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Utilizing Mobile Phones for Payment

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ABSTRACT

This study introduces a sound-based mobile payment system. Using a mobile phone for payment for mobile commerce is essential for its success. The proposed system will use sound that is generated from the existing mobile phone and the sound can be recognized by the existing credit card reader of the shop with an installation of an ordinary microphone and simple software to process sound input. This system is a better system since it doesn't require customers to buy a new mobile phone and the cost for the microphone and the software is very low.

INTRODUCTION

This article explains a sound-based mobile payment system. Electronic commerce has expanded into commerce with mobile devices, which is called mobile commerce. However in order to implement a truly mobile commerce in the physical world, i.e. purchasing products at a physical shop using a mobile phone, there should be infrastructure elements which can facilitate mobile commerce. In this paper, after presenting the existing mobile phone-based system, a new system that is based on sound of a mobile phone will be discussed as the better solution to promote mobile commerce. There are studies showing the fact that the information technology infrastructure for electronic commerce is a key factor for the success of electronic commerce (Weil & Vitale, 2001; Weil & Broadbent, 1998). For example, high-speed Internet service available for most of the nation's population is a critical success factor for the rapid rise of electronic commerce in South Korea. South Korea has more than 90% of mobile phone ownership which provides fertile ground for the growth of electronic commerce as well as mobile commerce. Korea has been recognized worldwide as one of a few nations with highly developed information technology and Internet infrastructure. As for the high-speed Internet usage rate, Korea is reported as the number one country in the world. More than 10 million users

subscribe to high-speed Internet services via such means as ADSL, VDSL, community LAN, and satellite. When taking the total number of Korean population into consideration, the high-speed Internet subscription rate in Korea is roughly 21% according to the Korean government ministry news (Ministry of Information and Communications, 204). This is a remarkably high usage rate when compared to those of other OECD countries since the average rate of high-speed Internet subscription in OECD countries is just 1.26% (Samsung Economic Research Institute, 2004). For many consumers in Korea, the Internet is just a part of their normal daily life. With the high-speed Internet available at very cheap price for almost all households, many electronic commerce firms flourish. Nowadays companies are selling contents that are downloadable through a mobile phone with a fee, which also has become a highly successful venture. But one of the essential elements of the infrastructure for supporting e-commerce and m-commerce is the payment system, which will be discussed in the next chapter.

MOBILE PHONE-BASED PAYMENT SYSTEM FOR E-COMMERCE

Besides the information technology infrastructure for e-commerce, another key success factor is a viable payment system for electronic commerce. Credit card payment system on the web is widely available and regarded critical for electronic commerce success. However in Korea where credit card usage in general is not as high as countries such as USA, researchers developed many alternative ways to implement a viable payment system. The most successful payment method for web-based electronic commerce is a mobile-phone based one (Mobilierz, 2004). Customers can type in their mobile phone numbers in a web site which will send the information to the mobile phone company for authorization. When authorization is successful, the customer can purchase products on the web and will take care of the payment through a mobile telephone company's bill which will include records of the customer's purchases on the web. This method was very successful in terms of facilitating more participation on web-based electronic commerce especially for people who do not wish to use credit cards for purchase transactions. With the advent of high mobile phone usage and penetration rate, South Korean firms noticed that migrating from fixed location-based electronic commerce to mobile device-based mobile commerce would happen. The mobile phones that are common in South Korea are highly-advanced ones which have capabilities such as web browsing, high-resolution graphics as well as top-quality sound generation leading to high-quality music listening device. People in South Korea can now make purchases on their mobile phone to buy products on the web and download a movie from the Internet and watch from their mobile phones as well as downloading and listening music from mobile phones. But this infrastructure is not enough for facilitating truly mobile commerce. Truly mobile commerce means that the commerce can be processed through the mobile device including the payment in the physical world. In other words, people should be able to make a purchase using a mobile device in a physical shop, not just in the web space. In the web space, as mentioned before, mobile phone-based system which only utilizes software aspect was widely used. However for the physical world-based mobile commerce, this kind of method is useless. Thus researchers at SK Telecom Corporation developed a new mobile phone as a payment device (Moneta, 2004). This product is called Moneta which refers to a mobile phone with a chip that will generate a unique electronic signal from the mobile phone. This signal represents the customer's purchase identification such as a credit card number. And the shop-keepers need to install a new device to accept the signal from Moneta mobile phone.

