



Opportunities to Drive the New e-Business with Mobile Commerce

by

Mr. Kritsakorn Chantarabunta

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

November 2004

D.
St. Gabriel's Library, Air

Opportunities to Drive the New e-Business with Mobile Commerce

by
Mr. Kritsakom Chantarabunta



A Final Report of the Three-Credit Course
CE 6998 Project


Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

November 2004


Project Title	Opportunities to Drive the New e-Business with Mobile Commerce
Name	Mr. Kritsakorn Chantarabunta
Project Advisor	Dr. Thanatphong Pratheepthaweephon
Academic Year	November 2004

The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

Approval Committee:


(Dr. Thanatphong Pratheepthaweephon)
Advisor


(Prof. Dr. Srisakdi Charmonman)
Chairman


(Dr. Chamnong J. Rapanich)
Dean and Co-advisor


(Assoc. Prof. Somchai Thayarnyong)
CHE Representative

November 2004

ABSTRACT

This project intends to study the possibility of operating mobile commerce with new e-business in Thailand. This study is related to measure the attitude of consumers toward the mobile internet concept in order to prepare the right marketing plan to attract the potential consumers to use this service, when they access to internet via mobile.

For conducting the research, the well-designed questionnaire is used as research tool with 400 sampling population, focused on the office people or salaried men and women in the Bangkok area. All data from the questionnaires have been analyzed by the frequency distribution and descriptive statistics in the form of percentage. Moreover, the researcher uses the SPSS version 12.0 to analyze and produce the survey result in the form of tables, bar charts, and pie chart.

From the survey results, it could be concluded that most respondents were not satisfied with the speed and quality of mobile Internet. However, the result show that most respondents would be satisfied with the new pattern of services that produced by Thailand Operator.

ACKNOWLEDGEMENTS

The author would like to express his deepest gratitude and sincere appreciation to his advisor, Dr. Thanatphong Pratheepthaweephon, for helpful guidance, useful suggestions, and encouragements that made this research study complete.

Moreover, author would like to express special thanks to Mobile manufacture Nokia, Sony Ericsson, Motorola and Thailand mobile operator, AIS and DTAC who give him all useful information to complete this research.

Furthermore, the author would like to extend his sincere gratitude to all respondents who have helped him in answering the questionnaire. This study could not have been successfully completed without their valuable time and information.

Finally, special appreciation is due to his colleagues for their suggestions and continuous encouragement. Above all, the author is forever grateful to all persons whose willingness to invest in his future has enabled him to achieve his educational goal.

TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
ABSTRACT	
ACKNOWLEDGEMENTS	ii
LIST OF FIGURE	
LIST OF TABLES	vii
I. INTRODUCTION	1
1.1 Introduction to the mobile Internet	2
1.2 Statement of the Problem	3
1.3 Research Objectives	8
1.4 Importance of the Study	8
1.5 Scope of the Study	8
II. LITERATURE REVIEW	9
2.1 Important technologies and innovations	9
2.2 New Business Opportunity	27
2.3 Evolution in consumer behavior	30
2.4 Business model and revenue sources	32
2.5 The mobile industry is characterized by a fast innovation cycle	34
III. RESEARCH METHODOLOGY	36
3.1 Research Design	36
3.2 Questionnaire Design	37
3.3 Data Collection	38
3.4 Sample Size	39

<u>Chapter</u>	<u>Page</u>
3.5 Data Analysis	40
IV. DATA ANALYSIS	41
4.1 Sample Design	41
4.2 The Analysis of the Demographic Characteristics	41
4.3 The Analysis of the Current Thailand Mobile Internet Services	50
V. CONCLUSIONS AND RECOMMENDATIONS	62
5.1 Research Summary	62
5.2 Recommendations	64
APPENDIX A QUESTIONAIR	66
BIBLIOGRAPHY	69



LIST OF FIGURE

Figure	Page
1.1 Mobile applications are generated from four different sources	7
2.1 The website of WAP Forum	9
2.2 Traditional big pipe small pipe problem	11
2.3 WAP and Internet standards in comparison	15
2.4 Homepage of Bluetooth Special Interest Group	17
4.1 Respondents Classified by Education	43
4.2 Respondents Classified by Income	44



LIST OF TABLE

<u>Table</u>	<u>Page</u>
1.1 The three main elements of the mobile Internet	3
2.1 WLAN standards compared to Bluetooth	26
2.2 Potential development for mobile applications	30
4.1 Table of Respondents Classified by Gender	41
4.2 Table of Respondents Classified by Age	42
4.3 Table of Respondents Classified by Education	42
4.4 Table of Respondents Classified by Income	43
4.5 Table of Respondents Classified by usage of Mobile Internet	44
4.6 Table of Respondents Classified by Download RingTone and Wallpaper	45
4.7 Table of Respondents Classified by Stock Exchange Online Trading	45
4.8 Table of Respondents Classified by Mobile E-mail	46
4.9 Total Number of Respondents Classified by Watching TV	46
4.10 Total Number of Respondents Classified by News Report	47
4.11 Total Number of Respondents Classified Mobile Banking	48
4.12 Total Number of Respondents Classified by Download Game	48
4.13 Total Number of Respondents Classified by Government Lotto Report	49
4.14 Total Number of Respondents Classified by Online Shopping	49
4.15 Total Number of Respondents Classified by Online Reservation	50
4.16 Total Number of Respondents Classified by Satisfaction on Thailand Mobile Internet Service	50
4.17 Total Number of Respondents Classified by Important of Mobile Internet Payment System	51

<u>Table</u>	<u>Page</u>
4.18 Total Number of Respondents Classified by Satisfaction on Mobile Internet Payment System	52
4.19 Total Number of Respondents Classified by Secure of Mobile Internet Payment Transaction	53
4.20 Total Number of Respondents Classified by Satisfaction of Product and Pricing on Mobile Internet Online Shopping Service	54
4.21 Total Number of Respondents Classified by Satisfaction of Product and Pricing on Mobile Internet Online Shopping Service	55
4.22 Total Number of Respondents Classified by Importance of Billing System	56
4.23 Total Number of Respondents Classified by Satisfaction of Billing System	57
4.24 Total Number of Respondents Classified by Importance of Speed on Mobile Internet Service	58
4.25 Total Number of Respondents Classified by Satisfaction of Speed on Mobile Internet Service	59
4.26 Total Number of Respondents Classified by Time	60
4.27 Total Number of Respondents Classified by Period	60

I. INTRODUCTION

In the past decade Mobile Commerce has become a lucrative channel for valuable transactions. The transaction purpose can obtain both tangible and intangible goods. While Mobile Commerce is a channel for obtaining tangible goods separately, it is an end receiver for intangible goods; for example, acquiring software application or information delivered to mobile phone in digital format.

Mobile commerce is a vast area of activity comprised of transactions with monetary value conducted via a mobile phone. These transactions may involve intangible goods, such as applications and information delivered to the mobile device in digital format, as well as tangible goods that are purchased using the mobile phone but delivered separately.

Mobile Commerce has open new opportunities for Services sector such as e-banking, e-payment, or e-movie ticket, or e-application. The value is estimated at billions of baht per year and is continuously growing at a fast rate. The major factors that supported this growth are high security, ease of use, personalization, along with immediacy, and location awareness.

Mobile commerce is creating entirely new service opportunities - such as payment, banking, and ticketing transactions - using a wireless device. Secure payment and ease of use are key features of mobile commerce, along with immediacy, personalization, and location awareness.

Today, a considerable proportion of Mobile Commerce consists of purchasing different types of digital content. In most cases it is used in the mobile device receiver that is the Mobile Phone. The new generation people are demanding for personalization especially with their mobile phone with tools such as ring tone, screen saver, wallpaper,

game and other applications, etc. These can easily be obtained via purchasing digital content and services, consequently adopting mobile payment mechanism.

People want to personalize their mobile devices with ringing tones, screen savers, and wallpapers and increasingly downloading games and other applications. They are getting used to buying digital content and services with the mobile device which makes it easier to adopt the mobile payment mechanism for physical goods as well.

The key drivers of mobile commerce service adoption are ease-of-use and convenience, keeping the issue of security in mind. Applications and services that are too complex and time-consuming will discourage consumers from "going mobile."

1.1 Introduction to the mobile Internet

Mobile business is a broad definition that includes communication, transaction and different value added services, which are made available using mobile terminals such as phones, PDAs and pagers. Today, most of the attention is around consumer services but business-to-business and business-to-employee segments are also important. The term "mobile internet" has been introduced to emphasize the synergy between Internet applications and the mobile world.

Another essential definition for this book is mobile commerce. This is referred to as "transactions with monetary value, conducted using the mobile Internet". This definition covers business-to-business, business-to-consumer and consumer-to-consumer transactions. Traditional voice calls are not included in the definition of mobile commerce, but services using voice recognition in order to enable commercial transactions fall into this category. Mobile commerce is a sub-set of electronic commerce in terms of technical issues. However, the term "mobile e-commerce" is a bit misleading because the business models and value chain are totally different from electronic commerce. Additionally, mobile commerce is not a truncated form of

e-commerce but a new, innovative way of conducting time-critical transactions regardless of location.

1.2 Statement of the Problem, Main elements and investment opportunities

Mobile Internet can be divided into three main elements, presenting a horizontal approach to the core applications. The elements are communication, commerce and value added services. Introducing vertical target groups, corporate and consumer can broadly categorize most mobile Internet applications.

Table 1.1. The three main elements of the mobile Internet.

	Corporate	Consumer
Communication	<ul style="list-style-type: none"> ■ Voice ■ E-mail ■ Instant messaging ■ Unified messaging ■ Team working tools ■ Video telephony 	<ul style="list-style-type: none"> ■ Voice ■ E-mail ■ Instant messaging ■ Unified messaging ■ Chat ■ Video telephony ■ Community services • Digital postcards

Table 1.1. The three main elements of the mobile Internet (Continued).

	Corporate	Consumer
Commerce	<ul style="list-style-type: none">■ Retails■ Location-based commerce■ Stock broking■ Banking■ Corporate auctions■ Multi channel commerce■ Insurance■ Reservation■ Advertising	<ul style="list-style-type: none">■ Retail■ Location-based commerce■ Comparison shopping inside the store■ Ticketing■ Stock broking■ Banking■ Auctions■ Multi channel commerce■ Music■ Gambling and betting■ Ringing tones and phone icons■ Insurance■ Reservation■ Advertising

Table 1.1. The three main elements of the mobile Internet (Continued).

	Corporate	Consumer
Value added services	<ul style="list-style-type: none">■ Industry and financial news■ Customer relationship management■ Management reporting■ Fleet management'■ Sales force automation■ Employee self service■ Travel management■ Recruitment■ Supply chain management■ Human resource management■ Security■ Remote control	<ul style="list-style-type: none">■ News■ Entertainment■ Travel■ Driving directions■ Location-based services■ Security■ Domestic remote control■ Calendar■ Society services■ Instant messaging services

The applications of mobile Internet are generated from four different sources:

- (1) Fixed Internet applications, such as e-mail, news and stock broking. The form factor of a mobile device is taken into consideration when developing the services. However, applications are based on the fixed Internet. Therefore, the time to market is considerably shortened. Another way to generate mobile applications is to design mobile extensions for existing Internet solutions. These extensions are not available when using the service with a PC. Instant messaging used with online auctions falls into this category.
- (2) Content-driven multi channel services. TV, radio or print is used in conjunction with mobile phones. The new channel is used in order to generate transactions, increase interactivity or provide secure and instant payment channels to consumers.
- (3) Corporate systems. Real-time information from the corporate legacy systems is used in order to generate mobile applications. For example, management reporting, sales force automation and employee self-service is used to increase efficiency and cut down costs.
- (4) Technology-enabled applications. Instant messaging, location technologies and personalization are used to innovate new services which are able to push time and location critical content to mobile devices. These applications are personalized for the user. This category has enormous untapped potential because it is something completely new. It uses the characteristics of a mobile device creatively.

