A TARGETED MOBILE ADVERTISEMENT USING WI-FI TECHNOLOGY FOR SHOPPERS USING MOBILE DEVICES

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ABSTRACT

The emergence of wireless and mobile networks has made possible the introduction of electronic commerce to a new application and research subject: mobile commerce. This paper will be mainly focused for the shoppers who likes to shop and looking for an easy way to shop plus save their time and also money. This proposed system is suitable for users who have mobile devices such as Pocket PC, Smart phones and Laptops enabled with Wi-Fi technology integrated with Wireless Local Area Network (WLAN). When a shopper enters any shopping complex they can review the list of latest promotion that is going on in that particular shopping complex that they have entered through the Pocket PC. This would help them to compare the price and also saves their time in shopping at unnecessary shop. This message will be sent through the Wi-Fi communication technology, where the shoppers who are around 100 meters near to the server (Transmitter). After the mobile device users has login into the system, the server would send the appropriate promotion message and products information depends past shopping history of that particular customer. This message would be free and will benefit even the shopkeepers. This proposed system would be helpful to the shoppers and also the shopkeepers. The shoppers can easily compare the prices for each shop and shop at the right place. This would save their time and also money. Shopkeepers also can promote their products to the shoppers.

KEYWORDS

Mobile Commerce,Wi-Fi, Wireless Local Area Network.

1.   INTRODUCTION

Mobile commerce is easiest and fastest way to do business. It involves mobile operators, remote service providers, commercial companies and financial institutions to engage in new way of business that hasn't existed before. It's computing and communicating on the move. M-Commerce opens new evolutionary era in global business and provides mobile solution for all engaged parties. In mobile business there will be no need for international custom regulations that vary country by country, therefore it will be business without borders. Business collaboration and new marketing opportunities in the consumer business segment have developed, met with widespread popularity and established a firm place for themselves. The gigantic growth rates for mobile commerce business prove this.

By keeping track of user's purchasing habits and current location, a very targeted advertising campaign can be performed. Mobile device users are informed about various on-going promotions in the shopping complex. Messages can be sent to all mobile shoppers who are currently in a certain area in shopping complex or to certain users in all locations(Gopal, R. et al, 2001). Depending on interests and personality types of individual users, advertisers could decide whether a "push" or "pull" form of advertising is more suitable. As more wireless bandwidth becomes available, content-rich advertising can be produced for individual users with specific needs, interests, and inclinations (Varshney and Vetter

2002). It has been demonstrated in several trials that mobile users are willing to receive advertising messages with incentives.

2.   STUDY ON THE SHOPPING TRENDS IN MALAYSIA

In order to identify the shopping trend of Malaysians, a survey is conducted with ten close end questions to be answered. In the survey that was conducted for 4 days, there were total of 50 respondents were involved in the survey. Twenty respondents answered took the survey through online. Shoppers came to the shopping malls such as MidValley, Sungai Wang, Low Yat Plaza and Time Square were the remaining respondents of our survey. The results of the survey cover the shopping trends in Malaysia, problems in shopping and solution to these problems. Now each question is reviewed for a better understanding.

Question 1 : Do you like to shop in big shopping complexes such as Midvalley, Times Square, Sunway Pyramid or any other famous shopping complexes around Malaysia?
Result : Almost 98 % of the respondent loves to shop from the big shopping complexes from survey that was conducted.

Question 2: What is the reasons do you like to shop in big shopping complex?
Result : From the survey that was conducted, the highest reason for them to shop is Variety of products is available with 66 % selected this then followed by answer saves shopping time then followed with the answer the product is cheaper and others.
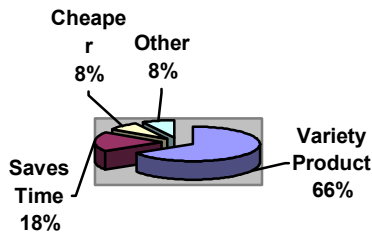

Figure 1: Pie-chart for the result of Question2

Question 3: How many times do you shop in one month?
Result : Out of 50 respondent who have answered this question, 20 of them shops 2 to 5 times in month where else 19 respondents are not sure how many times they do shopping. 10 respondents or about 20 % goes shopping once only in one month.
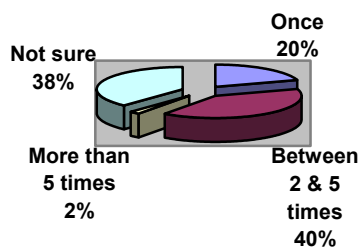

Figure 3: Pie-chart for the result of Question3

Question 4: . Have you encountered any problems when are you shopping?
Result : For this question, the answer is balance where 27 respondents or 52 % of them do face problems during the shopping time and 25 of them don't face any kind of problems. There are still problems that are faced by the customers when they do shopping. These problems can be caused because of external or internal problems in the shopping complex. From here we can see that even though majority of the respondents love to shop but they still some problems when they do shopping.

