

MONETARY TRANSACTIONS IN E-COMMERCE USING SMART CARDS

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ABSTRACT

For years now, there has been a lot of excitement about using digital cash for purchases of goods and services. In fact, studies in Briton indicate that two out of every three individuals would rather carry one card for every purchase as opposed to carrying cash (9). Additionally, there is tremendous interest in using digital cash for purchases via the World Wide Web instead of other common traditional payment methods such as checks, debit cards, and credit cards. This paper investigates the use of smart cards as a form of digital cash. Specifically, issues related to functionality, security, and competition are examined. The paper concludes with a look at the application potential of smart cards for e-commerce.

Keywords: Electronic Commerce, Electronic Cash, Mondex, Visa Cash, Smart Cards, Digital Cash

INTRODUCTION

In spite of the hype surrounding digital cash, large-scale implementation success of digital cash has been disappointing. Currently, only a small amount of transactions on the World Wide Web use a form of digital cash. However, analysts predict that e-cash will continue to evolve and mature in the next 5 years, and that by 2009, electronic payments will grow to 60% of all online transactions (6). As the amount of Web-based transactions continues to increase, the need to explore monetary solutions to facilitate the ease and effectiveness of e-commerce transactions is essential.

One type of digital cash that continues to receive attention is the Smart Card. The Smart Card is a form of digital cash that looks similar to a credit card but with an integrated circuit (IC) chip build into the card. However, in contrast to a credit card, the smart card has a prepaid amount of money stored on the card and is debited for the amount of goods or services purchased. IC chip cards hold up to 80 times more information than traditional magnetic stripe cards and new advances are pushing the storage amount to 256Kbytes and above (1). The added benefits of this storage capacity range from storing multiple currencies on a single card to allowing the card to be used as an electronic key for your home or office.

In addition, for the customer's benefit, there are also privacy measures taken into account. Conceptually, smart cards allow customers to spend their money wherever they like in a semi-anonymous environment. This concept is of utmost importance considering that privacy is widely considered a major concern of conducting business via the Internet (2). Technologies such as smart cards hold the promise of "converting transaction-wary consumers into avid Web shoppers – good news for many companies' online sales revenues and overall bottom lines" (6).

Functionality

A smart card is similar to a credit card in looks, but with a completely different function. Money is stored directly on the smart card. Purchases are made by transferring money from the smart card to the merchant's system, reducing the amount of money on the smart card by the amount of the purchase.

When a consumer purchases an item with a smart card, the system transfers electronic notations, or tokens, from the card to the merchant's electronic cash register. The merchant periodically contacts the computer network connected to the bank issuing the smart card and presents the tokens for payment. The network then notifies the customer's bank to pay the appropriate sum to the merchant's bank, and the two banks make a net settlement. The banks keep a percentage of the payment as compensation for the services they and the networks have provided (Congressional Budget Office Study).

Smart cards can be disposable or reusable. Disposable cards have a predetermined monetary amount stored on the card. When the value on the card is used up, another card is purchased. Reusable cards can have value added to the card via an ATM machine, a card reader, or any number of devices designed to accept the card.

Smart cards may be single purpose cards or multi-purpose. Some vendors elect to create a smart card for use in corporate cafeteria for example. The card is only useful in that specific location and for specific purchases. Other vendors, like American Express and Visa, are adding smart card capabilities to their traditional credit cards. American Express is marketing their "Blue" card as a better alternative to their traditional credit cards. The smart card potential in the "Blue" card is seldom utilized. (This appears to be more of a marketing ploy than a practical feature of the card.)

Smart card functionality need not be in a card format at all. IC chips can be placed in almost anything. Most companies are choosing to go with a credit card size form factor because it is universally accepted. The cards are easy to produce and the IC chips fit easily in the card. We will focus on credit card size smart cards in this paper.

Security

One major security advantage of the smart card is the concept of anonymity of purchases. For instance, Digicash uses an online banking solution to move cash from an account to an individual's computer harddrive. However, once the money is downloaded to the harddrive, the bank's software has a privacy feature that prevents the bank from tracking the money. This prevents the merchant from being able to tell from whom a payment is coming (5). As a result, consumers can enjoy the anonymity of traditional cash purchases in an online environment.

However, there are down sides and risks to this type of electronic purchasing. One risk taken is risk of loss. For instance, if a credit card is lost a call to a bank to report the missing card is needed and all purchases on that card are stopped. However, if a smart card is lost, there is no way of reporting or tracking it. A smart card loss is comparable to a loss of cash to the card

holder. Likewise, computer malfunctions are another vulnerability. If there is a computer malfunction, the money stored on the system could be lost. These are basic risks one must accept when using this form of commerce. With computer malfunctions and lost cards your money isn't totally safe. As a result, customers are conservative with the amount of money they place into these accounts. When larger purchases are to be made, credit cards are generally used instead.

Another disadvantage to this form of commerce is counterfeiting. There are widespread fears that counterfeiters could create their own personal e-cash that would be indistinguishable from legal monies in electronic accounts. Similarly, if computer hackers, or other criminals, were to break into e-cash systems they could steal millions from e-cash holders.