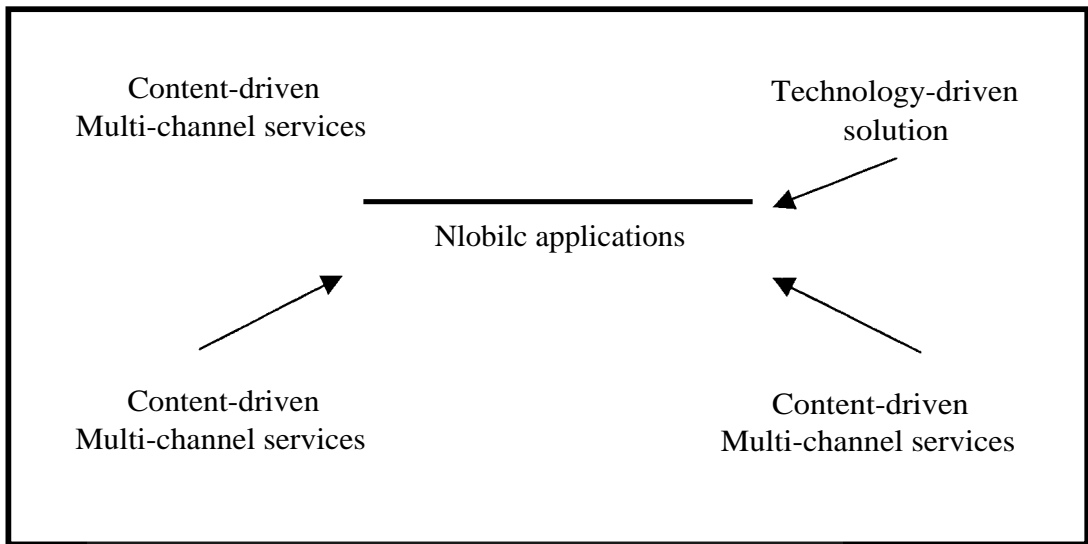


Figure 1.1. Mobile applications are generated from four different sources.

The players in the mobile Internet arena focus on applications most suitable for their interests and business strategy. Internet and mobile phone penetration, together with the user patterns and behavior in various countries, define the most appropriate approach. Countries with high mobile phone and inter- net penetration may be suitable targets for services integrating the two into a value added service. Fixed portals can offer PC interface for easy set-up and personalization of a mobile portal. This way, the small screen and character input limitations might be overcome because most of the customers also have a fixed Internet connection. On the other hand, countries with low Internet penetration are target for companies developing independent mobile applications. For example, location-sensitive driving directions, mobile e-mail, and ticketing and stock broking are all applications that do not necessarily need a fixed Internet connection to overcome the inadequacies of mobile terminals. Finally, some countries with very low mobile phone and Internet penetration may be immature

markets for the deployment of mobile services. Most developing countries are still in a state where investments in mobile Internet technology cannot be justified.

1.3 Research Objectives

The purpose of this research are as follow:

- (1) To know and analyze the current market situation of Mobile commerce in Thailand.
- (2) To explore the possibility of occurrence for New Mobile Commerce in Thailand.
- (3) To design a successful marketing strategy of Mobile Commerce concept.

1.4 Importance of the Study

This research study is emphasized to concern and measure the attitude of consumers toward the concept of Mobile Commerce with tiny screen web technologies delivery. Due to this attitude measurement can give the value to prepare the right marketing plan to attract the consumer to use this concept. Therefore, the researcher hopes that the findings of this research will be useful for investor who are interested to increase sales channel or drive new business on Mobile Internet.

1.5 Scope of the Study

The scopes of this study are as follow

- (1) This study emphasizes on the main target group, aged 15-45 years.
- (2) This study emphasizes on office people with low to high income.
- (3) The scope of this study covers only consumers in Bangkok area.

II. LITERATURE REVIEW

2.1 Important technologies and innovations

2.1.1 WAP and XHTML

WAP (Wireless Application Protocol) is an industry standard for mobile internet applications. Application developers around the world use WAP to create solutions for mobile data and communication. An open standard, it has been developed in cooperation with numerous companies from various segments of the mobile industry. Mobile operators, device manufacturers, software developers and many others have been involved in WAP Forum, the industry consortium dedicated to bringing information services to mobile devices. WAP

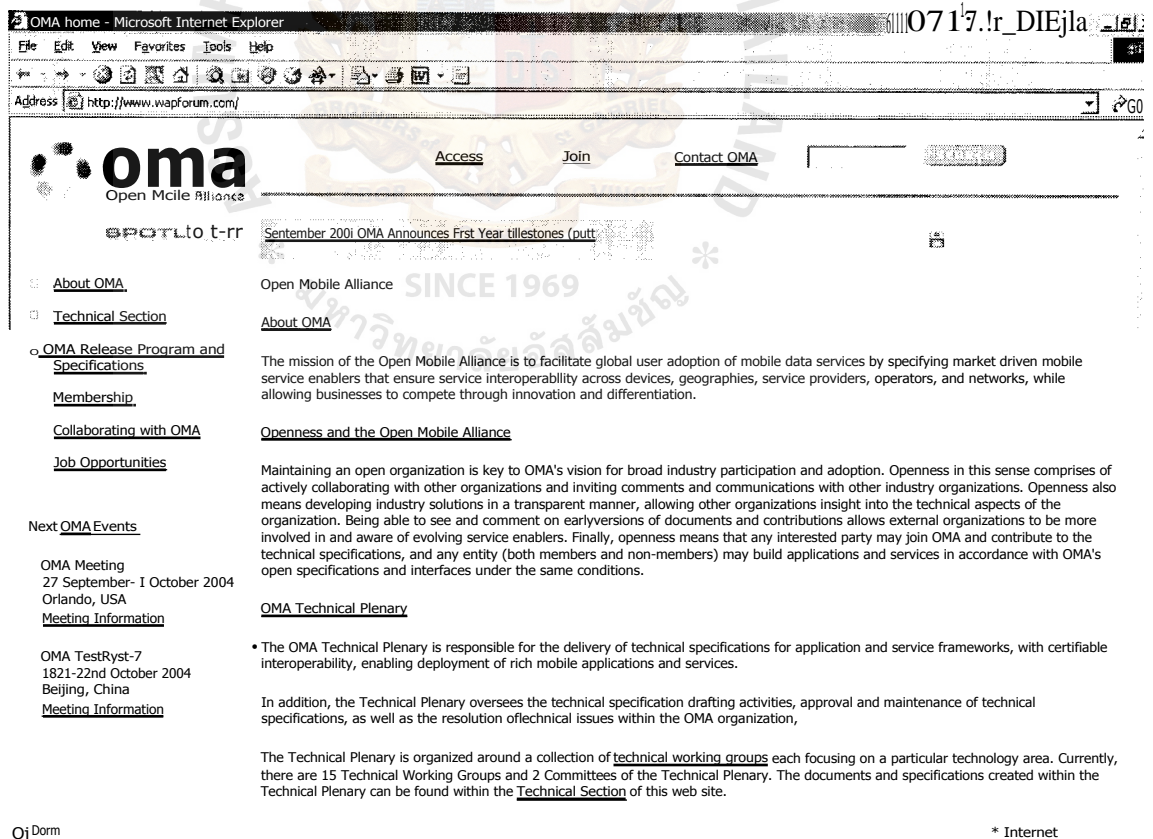


Figure 2.1. The website of WAP Forum

Forum was initially launched in 1997 by Nokia, Ericsson, Motorola and [Phone.com](http://www.phone.com) (recently renamed Open wave). Since its inception, WAP forum has been responsible for wireless protocol specification and its contribution to several industry groups and standard bodies. The organization has expanded rapidly and acquired strong industry backing from companies such as Microsoft, Deutsche Telecom, France Telecom and 3Com.

WAP Forum was founded primarily to integrate the two booming markets: Telecom and the Internet. Since the introduction of WAP, the two markets have been able to reach synergic advantages by combining their strengths and driving development in a desirable direction. Open Internet standards have already paved the way for WAP. Now the limitations of mobile devices will be taken into consideration with the emergence of WAP services. A fixed Internet connection and the mobile Internet are very different. Mobile devices have substantially smaller screens and keypads than PCs. Additionally, power consumption, small memory and less powerful CPUs restrict the use of mobile devices for the "surfing" we experience with the fixed internet today. Mobile data networks are different as well. They have less bandwidth and connection stability than the fixed networks. In addition, the availability of the network connection cannot be guaranteed at all times. This is also the case with the introduction of new mobile networks because they cannot instantly cover all the land areas, they are only available in the biggest cities. For all of these reasons, platform and bearer independent Wireless Application Protocol was developed. Wireless Markup Language, WML, is used to define the graphical layout of the service. WML is optimized for small screens and various input devices. Because the bandwidth is limited in mobile networks, the WAP Gateway before transportation to a mobile device compresses WML. This way, the speed can be enhanced while the load on mobile networks is decreased.

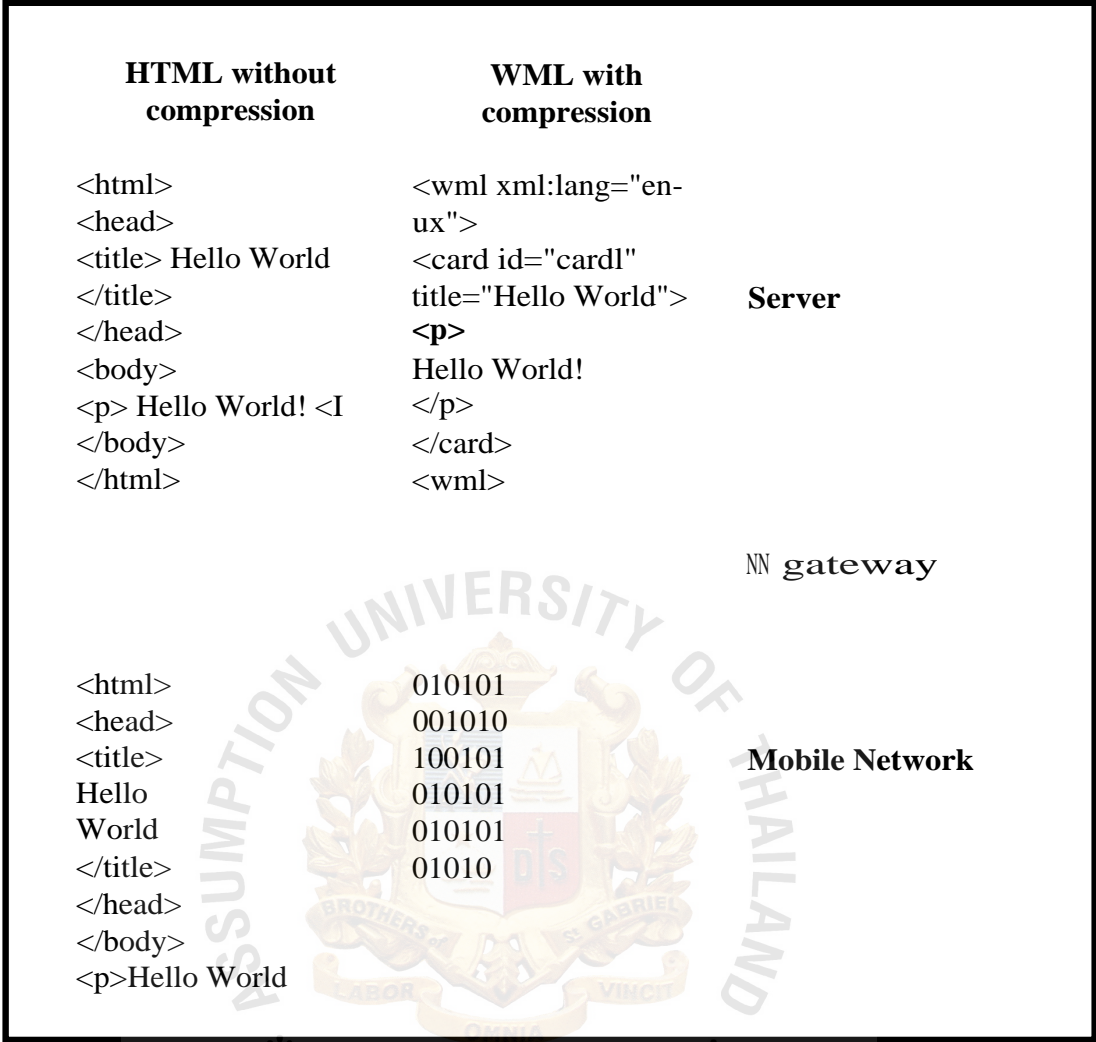


Figure 2.2. Traditional big pipe small pipe problem. (VML is compressed by the WAP gateway before transportation to mobile network) WAP browser of mobile phone is able to convert compressed tags back to original form.