Question 5: What are the problems that you have encountered?
Result : For this question, 13 answers were for Difficult to identify promotion was selected as the highest answer followed by other problems and next is Lack of information's about the shops and Couldn't recognize the shops.
The conclusion for this question is that most of the shoppers face three major problems during the shopping period which are:
-   *Difficult to identify promotion*
This would be because of the shops promotion is not so clear or the customers are lazy to find out the promotions in each shop.
-   *Lack of information's about the shop*s
The information can be about the shops such as the name of the shop, the items or services that is provided by the shops.
-   *Couldn't recognize the shops*
This problem is usually faced by the customers when they can't read the manual map that is prepared at each floor for them.

Question 6: Would you prefer to receive a text message regarding the shop that you visit through your Pocket PC or Smart Phone or LapTop?

Result: When this question was raised out to the respondents, 69 % or 35 respondents would like to receive a free text message through their Pocket PC or Smart Phone. This shows that the system that is going to be designed by the author would get a good response since the system does have a service where the Pocket PC or Smart Phone users would receive the text message when they past by the shop.

From this questions responds, the author can be glad that the response from the respondent is positive since the system is going to be created at later stage of the project.
Question 7: Would you buy a pocket PC or Smart Phone if there is a free service available where you can receive free text message about the shops that you visit in a shopping complex when ever you enter the shop?

Result: The response for this question is not really satisfying. This is because only 42% out of 50 respondents would like to buy a Pocket PC or Smart phone. Even though the shopping complex provides a free mobile advertisement service, majority of the respondents do not want to buy the Pocket PC or Smart Phone. But we are confident that the project can be successful in years to come. There are few reasons why the respondents would not by the Pocket PC because:
- The price of Pocket PC or Smart phone is very high.
- The respondents are not familiar with the Pocket PC or Smart phone functions and features.
- Some of them are not aware or knows what is Pocket PC or Smart Phone.
- The size of the Pocket PC which is bigger than smart phone or any other mobile phone.

3.   WI-FI TECHNOLOGY

Wi-Fi or better known as Wireless Fedility is a wireless way of handling the network access such browsing the Internet, sharing files and printing documents. Wi-Fi is also known as 802.11 networking and wireless networking. Wi-Fi high energy to offer 100 meters transmission compared to Bluetooth or any other wireless technology. Wi-Fi is not a completely cable-free solution the wireless access points still need to be

connected through a physical cable to the main network. The data that is transmitted using Wi-Fi can go up to 11 Mps depending on the connection speed. The Wi-Fi currently is popular among the Internet users since the Wi-Fi technology has built-in features in the notebooks, PDA, Smart Phone and Pocket PC. (The Future Of Wi-Fi , 2006)

3.1   Advantages of Wi-Fi

3.1.1   *Freedom of movement.*

The Wi-Fi users are free to move around in the range of Wi-Fi area as long they have they are connected to the network, the network access can be through PDA, Pocket PC and Mobile Phone.

3.1.2   *Strong Security*

The designers that have invented the Wi-Fi technology have included some powerful security features together with the Wi-Fi such as Wi-Fi Protected Access which is an encryption technique, Media Access Control Filtering which would reject un-authorized MAC address and Virtual Private Network.

3.1.3   *Wi-Fi products are widely available*

Nowadays there are a lot of products available in the market which is easy to get and getting cheaper day by day. Examples of products that have integrated Wi-Fi technology together are "Digital Camera, Smart Phone, Notebook, Video Game Consoles and Hand Handled devices such as Pocket PC and PDA.

3.1.4   *A global set of standard*

The owner of Wi-Fi products all over the world uses the same standard in terms of Frequency of the band, Maximum data rate and the range for data transmission. Therefore who ever owns a product integrated with Wi-Fi technology still can use it in oversea.

3.1.5   *Simplicity*

The users can connect computers or any other integrated Wi-Fi products anywhere such as at home or office without the need for wires. These devices can be connected to the network using radio signals, and computers can be up to 100 meters.

3.2   Technology of Wi-Fi

The future of Wi-Fi technology is more concern on the security and the performances for the Wi-Fi integrated technology products. Many IT manufactures such as Microsoft, Intel and HP have been focusing on the security for Wi-Fi technology since there have been more threats and attack on the Wi-Fi based technology.

