mobile phones into e-wallets, by adopting technologies that would allow mobile phones to be swiped in front of merchants' point of sales. Further studies in the area of mobile commerce should be conducted and the potential of revenue generation needs to be evaluated as more services are added into the portal.

5.10 Conclusion

The mobile Internet strategy is a good opportunity for VANOC to leave a lasting, technological legacy for British Columbia. As worldwide adoption of mobile Internet increases, the demand for mobile content and services will also rise. VANOC should be prepared and ready for that challenge. As the mobile industry focuses on the aspect of Internet access that transcends the geographic barrier to trade, there will more opportunities for mobile commerce to develop. In 2010, the world's attention will be focused on Vancouver and the surrounding region, and British Columbia will be welcoming the world by showcasing their brightest achievements including mobile technology.

APPENDICES

Appendix A

Table 6: Top 10 Smartphones in the US, August 2007. Source: M: Metrics October 2007

Top 10 Smartphones in the US, August 2007	
Vendor	Model
1. Motorola	Q
2. RIM	Blackberry 8100 Pearl
3. Palm	Treo 650CDMA
4. Samsung	SGH-I607 Black Jack
5. Palm	Treo 650GSM
6. Palm	Treo 700wx
7. Apple	iPhone 8GB
8. Palm	Treo 700p
9. RIM	Blackberry 8700c
10. RIM	Blackberry 7100i

Table 7: Top 10 Smartphones in Italy, August 2007. Source: M: Metrics October, 2007

Top 10 Smartphones in Italy, August 2007	
Vendor	Model
1. Nokia	N70
2. Nokia	6630
3. Nokia	6600
4. Nokia	6680
5. Nokia	N73
6. Nokia	N80
7. Motorola	A1000
8. Nokia	7610
9. Nokia	E65
10. Nokia	N95

Table 8: Top 10 Smartphones in the UK, August 2007. Source: M: Metrics October, 2007

Top 10 Smartphones in the UK, August 2007	
Vendor	Model
1. Nokia	N73
2. Nokia	N95
3. Nokia	N70
4. Nokia	N80
5. Nokia	E65
6. Nokia	6630
7. Nokia	6680
8. Nokia	5500 Sport
9. Nokia	6600
10. RIM	Blackberry 8100 Pearl

Appendix B

Table 9: Mobile Subscriber Monthly Consumption of Content and Applications

Percentage of Mobile Subscriber Monthly Consumption of Content and Applications							
	US	FR	DE	IT	ES	UK	China
Watched video	4.2%	5.0%	2.5%	6.0%	7.7%	5.1%	0.9%
Listened to music	5.7%	12.9%	15.0%	13.3%	20.0%	18.9%	34.8%
Accessed news/info via browser	12.6%	9.2%	5.2%	7.6%	7.5%	15.5%	6.1%
Played downloaded game	9.1%	4.0%	7.6%	8.7%	13.0%	11.0%	10.0%
Accessed downloaded application	4.2%	1.3%	2.2%	4.0%	2.5%	3.3%	2.4%
Sent/received photos or videos	20.5%	24.3%	21.7%	31.3%	31.7%	29.7%	15.2%
Purchased ringtones	9.7%	4.3%	4.2%	4.6%	4.6%	3.7%	4.4%
Used email	11.6%	6.7%	6.9%	10.2%	9.0%	9.1%	2.5%
Accessed social networking sites	3.6%	1.7%	1.4%	1.9%	2.4%	3.6%	2.2%

Source: M:Metrics Benchmark Survey: November 2007⁶²

Table 10: Percentage of Mobile Subscriber Monthly Consumption of Content & Applications by OEM

Percentage of Mobile Subscriber Monthly Consumption of Content and Applications by OEM						
	Market	Motorola	Nokia	Samsung	Sony Ericsson	LG
Any news or info	6.1%	6.0%	6.7%	4.9%	11.8%	3.0%
Played downloaded games	10.0%	8.3%	11.9%	5.7%	24.1%	9.5%
Sent/received photos or videos	15.2%	13.7%	18.6%	12.2%	26.6%	19.0%
Purchased ringtone	4.4%	3.6%	4.7%	5.3%	7.1%	2.9%
Listened to mobile music	34.8%	32.4%	36.7%	31.1%	59.6%	41.8%

Source: M:Metrics Benchmark Survey: December 2007⁶³

Appendix C – Recent Business Developments in Mobile Phone Manufacturers

Table 11: Top Five Mobile Phone Vendors, Worldwide Full Year 2007 Results

Vendor	2007 Unit Shipments	2007 Market Share	2006 Unit Shipments	2006 Market Share	2007/2006 Growth
Nokia	437.1	38.2%	347.5	34.2%	25.8%
Samsung	161.1	14.1%	113.7	11.2%	41.7%
Motorola	159.0	13.9%	217.4	21.4%	-26.9%
Sony Ericsson	103.4	9.0%	74.7	7.3%	38.4%
LG Electronics	80.5	7.0%	63.5	6.2%	26.8%
Others	202.9	17.7%	200.6	19.7%	1.1%
Total	1144.1	100.0%	1017.4	100.0%	12.4%

Shipments in millions.

Source: IDC Worldwide Quarterly Mobile Phone Tracker, January 25, 2008.

Note: Vendor shipments are branded shipments and exclude OEM sales for all vendors.

Nokia

Nokia has occupied the leading position, for the overall mobile device market, for more than a decade. In 2007, Nokia achieved the landmark of being the company that produce the all-time, best-selling cell phone. On May 3 2007, Reuters reported that the Nokia 1100, which became the world's top selling consumer electronic product, surpassed the 200 millionth unit mark. In comparison with other consumer electronics products: Apple's iPod reached the 100 million mark last month, Sony's PlayStation 2 had sold 115 million by end-2006 and Nokia's earlier, top seller, the 3310/3330, sold 126 million units up to its retirement in 2005⁶⁴.

Ironically, the Nokia 1100 is not a feature phone with advanced functionalities. It has a black and white screen with a resolution of 96 x 65 pixels that is capable of displaying 4 lines of text. It is used primarily as a voice communicator, but also has the capability to send and receive text messages. Other functionalities include: alarm clock, stopwatch, and a built-in flashlight. Coincidentally, Nokia's one-billionth phone was also a model 1100.