The use of WAP services is slow and cumbersome with circuit-switched networks. The initial connection takes a long time and there is a data call charge for browsing the services. This makes circuit-switched WAP expensive compared to the next generation of packet-switched networks, where the customer is charged according to the data transmitted. With the new GPRS (Europe) and 1XRTT (North America) networks, connection is always on, enabling push e-mail and an instant connection to

numerous innovative services. Therefore, it is likely that the use of WAP services will explode with the introduction of the new, packet-switched networks.

WAP has raised the question of whether there is a need for a completely new standard for mobile data provisioning. Additionally, there have been debates that WAP will be short-lived because the new mobile networks with substantial bandwidth capacity will soon be introduced. Application developers and systems integrators have also pointed out that it will be very expensive to design two net centric applications that generate the same information; one for HTML and the other for WML.

The next evolution of WAP (WAP 2.0) is being developed to overcome the problems inherent in WAP technology. WAP 2.0 uses the basic profile of XHTML Basic (eXtensible HyperText Markup Language) to replace WML in a Wireless Application Environment. XHTML Basic is backwards compatible with WAP and it will be used in most of the mobile devices from 2002 onwards. The ultimate goal of XHTML technology is to create a single markup language for both mobile and fixed Internet worlds.

Several industry leaders have joined to support XHTML standard. Mobile phone manufacturers (Nokia, Ericsson, Motorola, Siemens), Operators (Vodafone, Orange, T-Mobil, Sonera) and many others (Accenture, Adobe, Sun Microsystems, AOL, CNN) have expressed their commitment to the new markup language. Therefore, it seems that XHTML is likely to succeed in its mission to become a de facto standard of mobile and fixed Internet.

XHTML is not the only improvement in the WAP 2.0 standard. The WAP protocol stack introduced in the WAP 1 .0 standard has been extended to support common Internet standards, such as TCP/IP and HTTP. For application developers, this is a major improvement, because communication between a WAP 2.0 compatible client

and the origin server can be conducted using HTTP. The first version of WAP required a WAP proxy server between the client and the origin server. With WAP 2.0, this is no longer a necessity. However, WAP proxy servers may be used to optimize the communication process and to provide advanced features, such as push functionality, location awareness and privacy.

Push WAP is one of the most exciting features of the WAP 2.0 specification. It extends hugely popular SMS messaging and offers an easy interface for receiving real-time alerts and notifications. When the user receives a push message, the WAP browser is automatically started. The user can follow links in the message and download additional information easily. Real-time e-mail notifications, auction alerts and mobile chat are just some of the services suited to Push WAP.

Security has been one of the major concerns in the first version of WAP. The WAP proxy server was the vulnerable link, preventing end-to-end security. This was caused by a blind moment in the encoding/decoding process when data was not encrypted properly. Banks and other financial institutions solved the problem by placing the WAP proxy within company premises, which was the only way to properly secure the communication. With WAP 2.0, enhanced security can be attained by using the wireless profiles of common internet protocols: Transport Layer Security, HTTP and TCP. This way, data is transferred between the client and the server securely without blind moments in the proxy server.

WAP 2.0 introduces the User Agent Profile (UAProf), a service that provides a mechanism for describing phone capabilities and user preferences to an application server. With UAProf, application developers can design solutions that take phone and user characteristics into consideration. Because of variable screen sizes, input methods and data capabilities, UAProf is an essential feature in WAP 2.0.

Application developers must adapt quickly to the changing market situation. When developing mass-market applications, they have to consider WAP and XHTML phone penetration among the target group. It takes some time before the penetration of XHTML is high enough for application development. The phenomenon is similar to the web, where application developers have to consider browser capabilities before introducing new services. In the beginning, frames could not be used because most people had web browsers, which did not support them. Later, some multimedia effects were impossible because they required plug-ins installed in only a small percentage of the web browsers. The same pattern continues with mobile technologies and, therefore, application developers need to build services, which are accessible to as many users as possible.



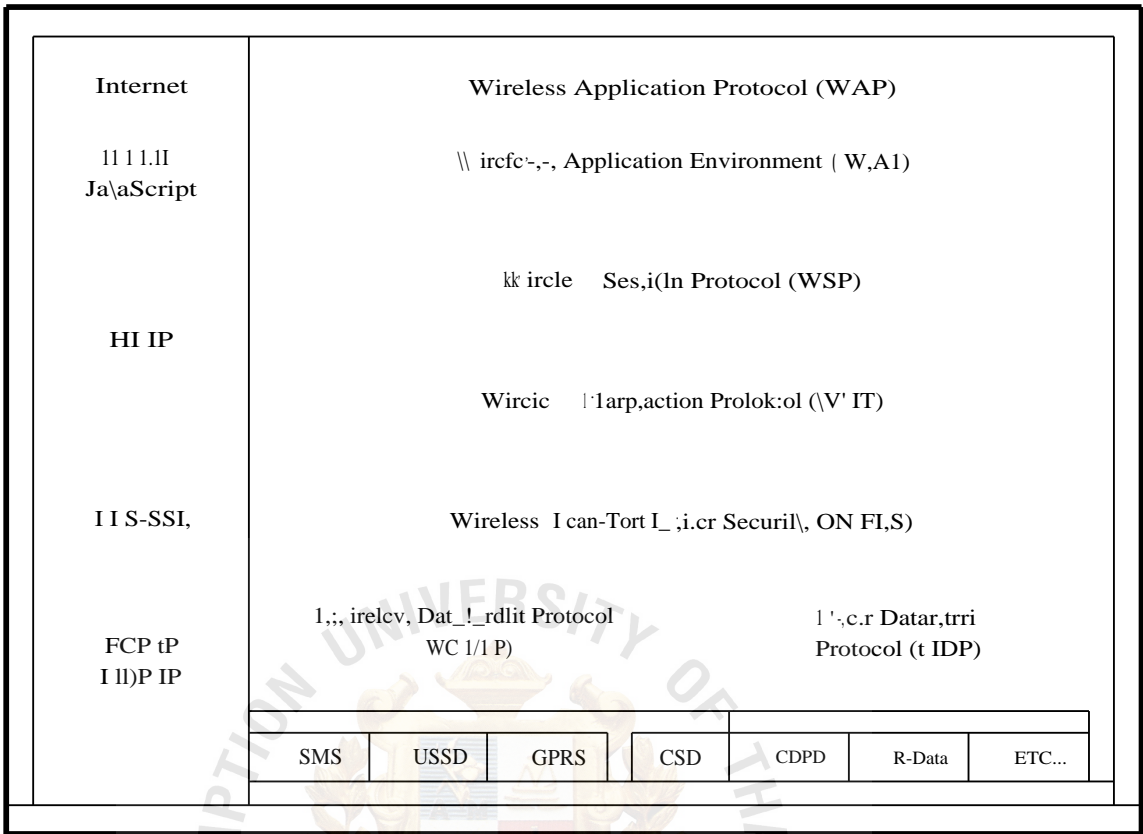


Figure 2.3. WAP and Internet standards in comparison.

One of the most common misconceptions about WAP is that the mobile operator controls the gateway and applications. On the contrary, WAP applications can be developed and managed by individual companies which have their own gateway and security components. For example, a company with Lotus Notes-based e-mail is able to offer WAP e-mail by attaching a special software component to Lotus Notes. This way, employees connect directly to a corporate Remote Access Server (RAS) to retrieve their e-mails. Information with a low or medium security rating does not require additional encryption procedures because the Notes and the WAP server reside inside the firewall. A company with its own WAP server has complete control over the information and applications transferred to a mobile device. This way, the applications can be used

regardless of the user's mobile operator. Therefore, companies using multiple operators are able to deploy corporate WAP applications that are accessible to everyone.

Strategic decisions regarding WAP deployment are based on two fundamental factors: timing and partners. The penetration of internet-capable mobile devices and the type of service define the right market entry conditions. Markets with high WAP device penetration are suited for horizontal, mass-market consumer services. In contrast, vertical WAP services, like corporate e-mail and team working tools, can be deployed as soon as all the employees have appropriate terminals in hand. In both horizontal and vertical markets, early entry is more expensive because of high infrastructure and development costs.

However, early entry helps a company acquire competitive advantage over its competitors and prepares the organization to adopt the new technology. Another fundamental factor regarding WAP deployment is the selection of partners. Should a company deploy a corporate WAP server instead of outsourcing it from the third parties? The deployment of a WAP server is likely to be more expensive but it provides increased security and control. The company can also monitor usage closely because the server resides within the corporate premises. On the other hand, installation, maintenance and upgrades require special expertise, which may be hard to find in some labor markets.

2.1.2 Bluetooth

Bluetooth is a short-range radio technology developed to connect several devices without wires. Because of its sophisticated power consumption, it is an effective technology for a new generation of internet-capable mobile terminals. The radio link of a Bluetooth device has a range of approximately ten meters. Within ten meters, there may be up to seven devices communicating with each other with a frequency of 2400

MHz. The size of a Bluetooth chip is about 9x9 mm and the technology is able to transmit voice and data at a rate of approximately 700 kb/s. The data rate is dependant on interference from other devices (such as microwave ovens and WLAN networks), the number of Bluetooth connections in a piconet and the strength of encryption. Because it is physically small and relatively inexpensive, the chip may be built into most terminals from 2002-2003 onwards. The development of Bluetooth technology takes place within the Bluetooth Special Interest Group, consisting of over 1,000 organizations. Some members are Ericsson, Nokia, 3Com, Microsoft, Intel and IBM. According to the International Data Corporation, the US will ship 103 million Bluetooth enabled devices in 2004 and the worldwide number will be 450 million.

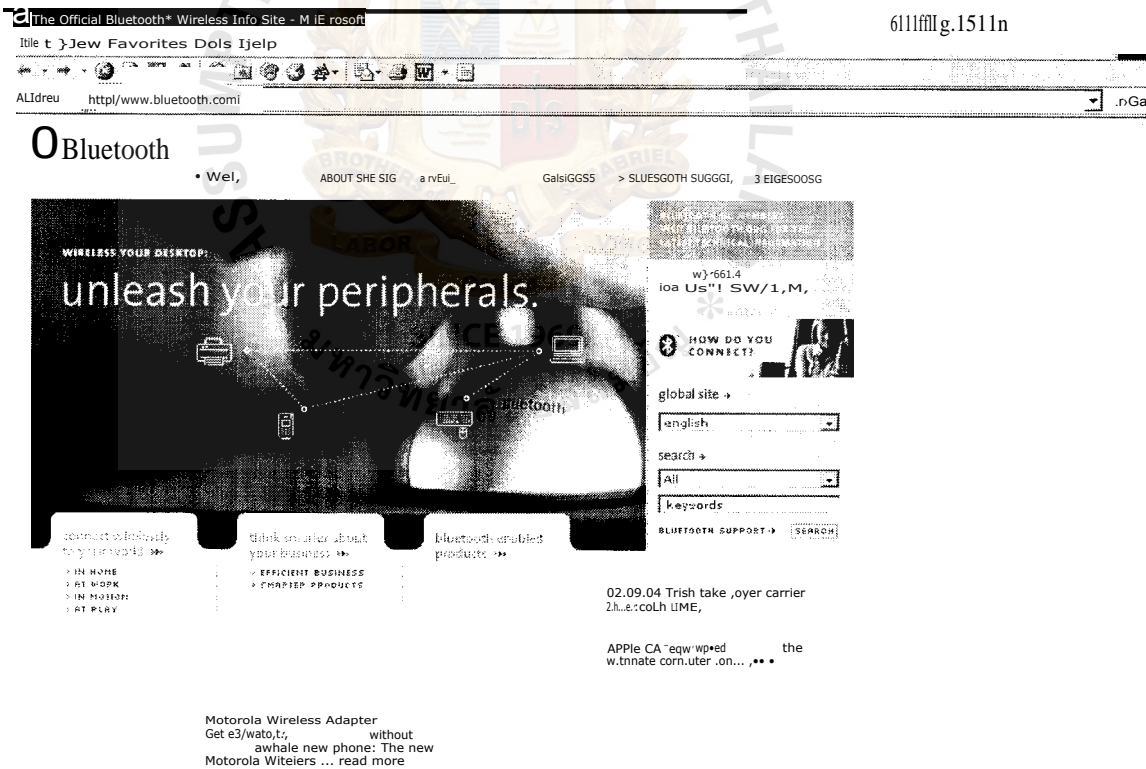


Figure 2.4. Homepage of Bluetooth Special Interest Group.