3.2.1   *Round-Trip Timing*

Intel has made a research and demonstrated on the access point times how long a packet takes to travel out to the client system and come back. This would "keep neighbors or passers-by from intruding on a home or enterprise network where it might be more effective than current encryption systems.

3.2.2   Power Consumption Reduction

Intel has also demonstrated on 16th March 2006 in the Fall Intel Developer Forum in San Francisco that the new 100-MHz CMOS which is a complementary metal-oxide semiconductor can turn the CPU power level up and down more quickly than the regulator semiconductors. Through this, the "notebook power reduces by 15 percent to 30 percent without affecting performance".

3.2.3   Speed up transmission

The transmission speed would increase above 54 Mps in coming next three years. Currently the highest transmission speed in 54 Mps which are 802.11a and 802.11g IEEE standard for Wi-Fi. There is a need to increase the speed in future because nowadays most of the users are utilizing the Internet speed by downloading, searching and transmitting some data through out the Internet at the same time. Therefore it would be possibility where the 54 Mps speed for Wi-Fi would not be enough for the users especially students and businessman. This would be the future technology for the coming notebooks that is going to invented using the mobile technology based processor (Wireless Networks and Wi-Fi Technology,2006)

4.   RECOMMENDATIONS AND SOLUTIONS

After analyzing the advertisement methods that have been implemented by the shops and major companies, some problems are identified with the promotion method. The problem that was identified would affect the sales of the shops in future. Looking into these problems the author has recommended some solutions to solve the problems that are faced by the companies and shops.

4.1   Recommendations

4.1.1   Provide a better service to the customers

Our main concern would be providing the best service for the customers that visit the shopping complex where it would ease the shopping style of the consumers where it would save their time and money. Therefore we suggest to develop and implement a smart wireless shopping application using Wi-Fi technology using Pocket PC or Smart Phone or Lap tops.

4.1.2   Implementation of a wireless system

The shopping complex management can use the wireless system to promote the products and promotion in each shop in the shopping complex. The shopping complex management can earn extra income and help to promote the products in each shop in that particular shopping complex. Furthermore the shop keepers can send the promotions and advertisements targeting the potential shoppers after checking past purchasing history. So customers will feel more convenient when shopping this kind of shopping complex.

4.1.3   Help consumers to compare prices

Throughout this wireless shopping system, the consumers can easily compare the promotions that are going on in each floor of the shopping complex. The consumers would receive a text message in their Pocket PC or Smart Phone or Lap Tops related to their interest about the promotion going on in the shopping complex.

4.1.4   Update the information faster

The shop owners can use this system to update their product and shop information's. This would just take few minutes by using the computer in their shop where it would help the shop owners to boost their sales.

4.1.6   Use the Pocket PC or Smart phone or Laptop as an information tools

The shoppers just need to hold their Pocket PC or Laptops or Smart phone with them and just stand at the elevator of each floor where the transmitter is placed and they would receive a text message informing them the latest promotions and service in that particular floor.

4.1.7   Ease the shopping process

The proposed system would ease the shopping time for the shoppers and furthermore save their money on buying the right items at right place. Furthermore it would save the promotion cost for the shop keepers where they only need to pay some monthly fees to the management to help them to promote the product using wireless system.
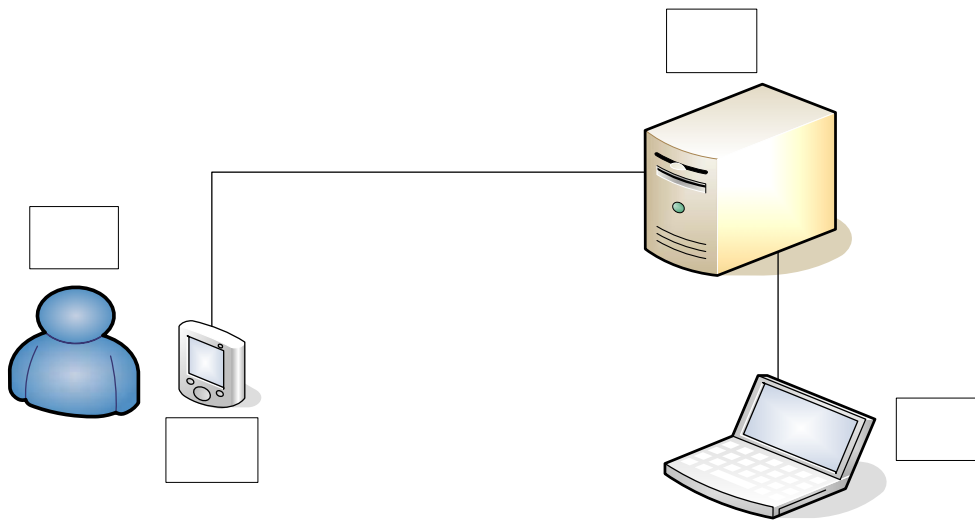
1 = Shopper, 2 = Server, 3 = Laptop and 4 = Pocket PC or Smart Phone