Krusell, the Swedish manufacturer of carrying cases, listed Nokia's 6300 as the second, top-selling phone in 2007⁶⁵. Sony Ericsson K800i was in first place; however, Nokia N73 and N95 rounded up the third and fourth place positions. Krusell's list is based upon the number of

units of model, specific mobile and Smartphone cases that have been ordered from Krusell during 2007. According to Krusell, their list is unique because it reflects the sales of phones on six continents and in more than 50 countries around the globe. It is used as a proxy indicator of the trend of mobile phone sales.

In contrast to the 1100 model, the Nokia 6300 is a defining sample of a feature phone. It is a phone with multitude of functionalities including a: 2+ Megapixel Camera, Bluetooth connectivity, Calendar, FM Radio, High-Speed Data GPRS and Email Client. With a built in memory card slot, it can also handle the transfer and playback of video clip as well as MP3 Music files. The Nokia 6300 is classified as a feature phone because the device is closed to user update.

Nokia Business Strategy

Although, the best-selling device is a low-end, entry, level phone, Nokia's strategy is to drive the adoption mobile Internet usage. Their website outlines their four pillars of business strategies: lead and win in devices, grow consumer Internet services, accelerate adoption of business solutions and leverage scale and transform to solutions in infrastructure.⁶⁶

In adherence to this plan, Nokia is rebuilding its branding as an Internet service company. The first step was the introduction of "Ovi" their Internet services brand on August 29, 2007⁶⁷. Ovi, meaning 'door' in Finnish, promises to enable consumers with ease of access to Internet connectivity, social networks, communities and content. Ovi is also a gateway to Nokia's other Internet services such as Nokia Music Store, Maps, and Games service through their Ngage brand. Subscribers will be able to download music, games as well as navigation and directional information. In addition, to digital media distribution, Ovi also includes a social networking element, where customers are able to form communities and post their content. In the

Nokia Go Play event in London, England, where the announcement took place, Nokia's president and CEO Olli-Pekka Kallasvuo spoke about Nokia's future plans as an Internet company:

The industry is converging towards Internet driven experiences and Ovi represents Nokia's vision in combining the Internet and mobility. Nokia is the number one, mobile device company in the world. Looking into the future, we will deliver great devices, combined with compelling experiences and services, to make it easy for people to unlock the potential of the Internet.⁶⁸

The reaction to the announcement is not positive amongst service providers. Ovi puts Nokia squarely on a collision course with the carriers. Until the entrance of Ovi, the mobile operators have been in control of their subscribers' mobile Internet experience. They are currently offering similar revenue, driving services such as: mobile portals, music and games downloads, as well as messaging. Orange, the European, mobile operator has since threatened not to carry Nokia's Ovi enabled devices⁶⁹, due to concerns that the device will drive traffic away from their own music, download service. On the other hand, European operator Vodafone has publicly endorsed Nokia's Ovi as a viable strategy⁷⁰, by allowing Nokia devices to operate both Ovi as well as their own competing Internet services.

Samsung

Samsung Electronics is a South Korea-based multinational company, whom surpassed Motorola as the number two manufacturer of the mobile phone in the world. The Samsung SGH-A707 was listed as one of the best-selling, consumer handsets of 2007, by Strategy Analytics ProductTRAX program⁷¹. Samsung has been actively involved with the Olympics movement since the 1988 Olympic Summer Games in Seoul, South Korea. During that time, Samsung acted

as a local sponsor. In 1998 during the Nagano Winter Games, in Nagano, Japan, Samsung officially signed an agreement with the IOC and became an official partner of the Olympic Games. Samsung has maintained the Worldwide Partner in the Wireless Communications category ever since.

For the 2000 Sydney Summer Games, Samsung launched a special recurring marketing campaign. Dubbed, Olympic Rendezvous at Samsung (OR@S) marketing campaign, the campaign targeted both athletes and Olympic fans alike and allowed them to become even more familiar with Samsung and their product offerings⁷².

During the 2002 Salt Lake City Winter Games, Samsung provided more than 20,000 units of wireless telecommunications equipment, along with all necessary technical support in key areas to the 2002 Salt Lake Organizing Committee. This technology enabled officials, media, staff and volunteers to maintain close voice contact, thus increasing operational efficiencies⁷³.

During the 2004 summer games in Athens, Greece, Samsung unveiled a wireless data system designed for the Olympic Events. Named Wireless Olympics Works, or WOW, the wireless technology helped the officials to disseminate medal results and event-related information throughout Athens during the games. WOW utilizes handheld devices such as mobile phones and Smartphones, whose functionalities streamline the operation throughout the games, increasing efficiency and improving effectiveness⁷⁴.

During the 2006 Winter Games in Turin, Italy, Samsung orchestrated a special presence during the torch relay. A “Samsung Caravan” traversed the entire country during the relay. As a promotional arm of the OR@S marketing campaign, the caravan was run as a showroom and

central point for their diverse on-site programs during the Games. Samsung also fed updates to the WOW systems to allow athletes, staff and media to receive real-time data on Samsung's SGH-D600 cell phone⁷⁵. Users of the system can access different types of information on the device, which include information on: venues, local weather updates, scheduling and results of events, brief, biographic data on medallists, and medal counts. The system also allows group messaging from the organizing committee headquarters to the on-site staff. Samsung is very committed to the Olympics movement, as they intend to continue their Olympic partnership and will sponsor future Olympic events such as: the 2008 Summer Games in Beijing, China, the 2010 Winter Games in Vancouver, Canada, as well as the 2012 Summer Games in London, U.K.

In February 2008, during the Mobile World Congress 2008 in Barcelona, Spain, Samsung introduced several new models of mobile phones. The G810 is a direct response to the Nokia N95 series of Smartphones. It features a 5 mega pixel camera as well as Symbian operating system. Another product that also features a 5 mega pixel camera was the Soul. It is a feature phone that targets the high-end, style-conscious consumers. A stylish, silver slide phone that includes all the usual multi-media functions such as: music and video player as well as high speed data 3G HSPDA data connection. The Soul is marketed as Samsung's flagship handset for 2008.

In addition to new, hardware, product announcements, Samsung also announced their intention to pursue an Internet service based strategy for their branded mobile phones. This family of services will be similar to Nokia's Ovi strategy and will put Samsung in a direct, competition path with Nokia. Samsung also used the event as an opportunity to detail how it plans to continue to invest in production and supply chain capabilities to fuel future growth. Geesung Choi, president of the company's telecommunications business views partnerships as

key way of ensuring buoyancy during what could be potentially turbulent times economically. Choi said:⁷⁶.