Bluetooth enables numerous innovative services and applications which function regardless of the mobile operator. Therefore, some of the concepts and business models of Bluetooth are dangerous for mobile operators. Because the handsets can be used off-line in various ways, if Bluetooth penetration becomes very high, mobile operators are in danger of losing their strong position as providers of value added services and payment solutions.

Some of the solutions enabled by Bluetooth technology are:

- (1) Synchronization between PC and mobile handset;
- (2) Synchronization of two or more mobile devices;
- (3) Mobile payment between a cash register and a smart card inside the mobile terminal;
- (4) Separate mobile phone handset and a PDA using the same interne connection;
- (5) Separate mobile phone handset, earpiece and screen;
- (6) Portable speakers;
- (7) Mobile games between two or more players;
- (8) Dynamic road toll collection and subway access;
- (9) Ticketing services (movies, museums, amusement parks, concerts);
- (10) Vending machine payments;
- (11) Parking space payments;
- (12) Security services, such as office and garage access.

Strategically, Bluetooth is an important technology for mobile commerce providers coming from high street retail companies. They are able to deploy multi-channel marketing strategies combining traditional media and mobile communication

into a lucrative package. With Bluetooth technology, established corporations will be able to offer new payment solutions and service concepts yet to be innovated. For example, retailers will be able to offer additional information about a particular product via a Bluetooth link located close to the actual item. This way, a customer could go "online" with his mobile terminal and acquire detailed information about the product. For instance, the customer can download a music sample from a record into his mobile phone while reading the cover. Later, at home, he could listen to the samples and download the rest of the album using the fixed Internet connection. This way, the traditional retail shopping experience is integrated into mobile commerce technology. In the era of electronic commerce, there is still an emotional and social need in traditional shopping.

Financial service providers such as banks and credit card companies can also use Bluetooth technology. Visa and Ericsson have become partners in order to develop concepts and technology for mobile payment using Bluetooth technology. Additionally, Nokia has developed technology where a mobile phone, equipped with a smart card, can be used for making payments at a cash register. This way, the booming fields of mobile communication and credit cards, are approaching each other and will eventually integrate. The two core technologies, Bluetooth and smart cards, enable this integration. In the future, there might be multiple smart cards within a single mobile device. This enables a situation whereby a credit card is used for payment and loyalty points are awarded simultaneously within the same transaction.

Companies with strategic intentions to introduce Bluetooth services should closely monitor the penetration of Bluetooth-enabled mobile terminals. They will be introduced in 2001-2002. Horizontal deployment of Bluetooth services, however, will not be possible until market penetration is high enough. Consumer adoption and handset

replacement cycle affect the expansion of Bluetooth-enabled terminals. Additionally, some of the first solutions are offered by the device manufacturers in order to connect physically separate pieces together. Ericsson has already introduced a mobile phone with a separate Bluetooth earpiece. It remains to be seen if these early solutions can also be used for other ad hoc Bluetooth connections.

2.1.3 Micro-browsers

A micro-browser is a piece of software, which enables internet access from a mobile phone. It may be installed on a SIM card with phones using SIM Application Toolkit. Another option is to integrate a micro-browser as a part of the core operating system of a mobile device. The first option enables new features to be introduced later on and gives mobile operators an opportunity to synchronize handsets at a later stage. However, most new phones are already equipped with WAP micro-browsers and, therefore, WAP software residing on a SIM card is becoming less popular.

Currently, there are three strategies on the market. Siemens, Nokia and Motorola rely on WAP. NTT DoCoMo in Japan offers HTML micro browsers. Microsoft has taken yet another approach by offering both WAP and HTML browsers with its Mobile Explorer. NTT DoCoMo has experienced tremendous success with their service in Japan, offering packet-switched data networks along with special phones called i-Mode. One of their key success points has been a wealth of content provided by thousands of individual developers. This has been possible because i-Mode-compatible phones are capable of accessing HTML content on the Internet. Naturally, the page cannot contain large images or special effects, but, as an approach, this is interesting because time to market can be cut down, as developers do not have to learn another markup language. Another success factor for i-Mode has been correct pricing and convenience because

they are used in a packet-switched environment where the user can connect to services instantly.

As a standard, WAP is very strong, supported by the largest players in the industry. Therefore, it seems likely that terminals equipped with a WAP-enabled browser will become more and more popular. Eventually, WML, HTML and XML evolution is likely to lead to a common standard integrating the technologies into one markup language. The industry has already announced strong support for XHTML Basic, the next generation of WAP. XHTML is supposed to lead to a common standard which brings the web and mobile worlds closer together.

2.1.4 Mobile networks: GSM

General Packet Radio Service (GPRS)

GPRS is a packet-switched protocol offering instant Internet access and enhanced data capabilities to existing GSM networks. It requires a software upgrade, new cards in the base station, and two pieces of equipment to handle the internet connection on the mobile operator's side. Additionally, consumers require new mobile terminals in order to use the new services.

GPRS uses the existing time slots of GSM networks to provide data services. Therefore, the service level is dependent on the amount of voice traffic and the number of active connections. In an ideal environment with little or no voice traffic, GPRS is able to use seven or eight time slots for data transfer. This way, the connection speed could realistically reach 115 Kb/s. However, the initial speed for GPRS implementations is likely to remain as low as 43.2 Kb/s downstream and 14.4 Kb/s upstream. The speed may be even lower than that because of immature user terminals. In the second phase, the connection speed may increase to bi-directional 56 Kb/s These

figures are substantially lower than the hyped 171 Kb/s which is the theoretical burst transmission speed of a GPRS network with no voice traffic.

Despite the hype and false expectations, GPRS has the potential to revolutionize mobile Internet access. As a matter of fact, the small screen size of mobile terminals and the light structure of markup language (WAP or XHTML) enable innovative services without high transmission speed. The most relevant success factors of GPRS-enabled terminals are instant connectivity and continual connection with the network. Because it is a packet-switched network, data can be pushed to a mobile terminal. Therefore, the user is able to receive e-mail as soon as it hits the inbox. Compared to the old circuit-switched (GSM) networks, this is more convenient. The user does not have to make a data call to check for e-mail. Another advantage of packet-switched networks is a new payment model whereby the user pays for the transferred data, not for the online time. Almost all the WAP applications require data to be transferred in bursts as opposed to continuously. Therefore, there are periods of inactivity in between the data bursts. For example, when browsing financial news the user downloads a certain amount of data from the network and then reads the screen. When compared to circuit-switched networks, GPRS is cost effective because the customer pays only for data transferred, not for the time taken to read the news.

2.1.5 Enhanced Data Rates for Global Evolution (EDGE)

EDGE is another packet-switched evolution of the existing GSM networks. It boosts the bandwidth of GPRS networks up to 384 Kb/s. This speed is achieved by using all eight 48 Kb/s timeslots available in the network. Realistically, however, the speed mobile operators are able to offer to customers is likely to be around 40 Kb/s upstream and 100 Kb/s downstream. Even though EDGE depends on GPRS equipment to provide service, mobile operators may choose an option to update the existing GSM

networks directly to EDGE. This way, the operator would have to wait for technology to become available. The first installations of EDGE are expected to take place in 2002 at the earliest. Therefore, a direct migration path to EDGE may be a selection for conservative operators wanting to see how the market for data services performs. In addition, GSM operators have to make strategic decisions regarding new networks because they aim to maximize service life and minimize costs. This can be done by selecting the correct network standards instead of investing in all of them as they become available. When compared with 3G, the next generation of mobile networks, EDGE is similar in terms of bandwidth and timing. Some mobile operators without licenses for 3G are likely to retain EDGE and wait for the new technologies instead of rushing to 3G. For operators, this might be a viable strategy because the demand for high-speed data has not been completely proven.

2.1.6 Wireless LAN - Another Perspective Towards 3G

WLAN (Wireless Local Area Network) technology was not an issue of discussion until European operators ended up paying enormous amounts of money for 3G spectrum licenses. After that, the stock prices of operators have decreased substantially, partly because of general technology slowdown and partly because investors think that 3G spectrum holders are in danger of drifting towards financial crises. This is caused by heavy investment in third generation network infrastructure and license fees that had to be paid in advance. In this situation, operators without 3G licenses are actively looking for alternative ways to offer sophisticated mobile services with smaller investment.

In a way, WLAN technology is closer to the fundamental principle of the internet, where everybody can set up an individual network as long as it follows the general Internet guidelines. Therefore, Internet Service Providers have shown an increasing interest towards WLAN technology. Similarly to the Internet, WLAN networks cannot

provide consistent Quality of Service (QoS). Because they operate in a free, "polluted" frequency band, other devices such as microwave ovens, Bluetooth devices and cordless phones produce interference and may cause lower service levels at times.

Generally, WLAN service providers do not have to pay spectrum license fees, because they operate in the license-exempt 2.4 GHz and 5 GHz frequency bands. France and the UK are exceptions to the prevailing frequency policy as they have imposed more restrictive procedures. According to the Wireless Telegraphy Act 1998, private (homes- and companies, indoors) WLAN networks operating on the 2.4 GHz band do not require licenses in the UK. A Telecommunications Act License is required to offer third party WLAN access. Currently, the Government does not have a formal process in place to issue commercial licenses. It is currently not known how the UK will react to the new WLAN technology using the 5 GHz frequency band. In France, the frequency band for WLAN applications is limited. In addition, Agence Nationale des Frequences (ANFR) has limited the maximum permitted radiated power in products, making it impossible to offer WLAN services outdoors. Despite limitations, some companies are offering commercial WLAN services in France, such as US-based Waypoint, which is building WLANs for luxury hotels.

Currently, the WLAN market is dominated by equipment based on the IEEE 802.11b standard. IEEE 802.11b defines wireless local area networking using the 2.4 GHz frequency band between a client network interface card (NIC) and an access point. The access point can be connected to a wired local area network or Internet access gateway. IEEE 802.11b compatible networks are able to deliver bandwidths up to 11 Mb/s, but the realistic data rate is closer to 5 Mb/s. Compared to 384 Kb/s provided by 3G networks, WLAN performs over ten times faster. Bandwidth depends on the following issues:

- (1) Distance between a WLAN card and an access point;
- (2) Encryption methods;
- (3) Interference from other devices using the same frequency band;
- (4) Number of WLAN cards attached to the same access point.

The maximum range for IEEE 802.11b equipment is approximately 50-100 meters indoors and 300-500 meters outdoors using an omni-directional antenna. WLAN can be used to provide internet access via:

- (1) "Hot spots", located indoors in office buildings, restaurants, train stations, airports, hotels, shopping centers, etc.;
- (2) Outdoor access points in densely populated areas.

The coverage area of a WLAN access point is much less than the area covered by one 3G base station. Therefore, WLAN is not a direct competitor to 3G mobile networks. The game becomes interesting when an operator without a 3G license deploys a hybrid network using GPRS, EDGE and WLAN technology. In this case, the operator is able to offer advanced services without having to pay license fees.

By the end of 2002, the next generation of WLAN products is expected to be available. These products will use the license exempt 5 GHz band and they will be designed to be more robust against sources of interference. Bandwidth in next generation WLAN products will increase, as the maximum physical rate is 54 Mb/s, providing a practical data speed of up to 32-38 Mb/s.

There are two competing standards with the next generation WLAN market: IEEE 802.11a and HiperLAN/2. HiperLAN/2, approved by European Telecommunications Standards Institute (ETSI), has been developed primarily in Europe. US-backed IEEE 802.11a standard relies on earlier development of IEEE 802.11b and, therefore, products supporting this standard are likely to be introduced first. Both standards may

be used to complement or compete with the third generation network technology in case an operator decides to build a hybrid network, using both WLAN and GPRS/EDGE/UMTS.

Table 2.1. WLAN standards compared to Bluetooth. Note that practical data rates and maximum range depend on several issues, such as interference, encryption and number of connections per access point.