Competition

The competition in the smart card arena is intensifying. The two primary companies involved seem to be Visa and Mondex International (Mondex International is a wholly owned subsidiary of MasterCard International). American Express and others have offerings, but it seems that Visa and Mondex are increasing their effort to capture this market. Some feel the reason for this is due to Visa and MasterCard being able to force banks into issuing their cards and not card from other companies. This issue was so strong in regards to the credit card market that the United States sued Visa and MasterCard for limiting competition (4). It appears that the smart card market may be hampered by this same problem. There are other players in the electronic payment market, but not all of them are based on smart cards.

Single use credit card numbers from many credit card companies. These single use numbers will compete with online purchases, but they will not compete with physical sales. These single use numbers can provide the security consumers feel they need for online purchases without the need to invest in a smart card. However, they will sacrifice the versatility of providing online and physical means of payment.

C2it, by Citibank, allows consumers to send and receive cash via e-mail. Consumers must link to an existing credit card or bank account to use this service. Electronic payments may be made using this system but the anonymity is removed from a transaction. This system, like the single use credit card numbers, can only be used online and not in the physical world.

Beenz.com, a web site which rewards visitors for visiting a Webpage company, is planning to work with Mondex International to integrate beenz into Mondex's smart cards. As a result, this integration would allow consumers to redeem their beenz in traditional brick-and-mortar stores (12). This union would improve consumer faith of the smart card and add flexibility in purchasing power. Other partnerships include eBay forming a strategic alliance with a company called PayPal, which allows people to make purchases through e-mail with others with PayPal accounts.

Initially, the primary focus of the smart card was on low-value transactions, such as purchasing goods in a fast-food establishment or from a vending machine (Congressional Budget Office Study). However, individuals now realize the application potential of the smart card. This card

can improve growth and ease transactions in a number of other areas of commerce in the United States and worldwide.

Smart Card technology is showing promise with consumer transactions in the area of transportation. For instance, the introduction of the New York MetroCard in 1997 has resulted in annual usage gains of over 10 percent to a previously declining transit system. (3). More than 900 new buses have been added to the fleet since the card's introduction. These results show that consumers have adapted to the flexibility of the smart card. Similarly, these results show the card has apparent success outside the retail area.

Smart Cards are also showing promise in countries with poor telecommunication infrastructures. For instance, Mondex International is helping banks in Latin America to overcome the barrier posed by poor telecommunications. Mondex is providing customers with "virtual cash" and avoiding the necessity of going to distant bank branches to access their accounts (11). The information necessary for each transaction is contained in the microchip embedded in the card, which removes the need for a telecommunication confirmation with each purchase. As a result, distance, as well as poor telecommunications, will not be as big of a stumbling block for individuals using the smart card.

The popularity of American Express shows that the chip cards work better in the online environment—where security is a major issue for consumers—because they are capable of carrying sophisticated digital certification codes (7). People are starting to feel more comfortable spending online knowing the Smart Card has built in technologies that will safe guard their money and personal information. The smart card can and should gain the confidence of consumers who are particularly concerned with security.

Finally, teenagers appear to be one of the largest online markets for smart card technology. Many teenagers do not have credit cards and are isolated from making purchases on the Web. However, smart cards would provide teenagers with a mechanism to make small purchases online without requiring a credit card. Similarly, this market population is typically more comfortable with buying online and this option gives them the flexibility to do so. The smart card may be the smart choice for a huge market population with a lot of spending power.

CONCLUSION

Although many smart card companies, such as Digicash, have gone out of business, it appears that many of these companies were created before the average consumer was ready. Many aspects of smart cards are just now catching on. Corporate internal usage of smart cards has been on the rise, but public usage is still not widely available.

Smart card trials, such as the one conducted in New York (10), will likely continue in the near future both in the United States and abroad to help bring about wide acceptance of the card. More trials and demonstrations, such as the Mondex demonstration at Comdex 2000 in Las Vegas, will surely help educate the public on the benefits of smart cards.

Although e-cash has yet to catch on with mainstream users, analysts predict that Smart Card technology will continue to evolve and mature in the next five years, and that by 2009, electronic payments will grow to 60% of all online purchases (6). ‘E-cash holds the promise of converting transaction-vary consumers into avid Web shoppers – good news for many companies’ online sales revenues and overall bottom lines (6). “A widely accepted form of e-cash would galvanize e-commerce in much the same way the credit card caused an explosion in shopping 40 years ago (8). This new spending mechanism will certainly give the consumer one more powerful option with greater flexibility and ease.

Smart cards won’t take as long as credit cards took to catch on and become mainstream, but there must be some standards set out and some large companies willing to take a risk to kick start the acceptance process. The smart cards are available; it is simply a matter of merchants taking a risk on the technology. Just think if Wal-Mart accepted Mondex cards for payment and offered a discount for using them – how long would it take to have Mondex cards in your wallet or purse along side your credit card?

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