(Given the) uncertainty of the global economic situation, I'm sure you are interested in our forecast. Mobile phones are today an incredible part of our lives... (We plan to) grow our business much faster than the market to more than 200 million units

Motorola

Motorola is the iconic company in the mobile communication industry. They are a radio communication pioneer, and made their historical mark in 1930, by inventing the car radio; thus creating the automobile, audio industry. They are also the segment creator of the consumer, mobile phone industry through introducing the world's first commercial Cellular phone⁷⁷. In 1983, Motorola's DynaTAC 8000X phone and the Cellular system that the phone operated on revolutionized the way the world communicates. Motorola also created the whole category of clamshell, design Cellular phones, with the introduction of the StarTAC in 1996. Finally, in 2004, Motorola introduced the RAZR, and sparked a new trend in thin, Cellular phone design.

Arguably, the story of the Motorola RAZR is one of the most important lessons in the history of the mobile phone industry. Not only does this story highlight one of the zenith achievements of Motorola, addressing innovation in both product development and marketing, but also draw attention to the rapid changing nature of the mobile phone industry. The RAZR V3 was the result of a skunk works project whose development team intentionally and consistently defied Motorola's own rules in developing new products, and an article in June 2006 edition of Fortune magazine chronically documented the story of the birth of this legendary device⁷⁸. The following is the summary of the article:

Motorola initially planned to release the RAZR as a pricey fashionable item, a high-end, niche product that, like jewellery was meant to increase the company's exposure by targeting high, profile customers. After several years of declining sales, Motorola badly needed a reputation builder, a signal to the market that they still had an alluring product offering.

Normally, Motorola would consult closely with the wireless operators that sell the device and try to incorporate the features that they deemed necessary. However, the design team kept the project secret in order to keep the design radically different and unique. Consequently, the process of designing the RAZR was shrouded in top secrecy. Even within Motorola's circle of engineering employees, the project's detail was only distributed within the insider circle. The project was given flexibility by the senior officers because in the beginning, the phone was not meant to be a mass-market, money-maker. However, the stakes were high enough that they did not spare any resources in the development of the product. The team did not follow any predetermined design guidelines for this project. They even defied the published Motorola "human factor" manual, which denoted that a phone that is wider than 49 millimetres would not fit well in a person's hand (the end product is 53 millimetres wide). Engineers and designers were working side-by-side, with the objective to create the thinnest, possible phone at the time within one year.

It was 2003 and the project's aim was to release the phone in time for the 2004 Academy Awards, so that the device would gain exposure through celebrity usage at the event. However, the project eventually over- shot that target, and the phone was not released until the summer four months after the original deadline.

Keeping to the naming convention, the initial marketing plan labelled the device "V3". However, the late Geoffrey Frost, then Chief Marketing Officer who had paid close attention to

the project, determined that the device would need an additional catchy nickname to accompany that monotonous model number. Borrowing from the project's development code name "Razor" as to emphasize its distinguishing feature, Frost ultimately gave birth to an eye catching, four-letter name: RAZR. Motorola did several things to promote the RAZR that differentiated from their traditional marketing strategy. Firstly, in addition to the usual network executive preview of their new devices in trade shows, Frost organized a sneak preview event in parallel to the gadget fashion show at Copenhagen's Arken Museum of Modern Art, and invited design-oriented journalists. Secondly, defying traditional, public, official unveilings at wireless conferences, Motorola CEO Ed Zander chose to launch the RAZR at Motorola's annual meeting in July 2004, within the presence of many financial analysts.

In the fourth quarter of 2004, Motorola reported a shipment of 29 million handsets, within which the RAZR V3 accounted for 750,000. Roger Jellicoe, a director of operations, whom managed the RAZR development project said, "The RAZR exceeded the company's total lifetime projections for the product in its first three months."⁷⁹

Sales exploded the following year when Ron Garriques took over the cell phone division. The company forecast a sale of 2 million units that year, in spite of this; Garriques insisted that they needed to build 20 million units. In the end, by the end of 2005, Motorola shipped over 20 million units, exceeding Garriques' projection. By July, 2006, Motorola reported the shipment of the 50 millionth unit of the RAZR V3.

Upon the launch of the RAZR V3, the phone quickly became a "must-have" in mobile communication³⁸. Catching the wave of unprecedented popularity, Motorola released several different editions of the RAZR. For example, Motorola introduced a special edition RAZR in black at the 77th Annual Academy Awards in early 2005⁸⁰. In September 2005, a version was

created in hot pink. By November, of the same year, consumers were able to purchase the RAZR Magenta at T-Mobile.

The phone was dubbed a cultural icon and could be seen almost everywhere, for example it was featured in many TV and movies⁸¹. As the late Geoffrey Frost intended, the phone was also popular throughout the fashion and design industry circle. Consequently, Motorola introduced the RAZR V3i Dolce & Gabbana edition in gold and silver finish, with the signature Dolce & Gabbana logo engraved on the front faceplate³⁸. The success of the RAZR enticed other companies to introduce their own thin phone.

However, by 2007, the story of the RAZR seemed to have completed its product lifecycle. In a span of just three quarters, Motorola's shipments of wireless phones have plunged to less than 35 million from the height of 66 million. Sales were expected to shrink and the company announced that its flagship mobile-phone unit would not turn a profit at all in 2007⁸². Motorola was struggling to emulate the success of the RAZR by introducing different phones that feature designs close to the look and feel of the RAZR. For example, the Motorola SLVR is the "candy bar" form factor phone that features a keypad similar to the ones that was used in the RAZR. The Motorola ROKR introduced music playing functionality into the phone. However, the company was unable to produce a successor that generates the same level of popularity of the Motorola RAZR V3.

On May 15, 2007, Motorola was once again betting its future on the RAZR family of phones⁸³. CEO Ed Zander unveiled the next series of mobile devices at an event in New York City. Dubbed the RAZR², the next generation of the RAZR series is packed with more features than its predecessor. It is 2 millimetres slimmer than the original RAZR, and came with a newly developed Linux operating system. It also features a screen size that is twice as big as the

original, and with several different versions that supports a multitude of different 3G networks for higher bandwidth data application. The company was hoping that the RAZR² would generate the same level of excitement as the original. However, it was a little too late for Ed Zander.

Six months after the unveiling of the RAZR², CEO Ed Zander announced in November, 2007 that he would step down as CEO, effective December, 2007⁸⁴. Greg Brown, the president and Chief Operating Officer would take over as the new CEO on January 1, 2008. Zander will remain as the company's chairman. At the time of the announcement, Gartner Group estimated that Motorola's market share was at 13%, down from 21% the year before. After Brown took over as CEO, the situation has not improved. Not only did the stock price plunge 42% in the first quarter, but the struggling company also faced immense pressure from investors.