Standard	Frequency	Maximum range	Practical Data Rate
IEEE 802.11b	2.4 GHz	30-100 meters indoor 100-500 meters outdoors	5 Mb/s
IEEE 802.11a	5 GHz	30-100 meters indoor 100-500 meters outdoors	32-38 Mb/s
HyperLan/2	5 GHz	30-100 meters indoor 100-500 meters outdoors	32-38 Mb/s
Bluetooth	2.4 GHz	10-100 meters	Asymmetric 721 Kb/s downstream and 57.6 Kb/s upstream, Symmetric 432.6 Kb/s

The availability of user terminals is one of the big questions for WLAN technology. Currently, laptop computers and some PDA devices can be attached to a WLAN network using a CF or a PCMCIA card. In future, we are likely to see PDAs and mobile phones that support multiple network technologies. From a consumer point of view, network technologies should be transparent and roaming

between WLAN access points and 3G base stations should take place automatically.

2.2 New Business Opportunity

Evolution in applications

Evolution of mobile applications is, without a doubt, a controversial issue. Similar to the fixed Internet, future expectations have been set with multi-media and mobile video telephony being the ultimate goal. However, reports of the fixed Internet have already proved many people do not use that multimedia itself. There are e-mail, chat and other less sophisticated programs that are killer applications instead of streaming multimedia. Therefore, it is likely that mobile Internet will follow the same pattern, with stripped-down features. Completely new solutions will also revolutionize the use of mobile internet. To sum up, high bandwidth is not always needed to offer sophisticated services capable of providing added value to the customer.

Evolution in applications is highly dependent on the development of mobile terminals. Operating system, screen size and the data processing capability of a mobile device define the framework for the application. Additionally, the type of micro-browser and possible plug-ins limit the applications provided over the network. Application developers should work closely with device manufacturers in order to understand the requirements of the future.

Mobile terminals are challenging environment for an application developer because of the variety of screen sizes and data processing capabilities. Especially at the initial stage, the processing power of mobile devices is substantially lower than computers. Screen sizes are not standardized, which makes it very hard to develop applications that look ideal in all devices. Content and graphical layouts

have to be separated from each other. This is the only way to optimize layout and ensure that the device is capable of receiving all the data that has been transmitted.

At the initial stage, most of the data services provided by mobile portals are general news and entertainment. However, news and entertainment will fall short of achieving customer loyalty because the competition in mobile services is fierce. Therefore, the portal sites will offer messaging solutions, such as e-mail, to increase customer loyalty and reduce churn. In addition to offering mobile messaging services, companies will move towards personalization to overcome the limitations in screen size and character input. This way the customers are able to access relevant services and information without expensive and time-consuming browsing. After personalization, some application developers will introduce large-scale location solutions integrating information into location coordinates. With location technology, mobile portal providers are able to offer new value added services to customers.

Application business models are also likely to change with the development of new mobile terminals. Currently, the user pays for access to the mobile internet personally. In the future, location-based and personalized advertisement will take place, gradually offering subsidized voice and data services. A mobile terminal, being a personal device, is an ideal tool for target marketing. There are already some companies offering free voice calls in return for listening to target advertising messages. However, mobile advertising is not likely to be introduced on a large scale until terminals develop and networks are able to offer location information in a relatively precise manner.

Evolution also takes place in other horizontal applications, such as commerce and messaging. Mobile commerce will develop in terms of security,

personalization and time sensitivity. Financial institutions will launch smart payment cards that can be included in the phone. This way, the security of a transaction is enhanced and convenient payment solutions can be launched. Additionally, personal matters and time sensitivity will characterize mobile shopping. It is impossible to "surf" the mobile internet in the same way we do using the fixed internet. Therefore, successful merchants have to introduce convenient solutions for personalization. In a personalized environment, the customer can access applications and information easily without time-consuming searching. Time sensitivity and independence of location will make mobile commerce unique from all the other marketing channels. Customers can complete transactions regardless of their location or time. Instant messaging technology and commerce applications will gradually integrate, offering solutions for mobile commerce. For example, a customer may set limits on a certain stock price in his personal portfolio. After the limits are broken, an instant message is automatically sent to his mobile terminal. While reading the message, he may decide to sell or buy some stocks, immediately, using his mobile device.

Table 2.2. Potential development for mobile applications.

	Current	Future
Target group	<ul style="list-style-type: none"> Horizontal mass market application 	<ul style="list-style-type: none"> Vertical applications with target groups User segmentation
Commerce applications	<ul style="list-style-type: none"> Mobile commerce tries unsuccessfully to imitate e-commerce business model 	<ul style="list-style-type: none"> Multi-channel strategies Location-base shopping Increased personalization <ul style="list-style-type: none"> Time-sensitive premium service Bluetooth enabled transaction Increased importance in system integration
Messaging	<ul style="list-style-type: none"> Mobile e-mail <ul style="list-style-type: none"> SMS 	<ul style="list-style-type: none"> Advance instant messaging Unified messaging combining all the messaging application together <ul style="list-style-type: none"> Increased time sensitivity
Advertising	<ul style="list-style-type: none"> Mobile advertising is virtually nonexistent 	<ul style="list-style-type: none"> Sponsored content Location-based advertising <ul style="list-style-type: none"> Free voice calls in return for listening to advertisement Personalized advertising
Corporate application	<ul style="list-style-type: none"> Simple CRM, ERP and SCM applications 	<ul style="list-style-type: none"> The corporate applications are integrated into mobile technologies resulting in location-based applications and increased time sensitivity with instant messaging

2.3 Evolution in consumer behavior

Consumers have the power to determine successful applications and terminal concepts, so their expectations have to be examined and nurtured. However, some of the applications and service models, which exist today, are so unusual that it was

impossible to forecast consumer demand for them. Text messaging is one of the surprising successes, bringing additional revenue to mobile operators and application developers. Who could have expected that messages typed with a very slow, 12-key keyboard would have such a success among mobile phone users? In Finland, the revenue from text messages already exceeds the revenue generated from television advertising, not to mention banner advertising on the Internet. Imagine the same thing happening in the US, Germany or some other country with a large population.

However, evolution in consumer behavior can be broadly predicted by examining the success factors of yesterday. Communication is likely to remain one of the core reasons for using a mobile device. The beginning of the internet was also characterized by a strong emphasis on communication tools, such as e-mail and newsgroups. E-mail has been able to maintain its strong position through the evolution of the fixed internet. Therefore, it seems inevitable that tools that provide social communication between family members, business professionals and friends are likely to conquer the mobile Internet as well.

Any development is partly dependent on the evolution of mobile networks because advanced solutions require the implementation of sophisticated location technologies. Where evolution continues to be focused on communication tools, there will be solutions that are based on the location of a handset. For example, family members are able to communicate with each other based on their current position. This way, the core characteristics (time sensitivity, location, intimacy) of mobile phones are used to innovate new communication services.

The evolution in consumer behavior always depends on the price of the services. The third generation networks are associated with mobile multimedia and video telephony. However, their increased bandwidth is likely to cost substantially more than

applications requiring less speed. Therefore, mobile multimedia for a horizontal target group cannot succeed unless the price is acceptable to the consumers. In contrast, business users are likely to be less concerned about the price. Additional value provided by the new technology is the most important factor for them.

The business models of mobile operators also affect consumer behavior. In some countries the mobile terminals are subsidized and the consumer pays, primarily, for network connection. This way the mobile operator can affect the adoption of the new services by providing new terminals to the consumers. The third generation networks are able to accelerate consumer adoption by delivering devices supporting advanced applications. In addition, mobile operators can offer free trials for video telephony and other sophisticated services. The situation is different in countries where subsidization is not used. The price of multimedia terminals is likely to be high initially, but those making a purchase decision will definitely use the advanced services. This is different from the countries with subsidized terminals, where there are no guarantees that consumers will actually start to use the new services when they are given the terminal for free. All in all, the mobile terminal replacement cycle will most definitely affect the implementation and deployment of the new services enabled by the advanced mobile networks.

2.4 Business model and revenue sources

The business models of mobile commerce providers have different success factors than the companies operating in the fixed Internet environment. Typically, mobile commerce is characterized by value added services and multi-channel strategies combining several medias together. The provider of mobile commerce has to use fixed internet, TV, radio and print media to overcome the limitations in screen size and character input methods. Therefore, some of the early movers are going to be

entertainment companies and other content providers, which have multiple channels for information provisioning. The mobile terminal can be used as a time-critical and location-independent tool for making a transaction. Because it is a personal device, a mobile phone or a PDA is an ideal instrument for payments and other transactions.

In many cases, an Internet service provider is acting solely as a gateway to the Internet without further intentions. However, mobile Internet providers, especially operators, intend to keep all the customers within their mobile portal. This way they are able to generate additional revenue from chargeable value added services. Because they have a billing relationship with the customers, mobile operators are able to offer services with micro-payments. This way, third party developers are also able to offer value added premium services that can be charged on the telephone bill. Naturally, the mobile operator takes a cut of the amount for providing the payment gateway.

Some of the operators have taken a so-called "walled garden" approach towards the mobile Internet. This means that the mobile operator does not allow free Internet browsing for their customers. In other words, the user cannot enter a particular internet address on her mobile phone and browse information found there. She has to stay within the environment provided by the mobile operator. This way, the operators ensure that the value added services provided by them are actually used. However, consumers accustomed to the fixed internet are not likely to tolerate these kinds of restrictions. It is going to be extremely easy to change the settings of a mobile terminal and start using another service provided by the competitor. Therefore, mobile Operators should follow the development closely and respond to consumer action without delay.

As noted earlier, a mobile terminal is not an ideal tool for general browsing on the internet. In contrast, search engines and directories are some of the main applications of the fixed internet and are used for searching global databases and specific documents

from all over the world. The fixed internet is characterized by globalization and international content. Mobile internet users are more interested in local information. They want to know what time a movie starts in the theater close by. They want to have access to the local news while on the move. Therefore, the mobile internet will be characterized by local content and information specifically targeted to the user.

2.5 The mobile industry is characterized by a fast innovation cycle

The mobile industry is loaded with future expectations and hopes that the emerging technologies will bring new dimensions to existing services. Application developers are looking forward to enhanced terminals with more data processing power and built-in security features. Mobile operators upgrade their networks to offer value added services to the customers. This way, everybody in the mobile internet value chain is affected by the new technology.

The innovation cycle of the fixed internet is very fast. New browsers are introduced regularly and computers and operating systems develop all the time. However, the fixed internet has come to a point where the user does not require the fastest and newest equipment in order to access the services. A computer may be three years old and still the quality of the internet browsing experience is high. This is where we notice the difference between fixed and mobile internet. Can you even imagine trying to browse some of the mobile services with a mobile phone that is three years old? It is simply impossible because the technologies have changed so much.

The innovation cycle of the mobile internet is very fast because of the immature nature of the mobile devices and networks. Developing mobile applications in an environment like this is challenging because the companies have to take into consideration the migration path to the next version. First application providers pay a high price for product development but they also acquire important experience from

user requirements and patterns. An early start is essential for those companies wanting to achieve a competitive edge and a critical mass of users before their competitors.



III. RESEARCH METHODOLOGY

The purpose of this research is to study the possibility to Drive Mobile Commerce business in Thailand, Anyway; it is emphasized to research the consumer's opinion in Bangkok areas. The scope of this research includes:

- (1) Research Design
- (2) Questionnaire Design
- (3) Data Collection
- (4) Sample Size
- (5) Data Analysis

3.1 Research Design

The definition of the research design is the plan to be followed to answer the research objectives or hypotheses. In essence, the researcher develops a structure to solve a specific problem.

For this study, the researcher selected the survey method for collecting the data because it allowed the researcher to collect the data for directly describing a large population. Therefore, the 400 sets of questionnaires were distributed to respondents in Bangkok areas during Sep 6 to 24, 2004. The questionnaire was divided into 4 main sections. The first section was designed to collect the respondent's personal information using 4 close-ended questions. The second section consists of 2 close- ended questions, which were designed to collect information to analyze the Mobile Commerce market situation in Thailand. The third section consists of 8 close-ended questions, which were designed to collect consumer's opinion toward the Thailand Mobile Commerce market. Finally, the fourth section is use for open-ended question.