Figure 3: The overview of the proposed system to solve the advertisement problems in a shopping complex environment.

i.   It is one way communication where the shoppers would use the laptop that is placed in their shop to update the promotions and information about the shop.

ii. Next the data would be sent to the server to be stored. This server would be managed by the shopping complex management.

iii. Third once the server detected a Pocket PC or Smart phone or Laptop around the 100 meters radius, the server would respond by sending the relevant information about the shops in that particular floor after checking the purchasing history of the shopper to the Pocket PC or Smart phone.

iv. Once the text message is received through the Pocket PC or Smart phone, the shopper can make decision for their shopping.

212

4

5. WORKING MODEL OF THE PROPOSED SYSTEM

Shop Keeper 1   Shop Keeper 2
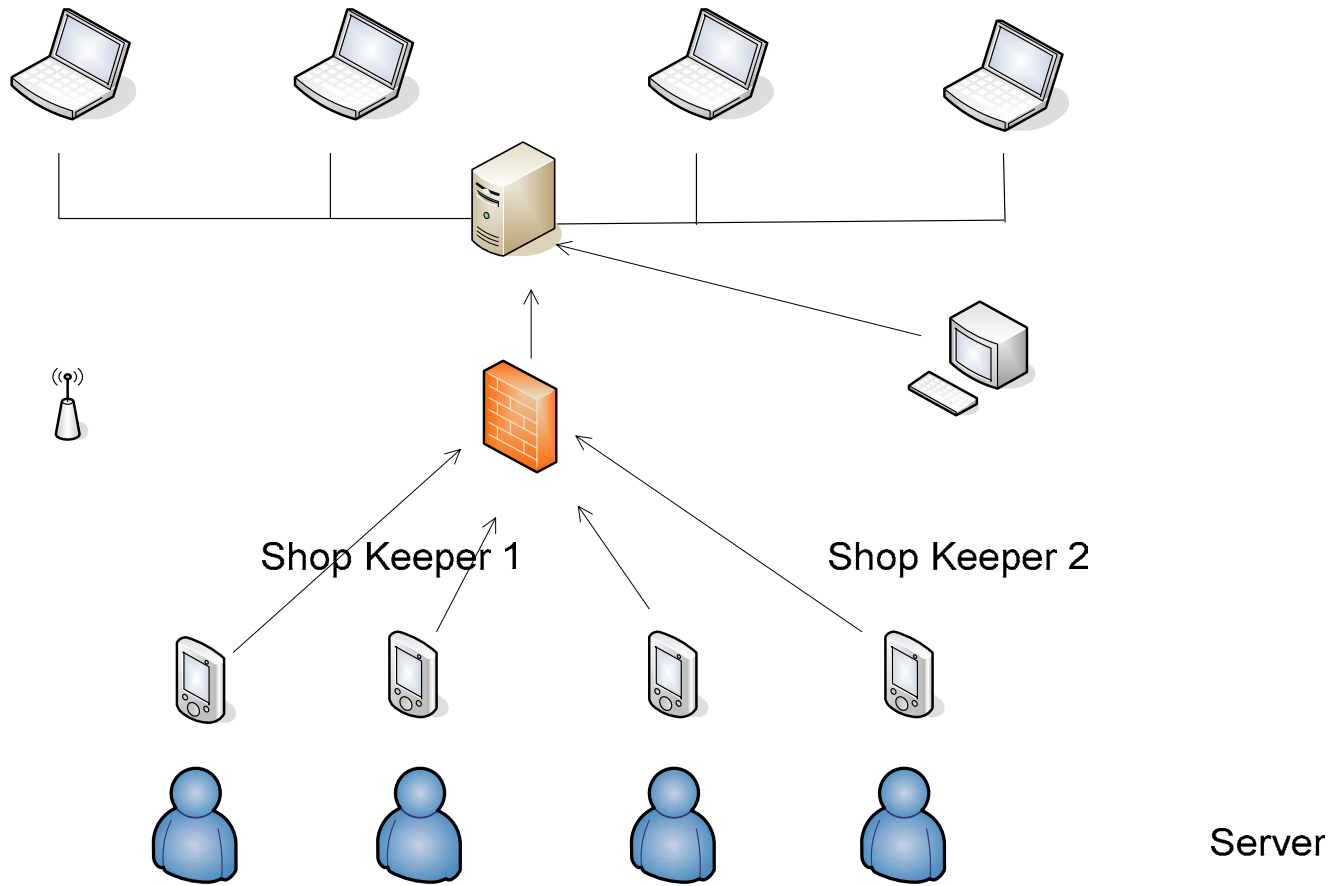
Server

Access Point

Firewall

Figure 4: Working Model of the Targeted Mobile Advertisement System

From the diagram above, it is a simple illustration on how this shopping application would be operating in a shopping complex. In this network environment, there would be a server. The shop keepers would be updating the promotion news and also sending feedback to the server. The management would be maintaining the server and monitoring the process and also the promotion informations. The shoppers would be using the Pocket PC or Smart phones to retrieve shopping information through the network. The wireless network environment is created using the access point where each of the devices in the network environment such as Pocket PC, Smart phone, Server, and Laptops would be connected by passing through the access point.