Carl Icahn, whom was the second, largest shareholder, and held about 6% of the company at the time, was exerting pressure on the company, demanding that the board spin-off the unprofitable handset division⁸⁵. On March 26, 2008, Motorola yielded to the pressure from Icahn and announced their intention to split into two, separate companies, spinning-off the handset division as a separate entity. Upon regulatory approval, they expect that the transaction will take place by 2009⁸⁶.

Although the market trend continually favours Nokia, and they have been leading the market since the beginning of the 1990s, the story of Motorola suggests a volatile market for mobile devices. The market share position may change dramatically over the course of two years. One successful and popular product does not guarantee further successes down the road. Relying on only one best-selling product line for market penetration might not be the best strategy. The misfortune of Motorola is currently fuelling the increase of market share of its competitors. However, given the volatility of the market, it would be difficult to predict two

years ahead and foresee another Motorola product offering, that attracts the interest of consumers constantly primed with short product lifecycles.

Appendix D – Smartphone Trends and Platforms

Smartphone Platforms

A Smartphone is mainly defined by the functionalities offered by their software operating system. These operating systems platforms are designed to provide the device capabilities that exceed those functionalities offered by feature phones. Compared to the feature phones, a Smartphone typically has a larger display and contains a more powerful microprocessor. Also, the operating systems designs have standardized user interfaces. Vendors in different distribution channels would have comparable Smartphone operating user interfaces if their designs are both based on the same operating system. Consumers already familiar with one operating system are more confident in trying out new product offerings of competitive brands. This increases the volume of sales and adaptation of new devices into the marketplace.

Palm OS is one of the oldest operation system for the Smartphone segment. Originally, the Smartphone evolved from the personal data assistant (PDA). Palm pioneered the PDA category of devices in the early 1990s. Initially, Jeff Hawkins' principle idea for Palm was to enable mobility with pen based computing⁸⁷. Marketed as a replacement of the paper-based day-planner, the PalmPilot PDA contains features that are similar to the incumbent, including: a scheduling calendar, task lists, contacts, a calculator, and a memo pad.

The Palm operating system (code name Garnet) was developed in 1996, with the primary focus on improving the device. The original PDAs did not appeal to business professionals because of sluggish, unreliable performance that rendered the PDA into a low-level, efficiency device. The Palm Pilot was promoted to the business community as a way to reliably access their stored data, while enabling them to synchronize their crucial data with their PCs while they were

away from the office. This strategy benchmarked the successful marketing of the cell phone as a useful communication device while away from the office. The Palm OS also allows a third party to create application software for the device. Allowing many vendors to distribute software packages increases the functionalities of the Palm Pilot.

The success of the Palm line of products enticed other companies to enter the market. Microsoft released its hand-held edition of Windows operating system in order to compete in the hand-held market segment. Hardware vendors including traditional PC manufacturers such as HP and Dell have introduced hand-held computing devices based on the Microsoft Windows CE operating system.

Table 12: Top Five Converged Mobile Device Vendors, FY 2006

Vendor	2006 Unit Shipments	2006 Market Share	2005 Unit Shipments	2005 Market Share	2006/2005 Growth
1. Nokia	38.7	48.1%	28.5	50.3%	35.8%
2. Research In Motion	6.0	7.5%	4.1	7.2%	46.3%
3. Panasonic	5.0	6.2%	5.5	9.7%	-9.1%
4. Motorola	4.9	6.1%	2.4	4.2%	104.2%
5. NEC	4.8	6.0%	5.5	9.7%	-12.7%
Others	21.1	26.2%	10.7	18.9%	97.2%
Total	80.5	100.0%	56.7	100.0%	42.0

Shipments in millions. Source: IDC Worldwide Quarterly Mobile Phone Tracker, February 2007.

The creation of a Smartphone – Symbian dominates the market

At the end of 1990s, Handspring Inc., utilized the Palm OS platform and introduced the Treo line of products, incorporating Cellular phone technology into the PDA design. By including a phone within the PDA, the users are now able to bundle their data access and communication needs in one device. Consequently, the Handspring Treo created a new category

of devices, the media defined as Smartphones. The traditional mobile phone manufacturers reacted strongly to this new threat to their positioning in the marketplace. In 1998, a group of manufacturers adjusted their competitive stance with each other and founded a joint venture to develop and promote their own operating system. Symbian Inc. is a jointly owned entity, its ownership comprises of: Ericsson (15.6%), Nokia (47.9%), Panasonic (10.5%), Samsung (4.5%), Siemens (8.4%) and Sony Ericsson (13.1%)⁸⁸.

The company's main mission is to create and license the Symbian operating system to any vendors that are interested in developing Smartphone devices. According to the company's fast-facts page, the company has recorded cumulative shipments of over 110 million Symbian Smartphones, since the formation of the company in 2006. Out of those 110 million phones, 51.7 million phones were individual consumer purchases. The popularity of the Nokia models commanded a significant two thirds of worldwide, Smartphone market penetration⁸⁹. Smartphones that are based on the Symbian operating system are particularly popular in Europe⁹⁰.