3.2 Questionnaire Design

All pattern of survey research relies on the use of a questionnaire. Therefore, the questionnaire plays a critical role in the data collection process. An elaborate sampling plan, well-trained interviewers, proper statistical analysis techniques, and good editing and coding are all for naught if the questionnaire is poorly designed. Improper design can lead to incomplete information, inaccurate data, and of course higher costs. The questionnaire and the interviewer are the production line of marketing research. It is here that the product, be it good or bad, is created. To design a good questionnaire, a number of considerations must be kept in mind: Does it provide the necessary decision-making information for management and does it consider the respondent.

3.2.1 The Questionnaire Development Process

Designing a questionnaire involves a logical series of steps, as follows:

Step 1: Determine Survey objectives, Resources, and Constraints.

Step 2: Determine the Data Collection Method.

Step 3: Determine the Question Response Format.

Step 4: Decide the Question Wording.

Step 5: Establish Questionnaire Flow and Layout.

Step 6: Evaluate the Questionnaire.

Step 7: Obtain approval of all Relevant Parties.

Step 8: Pretest and Revise.

Step 9: Prepare Final Questionnaire Copy.

Step 10: Implementing the Survey.

3.2.2 Questionnaire Construction

To achieve the objectives of the study, the questionnaire was designed to be easy to understand, short and convenient for answering. Therefore, the researcher tried to

design the close-ended question as much as possible to collect right data with less consuming time from the respondents. The Questionnaire is divided into 4 main sections. The first section was designed to collect the respondent's personal information using 4 close- ended questions. The second section consists of 2 close-ended questions, which were designed to collect information to analyze the Thailand Mobile Commerce market situation in Thailand. The third section consists of 8 close-ended questions, which were designed to collect consumer's opinion toward the Thailand Mobile Internet Service. Finally, the fourth section is use as a tool to get opinion and recommendation on 1 open-ended question.

- (1) Circling or marking on the level of satisfaction
- (2) Represented with numbers, 5 4 3 2 1, which means Strongly Dissatisfied, Dissatisfied, Neutral, Satisfied and Strongly satisfied, respectively.

3.3 Data Collection

The survey method is used in this research. The 400 sets of questionnaires were distributed to the respondents, who are working people in Bangkok area, to collect the data. Moreover, the researcher tried to emphasize on collecting data from the younger working people and students. In fact, most of the younger worker people are the workers in the office around Wireless Rd. area, because this group of respondents, always has the behavior to use new technology, is the primary target for Mobile Commerce in Thailand.

To prevent the occurrence of error or incomplete data, the researcher immediately checked it after the respondents returned the questionnaires. So, the researcher would ask the respondents to fill or correct it again, if any error or incomplete data occurs.

3.4 Sample Size

This research used the non-probability sampling design. According to the infinite population, the techniques for determining sample size of statistical inference are based on the relationship among the estimated proportion of customer, the maximum allowance for error between the true proportion and sample proportion, and confidence level which indicates the long-run probability that the confidence interval estimate will be correct. So, the samples of this survey are randomly selected from the high volume of using Mobile Internet around Bangkok area, The sample customers were limited to only working people and student in Bangkok areas. In addition, the exact population proportion is unknown in this research, so a common procedure is to assume the worst case or pessimistic assumption (where the population variance is at its maximum) regarding the value of P.

Thus, the formula is:

$$n = \frac{Z^2 [P(1-P)]}{E^2}$$

Where,

n = Sample size

P = Population proportion that has required characteristics

Z = Acceptable level of confidence in standard error

E = Allowed level of sampling error

The level of confidence was specified at 95%, so the maximum allowance for error between the true and sample proportion is 5% or 0.05. The Z score, in accordance with the specific confidence level is 1.96.

Substituting in Formula,

$$n = \frac{1.96^2 (0.5)(0.5)}{(0.05)^2}$$

$$= 384 \text{ or } 400 \text{ respondents}$$

Therefore, the sample size for this research is 400 units

3.5 Data Analysis

In this research, the data from all questionnaires have been analyzed by the statistical analysis. The researcher uses the SPSS (the Statistical Package for Social Sciences) version 12.0 for Windows, to analyze and deliver the survey result. The frequency distribution and percentage distribution is also used to summarize the finding of the analysis. The result from the analysis is in the form of tables, pie charts and bar charts in the analysis and Appendix part.

IV. DATA ANALYSIS

This chapter presents the survey results on the consumer's opinion toward the possibility to drive Mobile e-commerce business in Thailand.

4.1 Sample Design

The sample size of this survey was 400 respondents, calculated by using a formula for random sampling. The useful information from this survey was obtained from the respondents in Bangkok area. All questionnaires were directly done by personal survey during Sep 6 to 24, 2004. To prevent the occurrence of error or incomplete data of 400 questionnaires, the researcher immediately checked it after the respondents returned the questionnaires. So, the researcher would ask the respondents to fill or correct it again, if any error or incomplete data is occur.

4.2 The Analysis of the Demographic Characteristics

Background characteristics in term of demographic variables of the total of respondents are summarized in the following Tables.

(1) Total Number of Respondents Classified by Gender.

Table 4.1. Table of Respondents Classified by Gender.

Gender	Percent	Valid Percent	Cumulative Percent
Female	50.0	50.0	50.0
Male	50.0	50.0	100.0
Total	100.0	100.0	

In this research, there were totally 400 respondents. The result showed that the same number of male and female that representing 50% of each gender.

(2) Total Number of Respondents Classified by Age.

Table 4.2. Table of Respondents Classified by Age.

	Frequency	Percent	Valid Percent	Cumulative Percent
15-25	100	25.0	25.0	25.0
26-35	263	65.8	65.8	90.8
36-45	37	9.3	9.3	100.0
Total	400	100.0	100.0	

In total of 400 respondents, the majority ages of respondents range between 15-25 years, 25%. Second majority group range between 26-35 years, 90.8 %. Third ranking group was over 35 years, 9.3% respectively.

(3) Total Number of Respondents Classified by Education.

Table 4.3. Table of Respondents Classified by Education.

	Frequency	Percent	Valid Percent	Cumulative Percent
Below Bachelor's Degree	43	10.8	10.8	10.8
Bachelor's Degree	287	71.8	71.8	82.5
Master's degree	70	17.5	17.5	100.0
Total	400	100.0	100.0	

The result of this survey regarding the level of education was described in the following the majority of respondents were educated in Diploma 10.8%. The second ranking was the respondents who had Bachelor's Degree, 82.5%. The third rankings of respondent were educated in the Master's Degree, 17.5%, respectively.

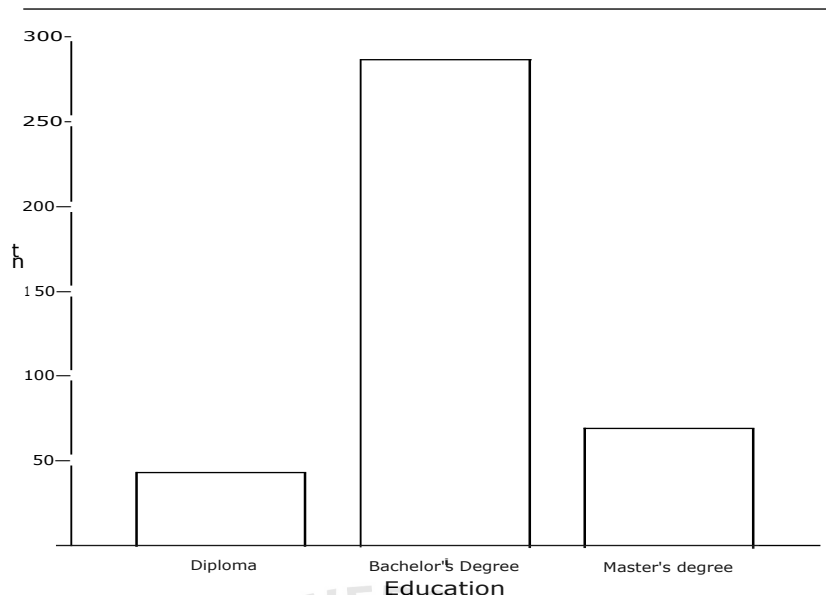


Figure 4.1. Respondents Classified by Education

(4) Total Number of Respondents Classified by Income.

Table 4.4. Table of Respondents Classified by Income.

	Frequency	Percent	Valid Percent	Cumulative Percent
10,000-20,000	201	50.3	50.3	50.3
20,001-30,000	92	23.0	23.0	73.3
30,001+	107	26.8	26.8	100.0
Total	400	100.0	100.0	

The majority of respondents had monthly income 10,000-20,000 Baht (50.3%). The second ranking group 20,001-30,000 Baht (23%). The third ranking group had monthly income over 30,000 Baht (26.8%), respectively.

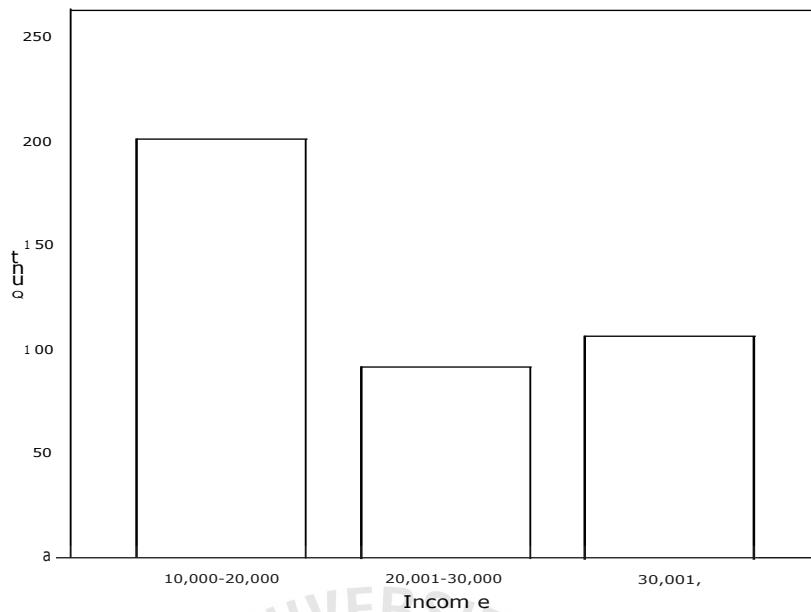


Figure 4.2. Respondents Classified by Income

(5) Total Number of Respondents Classified by usage of Mobile Internet.

Table 4.5. Table of Respondents Classified by usage of Mobile Internet.

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	187	46.8	46.8	46.8
No	213	53.3	53.3	100.0
Total	400	100.0	100.0	

This table showed that the majority of respondents never use mobile-internet before (53.3%). And the respondents, who usually use mobile-internet, are 46.8% of total response in the research.

- (6) Total Number of Respondents Classified by Download Ringtone and Wallpaper.

Table 4.6. Table of Respondents Classified by Download Ringtone and Download Wallpaper.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interesting	151	37.8	37.8	37.8
Download Ringtone and Wallpaper	249	62.3	62.3	100.0
Total	400	100.0	100.0	

This table showed that the majority of respondents that are interested to download ringtone and wallpaper via mobile interne (62.3%). And the respondents who are not interested on this service, are 37.8% of total response in the research.

- (7) Total Number of Respondents Classified by interesting on stock exchange online trading service.

Table 4.7. Table of Respondents Classified by Stock Exchange Online Trading.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interesting	324	81.0	81.0	81.0
Stock Exchange Online Trading	76	19.0	19.0	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested to use stock exchange online trading service via mobile internet (81%) and 19% of respondents were interested in this service.

- (8) Total Number of Respondents Classified by interesting on mobile e-mail service.

Table 4.8. Table of Respondents Classified by Mobile Internet.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interesting	229	57.3	57.3	57.3
E-Mail	171	42.8	42.8	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested to use e-mail via mobile Internet service (57.3%) and the rest of respondents 42.8% were interested in this service.

- (9) Total Number of Respondents Classified by interesting on watching TV via mobile internet service.

Table 4.9. Total Number of Respondents Classified Watching TV.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interesting	299	74.8	74.8	74.8
Watching TV	101	25.3	25.3	100.0
Total	400	100.0	100.0	

This table showed that the majority of respondents that aren't interested to use watching TV service via mobile internet (74.8%). And the respondents who are interested on this service, are 25.3% of total response in the research.