Although SK Telecom Corporation pushed this method strongly and installed the reading device for many shops, the usage of Moneta mobile phone for purchase transaction has never been improved. The biggest reason for the failure of Moneta as a payment method infrastructure for mobile commerce is the fact that people have to buy a new mobile phone in order just to be able to use it for physical mobile transaction at a shop. This is a great barrier since the average price of high-end mobile phone using Moneta is quite high. People do not want to abandon the existing mobile phone which was not cheap either to a more expensive Moneta phone just for the purpose of obtaining mobile commerce transaction capability.

SOUND-BASED MOBILE PHONE-BASED PAYMENT SYSTEM

Here a new system for physical mobile commerce is introduced. A South Korean firm called Telme Commerce Corporation and the Information System laboratory of Hanyang University developed the sound-based mobile payment system. This system is called Mobile Bell-Card Solution. This solution uses sound-wave for data communication, rather than electronic signal which is used by the existing mobile payment solution, Moneta. The Mobile Bell-Card Solution will use sound that is generated from the existing mobile phone and the sound can be recognized by the existing credit card reader of the shop with an installation of an ordinary microphone and simple software to process sound input. This system is made possible by utilizing the fact that each individual's identification information can be uniquely defined as a sound and the existing card reader with a microphone can receive the sound signal and the signal will be processed by the Point-of-Sale terminal that is used for card-reading, and processed information will be sent to the credit card company's main computer for authorization. Figure 1 shows how a customer obtains his/her unique bell card. Figure 2 shows how a customer uses the sound-based mobile phone to complete a purchase transaction.