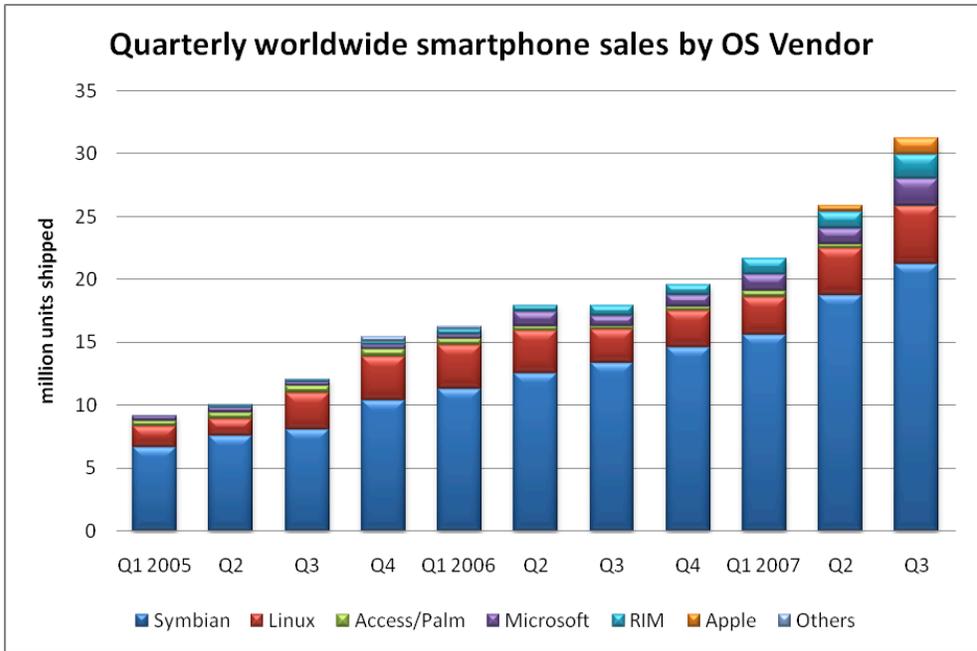


Figure 10: Quarterly worldwide smartphone sales by OS Vendor. Source: Canalsys⁹¹

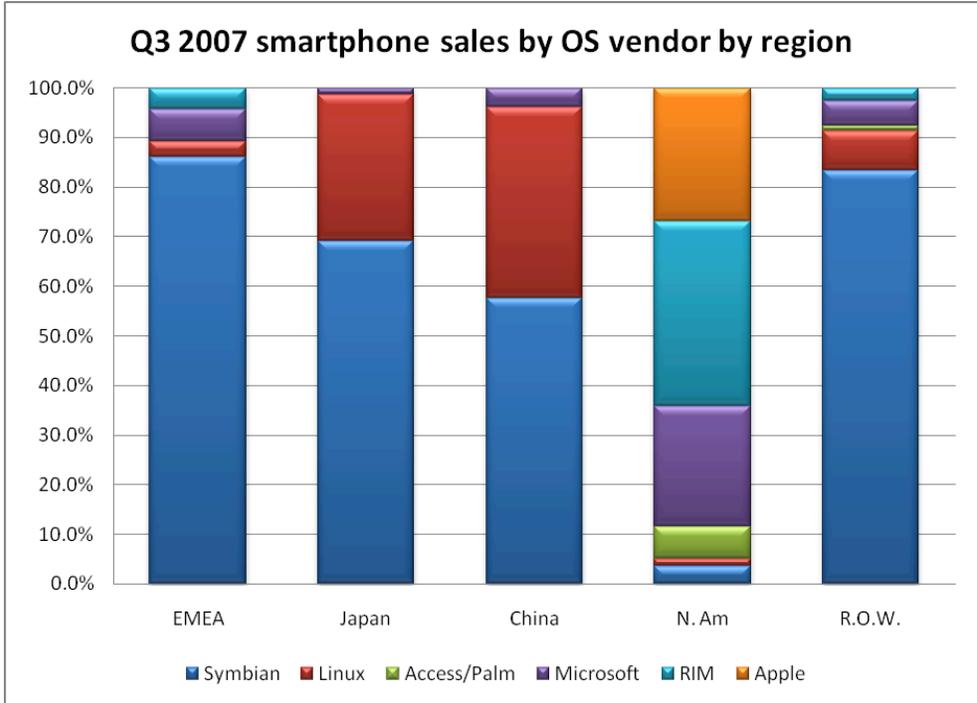


Figure 11: Q3 2007 Smartphone sales by OS vendor by region. Source: Canalsys

Microsoft Windows Mobile Platform

The giant software maker from Redmond, WA originally created this operating system to compete with Palm on the Personal Data Assistant (PDA) market. In the mid 1990s the company released Handheld PC 1.0. It is an attempt to put windows operating system on the handled device platform. The operating system platform evolved and first entered into the Smartphone market with the release of Pocket PC 2000. Microsoft Pocket office and Pocket Internet Explorer as well as Microsoft media player comes bundled in with the operating system. Microsoft officially changed the name of the product again with the release of Windows Mobile 2003. Today, Windows Mobile 6 is the current version of the operating system

Microsoft's strategy of selling windows mobile is to appeal to the business community's need to be mobile⁹². They are trying to cater to that specific need by mimicking their desktop version of Microsoft Windows and Office suite experience, as well as enabling users to stay in touch through the use of Microsoft Outlook and Microsoft Exchange Enterprise email server.

Today, over 30 different manufacturers produce Windows Mobile based devices. From the Canalys' research (Figure 11), Microsoft derives most of Windows Mobile overall sales in North American, trailing Research in Motion and Apple. Whereas the rest of the world is dominated by Symbian based devices. Today there are hundreds of different devices run Windows Mobile, but the most notable devices currently available in the North American market are manufactured by Samsung with their Blackjack series, Motorola with their Q series, and HTC with various different versions of OEM and private labelled phones.

Research In Motion

Based in Waterloo, Ontario, Research In Motion (RIM) is a Canadian company, that designs and manufactures wireless solutions for the mobile market. Their flag ship product line, the “Blackberry” utilizes RIM’s proprietary technology that enables users to send and receive corporate email, while they are away from their office. The service subscriber enjoys worldwide email access on their device. This option negates concerns regarding the security and confidentiality dangers of using a public access hotel desktop to access the Internet. It also enables users to communicate with business associates while onsite in a foreign location.

The Blackberry service is particularly successful in North America, where their majority subscriber base is comprised of corporate users. RIM is commanding approximately 41% of the U.S. Smartphone market and 11% of the worldwide, Smartphone market⁹³. RIM technology also enables a broad range of third-party software developers to develop software products to enhance the Blackberry experience. Ipsos-Reid conducted a usability study in 2005 and found that the Blackberry benefits administrators whom are seeking implementations of productivity gains; workflow efficiencies; and immediacy in their operational structure. In addition, the study also points out that the Blackberry reduces business costs, provides great Total Cost of Ownership (TCO) and measureable Return on Investment (ROI)⁹⁴.

In 2007, Research In Motion released the Pearl line of Blackberry devices. The importance of this new product line is particularly prominent because they are the first line of products that targets the consumer⁹⁵. The product is a success, and Research In Motion has not exhibited lack of growth since its introduction. In April 2, 2008 RIM reported better than expected earnings, double those of the previous quarter. The company also reported that they

have added over 2.18 million new subscribers that quarter, thus the subscriber base has grown to over 14 million.