(10) Total Number of Respondents Classified by interesting on news report update via mobile Internet service.

Table 4.10. Total Number of Respondents Classified News Report.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interesting	257	64.3	64.3	64.3
News Report	143	35.8	35.8	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested on news report update via mobile Internet service (64.3%) and the rest of them (35.8%) were interested in this service.

- (11) Total Number of Respondents Classified interested on mobile banking via mobile Internet service.

Table 4.11. Total Number of Respondents Classified by Mobile Banking.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interest	256	64.0	64.0	64.0
Mobile Internet Banking	144	36.0	36.0	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested on mobile banking via mobile Internet service (64%) and the rest of them (36%) were interested in this service.

- (12) Total Number of Respondents Classified by interest on download games via mobile internet service.

Table 4.12. Total Number of Respondents Classified Download Games.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interest	258	64.5	64.5	64.5
Game Download	142	35.5	35.5	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested on mobile banking via mobile Internet service (64.5%) and the rest of them (35.5%) were interested in this service.

(13) Total Number of Respondents Classified by Government Lotto Report

Table 4.13. Total Number of Respondents Classified by Government Lotto Report.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interest	345	86.3	86.3	86.3
Government Lotto Report	55	13.8	13.8	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested on government lotto report via mobile Internet service (86.3%) and the rest of them (13.8%) were interested in this service.

(14) Total Number of Respondents Classified by Online Shopping.

Table 4.14. Total Number of Respondents Classified by Online Shopping.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interest	283	70.8	70.8	70.8
Online Shopping	117	29.3	29.3	100.0
Total	400	100.0	100.0	

This table showed that the majority of respondents that are not interested to online shopping service via mobile internet (70.8%). And the respondents who are not interested on this service, are 29.3% of total response in the research.

(15) Total Number of Respondents Classified by Online Reservation

Table 4.15. Total Number of Respondents Classified by Online Reservation.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not interest	238	59.5	59.5	59.5
Ticket Reservation	162	40.5	40.5	100.0
Total	400	100.0	100.0	

The majority of respondents were not interested to reservation via mobile internet service (59.5%) and the rest of them (40.5%) were interested in this service.

4.3 The Analysis of the Current Thailand Mobile Internet Services Market

Situations

(16) Total Number of Respondents Classified by Satisfaction on Thailand Mobile Internet Service.

Table 4.16. Total Number of Respondents Classified by Satisfaction on Thailand Mobile Internet Service.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	63	15.8	15.8	15.8
Strongly Dissatisfied	28	7.0	7.0	22.8
Dissatisfied	89	22.3	22.3	45.0
Neutral	162	40.5	40.5	85.5
Satisfy	41	10.3	10.3	95.8
Strong Satisfy	17	4.3	4.3	100.0
Total	400	100.0	100.0	

The majority of respondents thought about services which provide mobile internet is fine that represents 40.5% of total response in the research. The second group feels service is poor (22.3%). The third group had no comment (15.8%) for mobile Internet service. The fourth group had a good experience with mobile internet service (10.3%) and fifth group thinks Thailand has excellent services on mobile internet (4.3%). The rest of respondents feel that quality of services provided in Thailand is unacceptable (7%), respectively.

(17) Total Number of Respondents Classified by Importance of Mobile Internet Payment System.

Table 4.17. Total Number of Respondents Classified by Important of Mobile Internet Payment System.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	71	17.8	17.8	17.8
Very Unimportant	27	6.8	6.8	24.5
Unimportant	51	12.8	12.8	37.3
Acceptable	119	29.8	29.8	67.0
Important	68	17.0	17.0	84.0
Very Important	64	16.0	16.0	100.0
Total	400	100.0	100.0	

The majority of respondents thought about Mobile Internet Payment System, which is provided by mobile internet is moderately important, customers still buy online whatever service provider has a good payment system or not that represent 29.8% of total response in the research. The second group had no comments for payment system service (17.8%). The third ranking-group thought that Mobile Internet Payment System is important (17%). The fourth-ranking

group selected payment system is very important and good quality of service will convince them to buy online via mobile internet (16%) and fifth-ranking group thought good payment system is not important (12.8%). The rest of respondents feel that they aren't concerned about good quality of payment system and still buy online (6.8%), respectively.

(18) Total Number of Respondents Classified by Satisfaction on Mobile Internet Payment System.

Table 4.18. Total Number of Respondents Classified by Satisfaction on Mobile Internet Payment System.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	71	17.8	17.8	17.8
Strongly Dissatisfied	40	10.0	10.0	27.8
Dissatisfied	105	26.3	26.3	54.0
Neutral	138	34.5	34.5	88.5
Satisfy	42	10.5	10.5	99.0
Strong Satisfy	4	1.0	1.0	100.0
Total	400	100.0	100.0	

When asked the respondents about the satisfaction of Mobile Internet Payment system that is provided in Thailand, the majority of respondents selected the service acceptable, representing 34.5% of 400 responses. Second ranking group of respondents (26.3%) selected the service is poor. The Third ranking group (17.8%) had selected no comment and the Fourth ranking group (10.5%) of respondents thought that Mobile Payment System in Thailand is good. The fifth ranking group (10%) feels that service provider in Thailand is unacceptable Mobile Internet Payment System and only 4 responses of 400 respondents selected service is excellent (1%), respectively

(19) Total Number of Respondents Classified by Secure of Mobile Internet Payment Transaction.

Table 4.19. Total Number of Respondents Classified by Important of Secure Mobile Internet Payment Transaction.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	22	5.5	5.5	5.5
Very Unimportant	28	7.0	7.0	12.5
Unimportant	35	8.8	8.8	21.3
Acceptable	57	14.3	14.3	35.5
Important	30	7.5	7.5	43.0
Very Important	228	57.0	57.0	100.0
Total	400	100.0	100.0	

When asked the respondents about the Important of secure Mobile Internet Payment Transaction, the majority of respondents selected very important, representing 57% of 400 responses. Second ranking group of respondents (14.3%) selected moderate. The Third ranking group (8.8%) had selected not important and the Fourth ranking group (7.5%) of respondents thought that Secure Online Transaction is Important. The fifth ranking group (7%) isn't concerned with secure transaction and only 5.5% of respondents selected no comment about secure payment system, respectively

(20) Total Number of Respondents Classified by product updated and pricing on Mobile Internet.

Table 4.20. Total Number of Respondents Classified by Important of product updated and pricing on Mobile Internet Shopping Service.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	40	10.0	10.0	10.0
Very Unimportant	21	5.3	5.3	15.3
Unimportant	35	8.8	8.8	24.0
Acceptable	84	21.0	21.0	45.0
Important	63	15.8	15.8	60.8
Very Important	157	39.3	39.3	100.0
Total	400	100.0	100.0	

When asked the respondents about the importance of product updated and pricing on Mobile commerce, the majority of respondents selected 39.3% of 400 responses, moderate, representing 21% of 400 responses. Third ranking group of respondents (15.8%) selected important. The fourth ranking group had no comment (10%) that represents 40 of 400 respondents and poor 8.8% of respondents thought about service that is poor updated. The rest 53% of 400 responses selected product updated and pricing on when shopping via Mobile Internet is not important represents 5.3% of 400 responses, respectively.

(21) Total Number of Respondents Classified by Satisfaction of Product and Pricing on Mobile Internet Online Shopping Service.

Table 4.21. Total Number of Respondents Classified by Satisfaction of Product and Pricing on Mobile Internet Online Shopping Service.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	40	10.0	10.0	10.0
Strongly Dissatisfied	37	9.3	9.3	19.3
Dissatisfied	89	22.3	22.3	41.5
Neutral	132	33.0	33.0	74.5
Satisfy	57	14.3	14.3	88.8
Strong Satisfy	45	11.3	11.3	100.0
Total	400	100.0	100.0	

When asked the respondents whether they are satisfied with product updated and pricing on Mobile Internet shopping service, the highest percentage of the respondents (33%) selected acceptable. The second highest percentages of the respondents (22%) selected poor for this service. The third highest percentage of the respondents (14.3%) showed that they have a good experience for the service. The fourth ranking group selected excellent (11.3%) that represents 45 of 400 respondents and 10% of respondents have no comment. Only 9.3% of the respondents were select service is poor.

(22) Total Number of Respondents Classified by Importance of Billing System.

Table 4.22. Total Number of Respondents Classified by Importance of Billing System.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	34	8.5	8.5	8.5
Very Unimportant	12	3.0	3.0	11.5
Unimportant	12	3.0	3.0	14.5
Acceptable	80	20.0	20.0	34.5
Important	49	12.3	12.3	46.8
Very Important	213	53.3	53.3	100.0
Total	400	100.0	100.0	

When asked the respondents the importance about Billing System, the highest percentages of the respondents (53.3%) selected Very Important. The second highest percentages of the respondents (20%) were neutral. The third highest percentages of the respondents (12.3%) selected important. The forth-ranking group of the respondents had no comment (8.5%). Only 3 % of the respondents were selected not important and the rest 3% selected poor, respectively

(23) Total Number of Respondents Classified by Satisfaction of Billing System.

Table 4.23. Total Number of Respondents Classified by Satisfaction of Billing System.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	35	8.8	8.8	8.8
Strongly Dissatisfied	28	7.0	7.0	15.8
Dissatisfied	74	18.5	18.5	34.3
Neutral	144	36.0	36.0	70.3
Satisfy	45	11.3	11.3	81.5
Strong Satisfy	74	18.5	18.5	100.0
Total	400	100.0	100.0	

When asked if the respondents had satisfaction about quality Mobile Internet Billing System, the highest percentages of the respondents (36%) were neutral. The second and third highest percentages of the respondents (18.5%) showed that they selected excellent and poor. The fourth-highest percentages of the respondents (11.3%) selected well. Only 7% and 8.8% of the respondents were strongly dissatisfied and no comment, respectively. This can be concluded that the majority of respondents were dissatisfied with the Mobile Internet Billing System.

(24) Total Number of Respondents Classified by Importance of Speed on Mobile Internet Service.

Table 4.24. Total Number of Respondents Classified by Importance of Speed on Mobile Internet Service.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	72	18.0	18.0	18.0
Very Unimportant	12	3.0	3.0	21.0
Unimportant	36	9.0	9.0	30.0
Acceptable	64	16.0	16.0	46.0
Important	66	16.5	16.5	62.5
Very Important	150	37.5	37.5	100.0
Total	400	100.0	100.0	

In the research, this table showed the opinion of respondents toward the significance of six factors for making decisions to select the importance of mobile Internet speed. According to the result, the majority of respondents, representing 37.5 % of 400 responses, agreed that the high speed was the important factor to select to use services on mobile Internet. Second (16.5%) and third (16%) ranking respondents thought that it was important and acceptable, respectively. Fourth ranking group (18%) had no idea for important mobile Internet speed. And the respondents who thought that the speed of mobile Internet was unimportant, representing 9% of total responses, and 3% of respondents thought that this factor was very unimportant factor for selecting to use mobile internet.

(25) Total Number of Respondents Classified by Satisfaction of Speed on Mobile Internet Service.

Table 4.25. Total Number of Respondents Classified by Satisfaction of Speed on Mobile Internet Service.

	Frequency	Percent	Valid Percent	Cumulative Percent
No comments	72	18.0	18.0	18.0
Strongly Dissatisfied	28	7.0	7.0	25.0
Dissatisfied	85	21.3	21.3	46.3
Neutral	107	26.8	26.8	73.0
Satisfy	64	16.0	16.0	89.0
Strong Satisfy	44	11.0	11.0	100.0
Total	400	100.0	100.0	

When asked if the respondents had satisfaction about Mobile Internet Speed, the highest percentages of the respondents (26.8%) were neutral. The second highest percentages of the respondents (21.3%) showed that they were dissatisfied. The third highest percentages of the respondents (16%) were satisfied. Only 11 % and 7% of the respondents were strongly satisfied and strongly dissatisfied, respectively. This can be concluded that the majority of respondents were dissatisfied with the Speed of Mobile Internet.

(26) Total Number of Respondents Classified by Time.

Table 4.26. Total Number of Respondents Classified by Time.