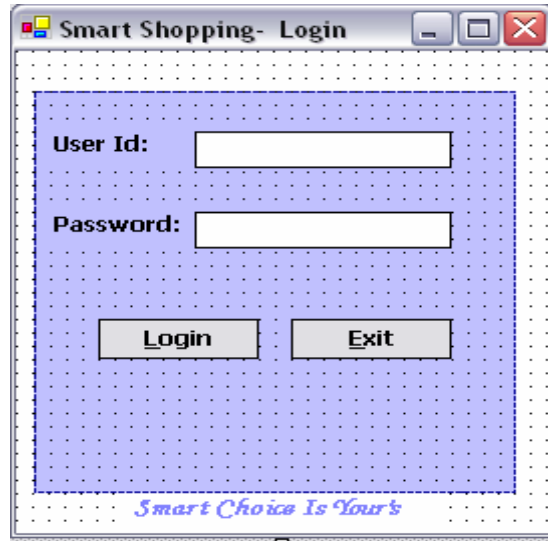## 6. PROTOTYPE OF TARGETED MOBILE ADVERTISEMENT SYSTEM

Figure 5 : Login Page

The shoppers need to login into the system according to the valid username and password that was given by the Shopping Complex Management in order for them to receive promotion information in their Pocket PC.
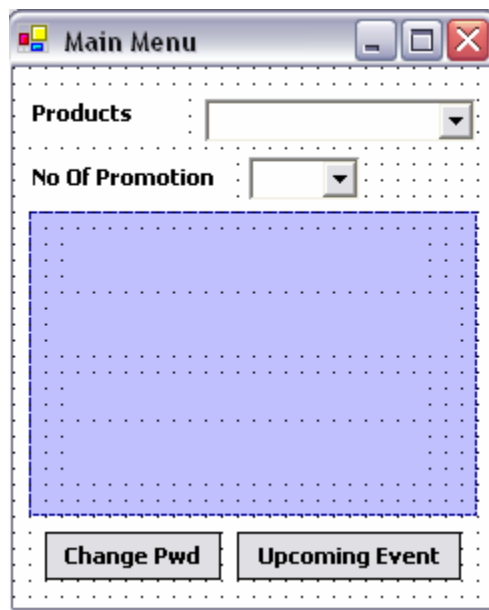

Figure 6: Advertisement Display Page

The promotion news would be displayed on the above screen once the users have successfully login. Furthermore the shopper can change their password any time.

7.   FURTHER WORK

Further work is needed for the development of the system because the Information Technology (IT) keeps on changing especially the technologies such as softwares and hardwares. System should be enchanced with attractive multimedia elements in the client side. Multimedia elements will capture more shoppers to read the mobile advertisements and persuade their mind. Network security also should be enhanced because the wireless network are more vulnerable for hacking. Currently the system supporting the Windows XP professional Operating System. So further work is required to change the system to support various operating system such as Linux and Macintosh.

8.   CONCLUSION

In this paper, based on the targeted mobile advertisement concept the system is successfully developed. The system is still capable to serve the current trends of Wi-Fi standards and needs for the growing mobile business. Since we believe that wireless devices such as Pocket PC, Smart Phone and Laptops will be more ubiquitous in the coming days, this proposed targeted mobile advertisement system would be useful for all shopping complexes.

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