Figure 12: RIM Subscriber Growth

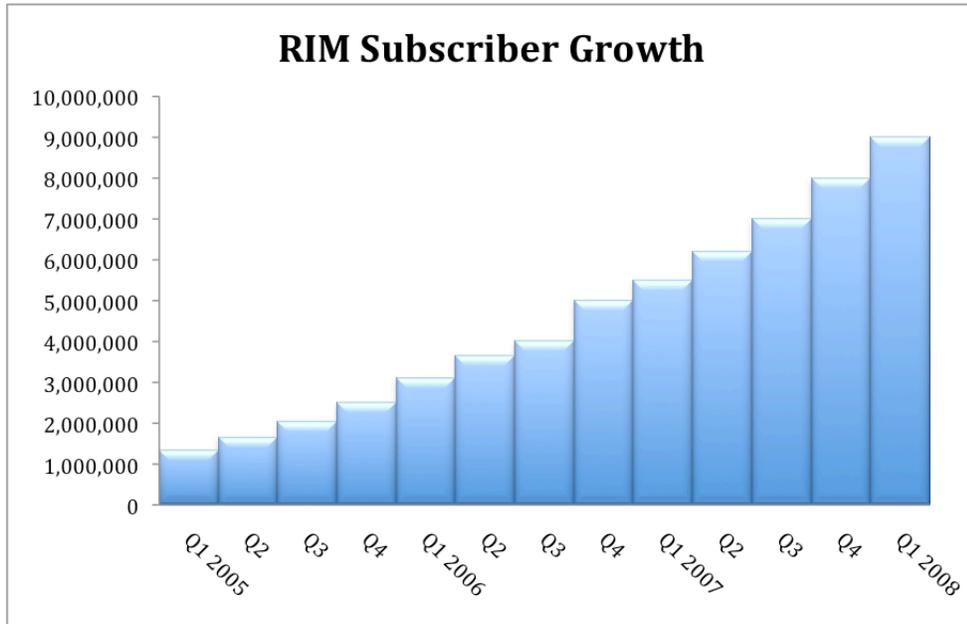
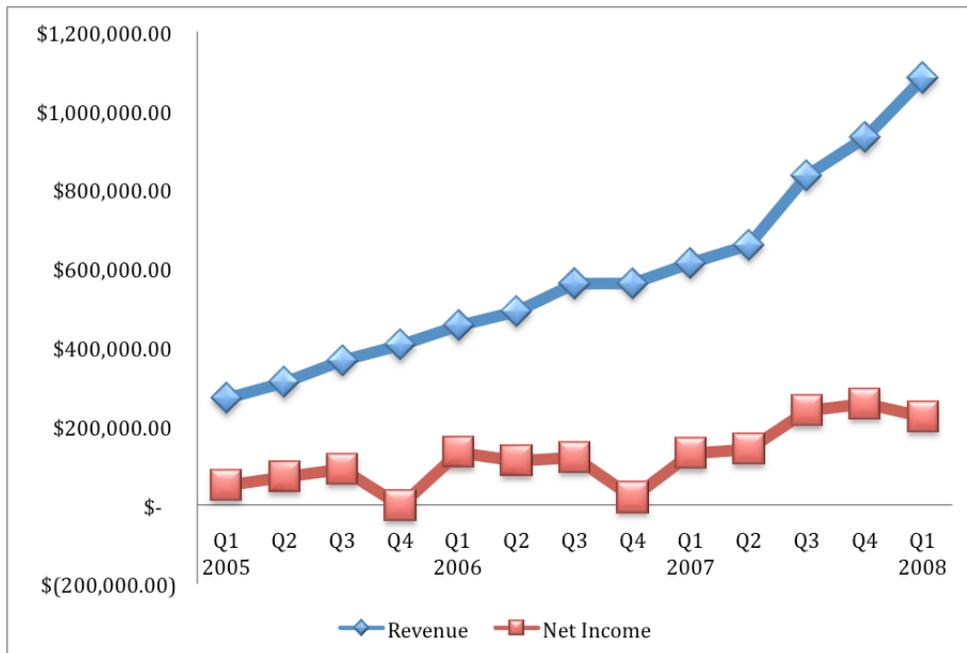


Figure 13: RIM Revenue and Net Income⁹⁶.



Google and the Open Handset Alliance

Google's has been well known for their support of the open-source software movement, including donating financial resources and maintaining links to a wide variety of open-source websites⁹⁷. Google's involvement has now reached mobile space. On November 5th, 2007, Google announced that they are releasing the first version of the anticipated handset operating system, code named Android. Joining CEO Eric Schmidt in the announcement, were the other members of the 34-member Open Handset Alliance, including the chief executives of: Deutsche Telekom, HTC, Qualcomm, and Motorola.

The open-handset alliance is a group of mobile network operators and handset manufacturers whose goal is to promote building a better mobile phone⁹⁸. Their vision for the next generation of mobile phones includes greater openness in the mobile ecosystem and enabling faster innovation at a lower cost. The Android operating system is the group's first step to realizing that goal.

Android is a complete operating platform that is designed specifically for the mobile phone. In order to jumpstart the development and gain support from the software development communities, Google has announced their Android developer challenge. In this challenge, Google has pledged a total of \$10 million to award developers who design a highly functional application for the Android Platform. Cash prizes, \$20,000 to \$270,000 will be awarded to the developer whose software application is picked by a panel of judges⁹⁹.

As Google's main source of revenue is from Internet advertising¹⁰⁰, media is focused on reporting the implications of mobile Internet access. Android will incorporate the WebKit rendering platform for its web browser, the same engine that acts as the foundation for Apple's Safari browser on computers and the iPhone¹⁰¹. This is significant because the goal for Apple's

Safari browser is to close the experience gap between desktop Internet access and mobile Internet access. By using the same rendering engine, a phone built with Android will potentially provide the users similar Internet browsing features and functionalities as Apple's iPhone. Google is effectively aligning itself with Apple's vision statement for future mobile Internet.