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 1 hr	362	90.5	90.5	90.5
1-3 hrs	28	7.0	7.0	97.5
More than 3 hrs	10	2.5	2.5	100.0
Total	400	100.0	100.0	

When asked the respondents about the time of Mobile Internet usage, the highest percentage showed less than 1 hour, representing 90.5% of total responses. The second highest percentage of respondents (7%) use 1-3 hours. Only 10 of 400 respondents (2.5%) use more than 3 hours. This can be concluded that most of customers were used Mobile Internet less than 1 hour a day.

(27) Total Number of Respondents Classified by Period

Table 4.27. Total Number of Respondents Classified by Period

	Frequency	Percent	Valid Percent	Cumulative Percent
6:00-10:00	29	7.3	7.3	7.3
10:00-14:00	76	19.0	19.0	26.3
14:00-18:00	42	10.5	10.5	36.8
18:00-22:00	191	47.8	47.8	84.5
22:00+	62	15.5	15.5	100.0
Total	400	100.0	100.0	

When asked the respondents about the period of time that they prefer to use mobile internet, the highest percentage thought this was the 18:00-22:00 comfortable for them to use the service, representing 47.8% of total responses. The second highest percentage of respondents (19%) thought that appropriate time for them was 10:00-14:00. The third and fourth highest percentage of respondents thought after 22:00 and 14:00-18:00, representing 15.5% and 10.5% of total responses, respectively. Only 7.3% of the respondents prefer 6:00-10:00.



V. CONCLUSIONS AND RECOMMENDATIONS

This study emphasizes to find out the opinions toward Mobile Internet from a survey of 400 respondents in Bangkok area. The purpose of this study is to know and analyze the current market situation of Mobile Internet in Thailand and explore the possibility of driving new E-Commerce on Mobile Internet. Moreover, after analysis, the researcher would like to design the successful marketing strategy.

In this research, the data from all questionnaires have been analyzed by the frequency distribution, descriptive statistics and cross tabs tabulation. The researcher uses the SPSS (the Statistical Package for Social Sciences) version 12.0 for Windows, to analyze and deliver the survey result. The survey results were presented in the forms of tables, pie charts and bar charts.

5.1 Research Summary

The result of survey showed that the number of respondents who completed the questionnaire were 200 female and 200 male. The majority of respondents were in the age ranges of 26-35 years. Most respondents had education level of Bachelor's Degree and the monthly income was between Baht 10,000-20,000.

Regarding the research, the research emphasized on 3 information classifications as follows:

(1) The Current Market Situation and Consumer Behaviors of Mobile Internet

Majority of respondents never used Mobile Internet. But the factor that they are concerned on Mobile Internet service is "Fast Speed" or less time to wait. However, it was also found that most of the respondents felt neutral and dissatisfied by means of the quality of Mobile Internet in Thailand, respectively.

The result of analysis found that most respondents had currently been paid for Download Ring tone and Download Wallpaper more than other service that is currently provided on Thailand Mobile Internet, respectively. In case of usage time, most respondents use that less than 1 hour/day mostly on 18:00-22:00 is the appropriate time for use of service on Mobile Internet. In case of price and speed satisfaction, most respondents had currently been satisfied. However, when asked about the Mobile Payment system, the survey found that most respondents thought that it currently dissatisfy, respectively.

From the survey on the reasons to respondent selected no comments, most of the respondents said that they don't have mobile which has capability to access through Mobile Internet and they can not evaluate the Mobile Internet before. In addition, the researcher could conclude that Mobile Internet is not famous in Thailand.

(2) The Significance of Mobile Internet in Customer's Opinions.

From the survey on the significance of Thailand Mobile Internet system, it was found that most of the respondents said they "Never use Mobile Internet" are the most important because we still have many customers for Mobile Internet Business. Next important was customer thought that, currently Mobile Internet usage price is high and also concerned with security features that protected customer information and they thought transaction information was "Very Important", respectively.

In case of the willingness to use Mobile Internet Service and the suitable price of product on Mobile Internet shopping service, most of the respondents thought that they would like to use this service if the price is

appropriate or less than the actual market price. In part of shopping feature, the survey found that it does not much affect to make a decision to use the Mobile Internet Shopping service is security issue.

- (3) The possibility of establishing new e-commerce with Mobile-Internet in Thailand.

From the survey on the service type that they were interested with Mobile Internet, the majority of respondents were interested in "Download ring tone and wallpaper" which is supported by the secure transaction and personal information with fast speed of Mobile Internet service.

5.2 Recommendations

At present, the Mobile Internet Commerce business is not highly competitive, especially in Thailand market. Most of the providers began to find a suitable system to serve their customer with the lower price and higher quality of service.

Due to low competition, companies who are interested on Mobile Internet should differentiate the unique selling of services to serve the hidden needs of consumers in the right way. In the research result, most of the respondents were not satisfied with the quality and speed of Mobile Internet, so the Mobile Internet Commerce could improve the quality and get rid of the weakness of the traditional Internet System. Moreover, top five services of Mobile Internet Service, that consisted of "Download Ringtone and wallpaper", "Mobile E-mail service", "Ticket Reservation", "Mobile E-banking" and "Mobile news report" were the things that Mobile Internet Commerce company should emphasize to do the marketing activities. Moreover, "Mobile Internet air time package" concept should be planned in the marketing plan to create the unique service of mobile Internet with appropriate prices to customer, because this service could fill up the completeness of Mobile Internet service and also differentiate with other competitors.

In the consumer's opinions, price is normally one of the most critical factors that directly influence the consumers in decision making to select to use services on Mobile Internet services. Moreover, the survey found that the consumers would be sensitive to the low price. Therefore, at the beginning, the promotion price at the suggestion period, 18:00-22:00, should be set up to attract the potential consumers to try to use this Mobile Internet service. Moreover, it should emphasize "Mobile Internet air time package" concept to differentiate with nearby competitors. This additional service will be the unique options for target consumers by not charging price when download failed in any situation.

In the part of the Mobile Internet Payment, the survey found that the "Security" was the high ranking importance for the consumers to select the services of Mobile Internet. Therefore, company should select firstly the high quality of security service, such as; payment transaction encryption, customer secure logon, secures customer information on wireless network, because these areas are the key areas to convince customer to trust when doing activities on Mobile Internet.

At the beginning period, the attractive promotion campaign and security would be the key successful factors to create the customer's need and induce customer to try this service. The Mobile Internet should be designed to communicate this concept, especially the word "Fast", "Secure" and "Low Price" should be easy to communicate to the target customers. From the research result, it also found that the speed of waiting time was one of the key factors, so company should guarantee the speed satisfaction campaign that the customers would not wait more than 3 minutes after took the activities. If the customers do not receive the information or service within 3 minutes, the reward or compensation will be given to them.



APPENDIX A
QUESTIONNAIR (THAI)

tantii nmialcdifriJum5fil5^{na}-antriflat% cViidaa1nl199J3a15 Mobile Internet Pi^{will}ImfIrialatia

iqfp_15 V1411alf154111TttilUird5M1³¹¹JAq6111.1f1T111 L^{ldird}1111111110T1115ititilfiSVMMLYili^{fi} N^{fi}li15ⁿ
T011rilld OlflaM¹¹⁴⁰leviillhrfiRinaintaau^{franil}l^{li}qacti^{ct}114LADN^{fi}li510951.:(11,1fi151110IMM151
LADIJMID1Insti^{fi}li14aaja^{hrihni}n^grualyim.

1. Mi

☐ 9f1t1 0 116211

2. am

o 15-25 7.1 o 26-35 o 36-45 o 45 414¹¹

3. 11141^{Ti}1

☐ oilfi^{ill}EtJNIAI o sifitutt^{rmi} o 1.13419lavi

4. ¹⁰14oiataalt

o 10,000 —20,000 cilivi o 20,000-30,000 o 30,000 invgulii

5. vinamfu^{int}5 Internet einninlilailaTalyinni1a1,11

☐ Iflel o IlikfiO

filaudoictlif t&fliamti10⁶inhrrutmtfciirivintta014iimaa11111u3n15 Mobile Internet ^{inla}Tanii

erdh, 51fi111101113fi15 665av 1j5[;]Fiilfi1111101fi151131111^{il} 001,15 41JUI.111fi15111ItInall4

11141trua45 lcuafⁿ⁹Jffifit1civ11 nisni³¹ 66fi,t5Z4111101falliimal9ilvi1n414iVicu6i61a2A1fi1ij Iflftt:

1 = ihnimiluehiffeou^{ficio}

5 = rmiimanivhfiquiniiqo ih2,41.111041111.111dIgmniiqo

tininfilit15g,-navviaufiltranfu matifiSmSoffiriiD1 o bi9ISvc1¹⁴²;0Dff1T11JFw11,111-1

6. vindinⁿ⁹JrrulOw11514Vin15 Mobile Internet ei^{rumiliidailnly}mlfl (tSaa1hinail 1 lia)

o Download Ring tone, Wallpaper o 510111,11i^{T1} O laRcuflittanrini5/9115n1u

o qsa/Inoill o ci15fi15Y111T111fi15 (eti^{tila}aut110

o '04 E-mail o Download Game o I5n15lasnIo5d-ann

o til TV ☐ 51n1uNavalniituni55r11a

7. nd^{niqu}5-111 TiniVallvialOun151*Llifn5 Mobile Internet eimnilriatlaTaoint

E1 9)

flfl 1 1 51-1

□ 1,61-1

gfl

14. nItuiiltvinaluTalvini 6fiEntivn15v3t_{nu}1lmu9i Mobile Internetivi151,1141110

.....

.....

.....

.....

.....

TDLJO1111511t1a1=**M 1 1** ^A11D111f151101A1t1111

BILIOGRAPHY

1. Andersson, Christoffer, GPRS and 3G Wireless Applications, John Wiley & Sons, 2001.
2. Barnett, Nick, Stephen Hodges, and Michael J. Wilshire, "An Operator's Manual," The McKinsey Quarterly, Number 3, pp. 163-173, 2000.
3. Bergman, Eric, and Robert Haitani, "Designing the Palm Pilot: A Conversation with Rob Haitani," Chapter 4, in Information Appliances and Beyond, edited by Eric Bergman, Morgan Kaufman Publishers, 2000.
4. Berners-Lee, T., J. Hendler, and O. Lassila, "The Semantic Web," Scientific American, May 2001.
5. Bughin, Jacques R., Fredrik Lind, Per Stenius, and Michael J. Wilshire, "Mobile Portals Mobilize for Scale," The McKenzie Quarterly, Number 2, pp. 118-127, 2001.
6. Burke, R., "The Wasabi Personal Shopper: A Case-Based Recommender System," in Proceedings of the 16th National Conference on Artificial Intelligence (AAAI-99), American Association for Artificial Intelligence, 1999.
7. Christensen, Erik, Francisco Curbera, Greg Meredith, and Sanjiva Weerawarana, "Web Services Description Language (WSDL) 1.1."
8. Cunningham, P., R. Bergmann, S. Schmitt, R. Traphoner, S. Breen and B. Smyth, "WEBSELL: Intelligent Sales Assistants for the World Wide Web," Thnity College Technical Report TCD-CS-2000-42, Thnity College, Ireland, November 2000.
9. The DAML Services Coalition, "DAML-S: Semantic Markup for Web Services," DAML-S (www.daml.org), July 2001.
11. Daum, Adam, "Selling m-Commerce in Europe: No Killer Application Just Killer Attitude," Gartner report, March 2001.

12. Devine Alice, and Sanna Holmqvist, "Mobile Internet Content Providers and Their Business Models—What Can Sweden Learn from the Japanese Experience?" Master Dissertation, Department of Industrial Engineering and Management, The Royal Institute of Technology, Stockholm, Sweden, 2001.
13. Durlacher Research, Mobile Commerce Report, November 1999. Can be downloaded at www.durlacher.com/fr-research.htm.
14. European Information Technology Observatory, "Mobile e-Commerce: Market Perspectives," pp. 256-281, EITO 2001, 2001.
15. Fridrnan, Jonas, "Billing in Change, a Peek into Billing in 3G Environments," www.edge.com, June 2001.

Website Reference

1. Nokia Web Site: www.nokia.com
2. Motorolar Web Site: www.motololar.com
3. Sony Ericsson Web Site: www.sonyericsson.com
4. M-Commerce Times Web Site: www.mcommercetimes.com
5. ThinkMobile Web Site: www.thinkmobile.com
6. WirelessWeek Web Site: www.wirelessweek.com