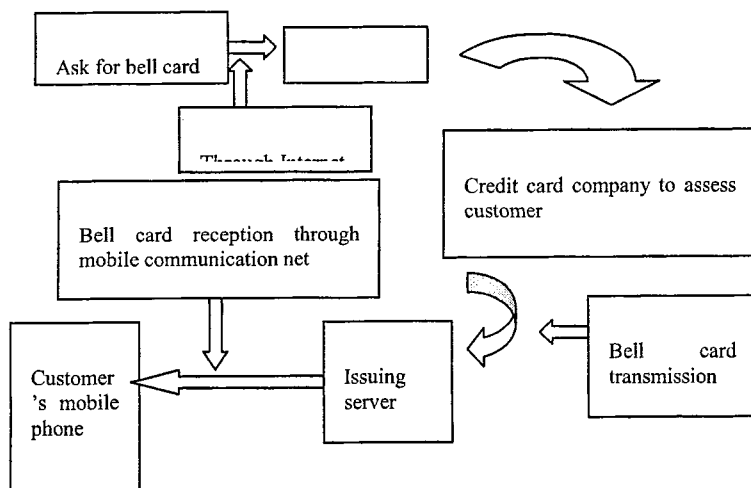


Figure 1 Obtaining a bell card

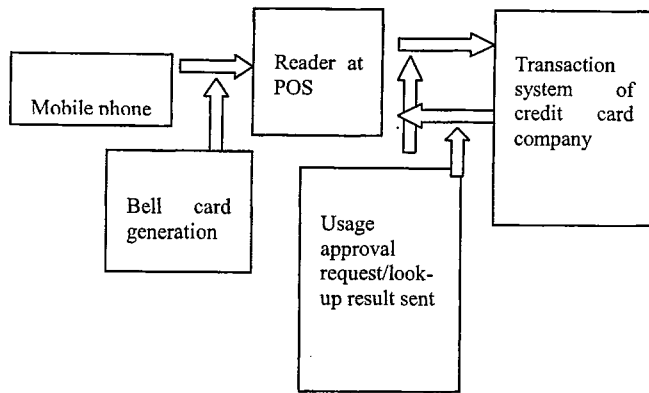


Figure 2 Use of a bell card

In addition to the application of a bell card for processing at a POS counter, there is another application which is currently used popularly. For many concert goers it can be a hassle to purchase the ticket in advance and submit it later to the attendant. With sound-based mobile data management system, these tickets can be completely eliminated. In other words, one can go to a concert web page where one can purchase the ticket with any kind of payment method including the mobile phone, and a sound that uniquely identifies one's ticket will be sent to the user's mobile phone. After receiving the bell card of the ticket which is a sound file in one's mobile phone, one will go to the concert and at the entrance, activate the sound generation function of the mobile phone which will be absorbed by a microphone at the entrance, and one will be allowed to be inside since the sound will be recognized by a multimedia database that contains records of sound that identifies each purchaser of the ticket. Figure 3 and 4 show this process graphically.

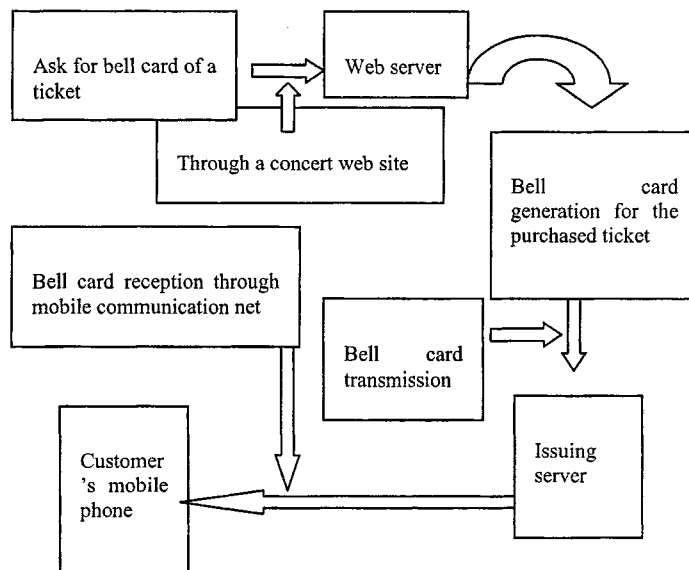


Figure 3 Obtaining a bell card from a concert web site

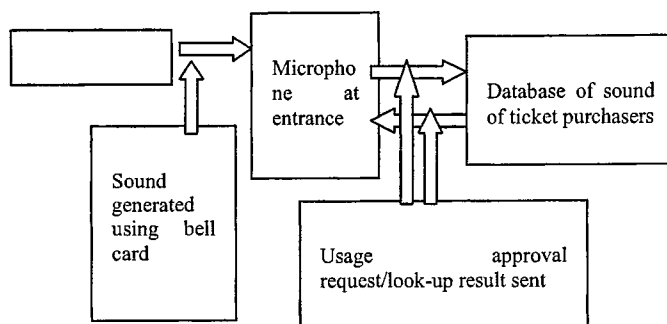


Figure 4 Use of a bell card at a concert

CONCLUSION

This system is a better system compared to competing system such as Moneta since it does not require customers to buy a new mobile phone and the shop-keeper has to spend very little for the microphone and the software both of which can be provided free of charge by the credit card company. Eventually when this sound-based payment system is prevalent, bell-card of a mobile phone which only exists in software form will replace physical credit cards. The bell-card will require a PIN number to be activated so that any stolen mobile phone can not be used for unauthorized purchase. The bell-card can also be used for driver's license, passport, etc. due to its ability to define a person's unique identity. This sound-based system is also very marketable since its can be implemented in any mobile phone regardless of its manufacturer. In terms of security, since this system uses encryption/decryption method with a complex cryptography algorithm, this system is copy-protected. At 80DB level sound, 100% of the content of the sound is recognized, which indicates no noise interference. The sound-based mobile payment system must encourage mobile commerce because of its low cost, convenience as well as security.

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