Apple – iPhone platform

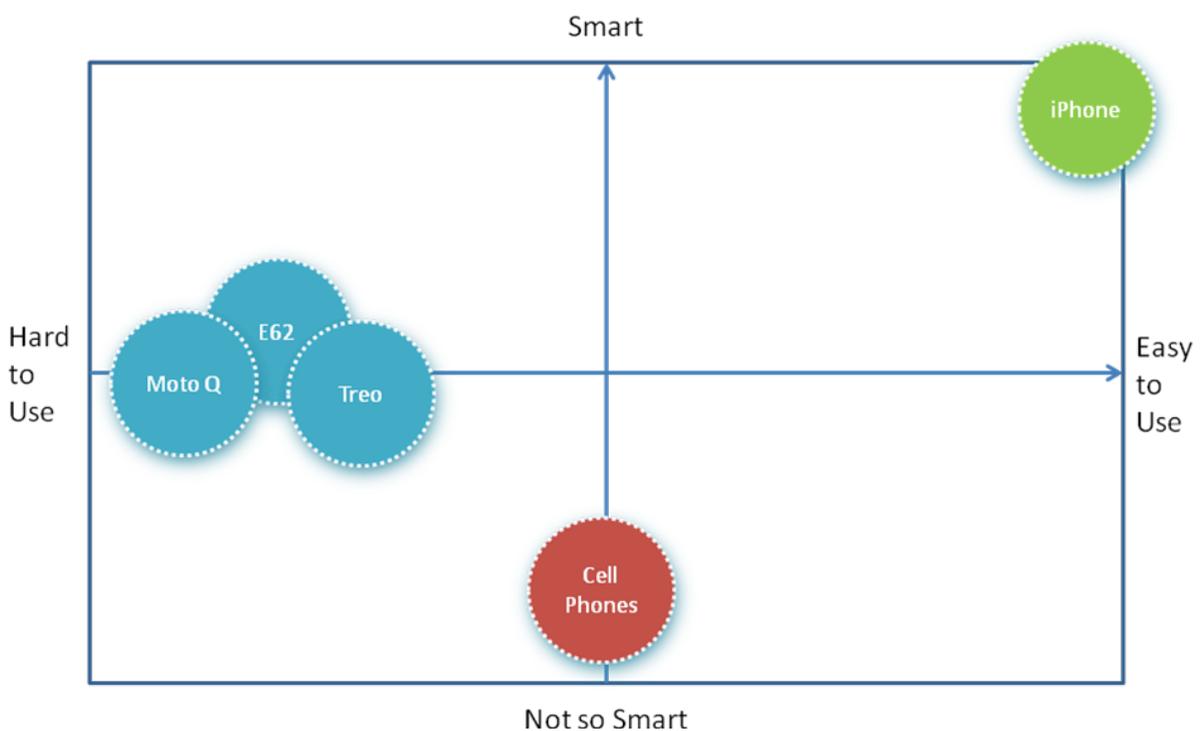
Regardless of the hype-marketing that promotes Apple's product lines, the Apple iPod is an iconic product on its own merit. Steve Jobs, the founder of Apple claims: "Apple released the iPod in 2001 and not only does it change the way we listen to the music, it changes the entire music industry".¹⁰² The popularity of this music device propelled Apple into a different business direction, and transformed the cultural use of music, not only in North America and but also around the world¹⁰³. The success of the iPod also promoted Apple's other products to the consumer. The sales of Macintosh computers benefited from the iPod's popularity and has gained market share steadily since 2005¹⁰⁴. Therefore, the effect of the iPod reputation and consumer exposure to its ease of use, will ultimately influence consumer selection of Apple's other products.

Steve Jobs unveiled the iPhone at the MacWorld San Francisco 2007 product launch and officially announced Apple as a new entrant into the mobile phone market, in his keynote address. Typical to his usual presentation style, he created suspense before the official announcement by repeating the main functionalities of the next Apple device: "A widescreen iPod with touch controls, a revolutionary mobile phone and a breakthrough Internet communication device; An iPod, phone and an Internet communicator ..."

Then he compared the iPhone's market positioning in relation to its competitors and proclaimed that, "the current batch of the Smartphones are not easy to use, whereas the feature

phones are not too smart. The iPhone on the other hand, is extremely easy to use and very smart.” He claimed that the usability issues on the Smartphones are due to their inflexible, input options: The keyboard is designed as a fixed, hardware keyboard with no way to change when the software demands changes. In comparison the iPhone is flexible, powerful and easier to use than the other devices.

Figure 14: Apple's iPhone market positioning¹⁰⁵



The iPhone has three main functions: an iPod music player, a mobile phone and a mobile Internet communication device. At a glance, the iPhone differentiates itself from other Smartphones by its appearance. While most other Smartphones have built-in QWERTY keyboards, the Apple iPhone has a large screen with only one button. The inputs to the device are completed through the touch screen system, with Apple’s patented gesture-user interface.

This interface is the source of the iPhone's ease of use, as it enables the user to directly manipulate the objects on the screen. Functions such as list scrolling and album cover art flipping can be done with a flick of the finger. The gesture controls are more natural compared with traditional buttons and hardware key inputs. Much like the other Smartphones, the iPhone allows the user to synchronize their contact information, scheduling data and files, along with their music collection through the use of iTunes. Given that the existing iPod user base is familiar with the iTunes synchronization procedure, the learning curve for an existing iPod user is relatively short.

One of Apple's many ambitions with the iPhone is to bridge the gap between PC computing and mobile device, Apple is encouraging software developers to take advantage of the iPhone software develop kit (SDK), to develop applications for the iPhone. Apple will also help to distribute the finished product through their iTune store. However, the most influential feature on the iPhone is the Internet communication feature. Apple is trying to close the user experience gap between the PC and mobile devices. The iPhone runs on a desktop class operating system: Mac OS X. Except for the smaller screen size, the iPhone software applications and user interfaces behaves much like the software that PC users currently use at home or in the workplace.¹⁰⁶ Users have come to appreciate and rely on successful Macintosh applications such as: iTunes, Safari, and Preview. These applications can be imported into the iPhone with minimal modifications and synced with a desktop application. For now, Apple has bundled their own web browser Safari with iPhone, with specific features such as zooming and multi-touch gesturing controls. However, the potential for other third party, Internet software developers to incorporate their "easy-to-use" Macintosh Internet products into the iPhone differentiates it from other platforms.

By the end of September 2007, Apple has sold 1.4 million iPhones in a little over a financial quarter. It took the iPod more than two years to reach the same number of sales¹⁰⁷. The price cut from their introductory price of \$599 down to \$399 on September 5, 2007¹⁰⁸, nearly doubled the daily sales of the iPhone. Apple predicts it is on track to sell 10 million iPhones by next year. According to the conference call transcript¹⁰⁹, of those 1.4 million iPhones, Apple estimates 250,000 (or 18 percent) were unlocked to work on networks other than AT&T.

The iPhone started selling in Europe late 2007. Starting with the UK, Apple partnered with O2 and later with T-Mobile in Germany. Apple then targeted France in November of the same year with Orange. However, the European reception of the iPhone launch was less than stellar¹¹⁰. By the end of 2007, the European operators reported that they have sold between 300,000 to 400,000 units¹¹¹.

There are several reasons for the iPhone's sluggish reception in Europe. Firstly, European customers are used to either paying for the phone, or the contract, but not both. In addition to paying for the device, iPhone subscribers are required to sign a contract with the designated network operator. Secondly, several companies introduced competing devices clustered during the time of the iPhone European launch: Nokia was targeting the technically, savvy crowd with the N95. LG was targeting the high-fashion segment with the Prada. Regardless of the lukewarm reception in Europe, Apple is still expecting to sell 10 million units of the iPhone world wide in the next three quarters of 2008.¹¹².

Demographics and device preference of Smartphone Users

M:Metrics surveyed three countries and collected demographics data regarding Smartphone usage. The company surveyed two European countries: U.K and Italy, as well as the U.S. The results were included in Mark Donovan's presentation. The findings indicate that the

U.S is still a male dominated market, with a median age of mid 30s. The U.K and Italy demographics findings indicated a female dominated market, with an overall median age of approximately 40 years old. The European data also indicated that on average, the typical European Smartphone users are older compared to U.S users. One notable aspect of this survey correlates the user preference of an operating system with the users' age. In the U.S, the older audiences are favouring older, established operating systems such as RIM's Blackberry OS and Palm OS, whereas Microsoft Windows and Symbian OS seem to appeal more to a younger user base. The market situation in Europe is different. Devices running the Symbian OS along with its subset, UIQ, dominate, making up over 60% of the market. The survey also indicated that Research In Motion's Blackberry is not as popular in Europe as they are in North America, although they are showing signs of increasing market penetration. Therefore, in the European market, female, end-users in the higher age median are exhibiting the same needs as the younger age median in the U.S.

VANOC may wish to target these consumers through further market segmentation according to user preference. International users of Symbian OS will have a heightened sense of interest in the 2010 Winter Games through a combination of excellent receptivity of streaming bandwidth on their mobile devices and advertising that appeals to their demographic needs for products, services and media communications.

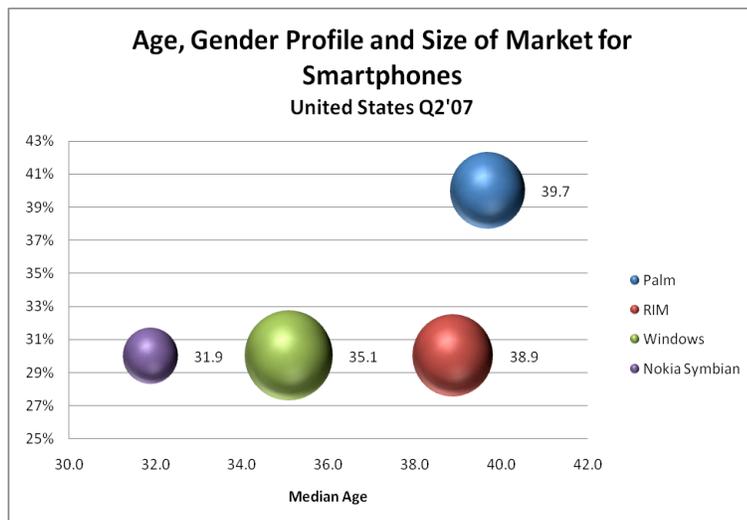


Figure 15: Age, Gender Profile and Size of Market for Smartphones United States - Source: M:Metrics Smartphone Owners Presentation October 15th 2007

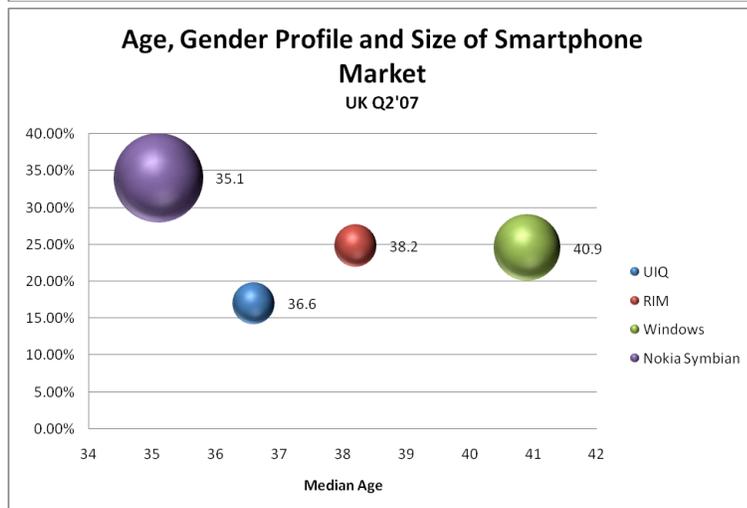


Figure 16: Age, Gender Profile and Size of Smartphone Market - UK 2007. Source: M:Metrics Smartphone Owners Presentation October 15th 2007

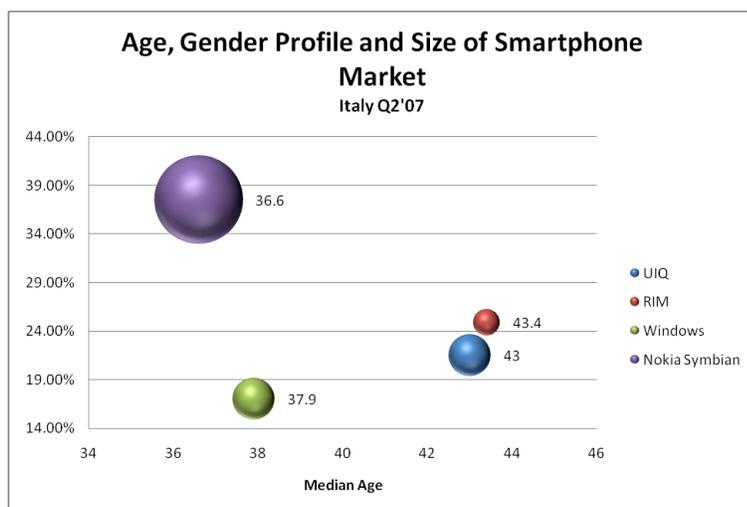


Figure 17: Age, Gender Profile and Size of Smartphone Market - Italy 2007. Source: M:Metrics Smartphone Owners Presentation October 15th 2007

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